



**INVITATION FOR BID
(IFB) #11-1106-OV
Manatee County Convention Center HVAC and Control Replacement
Palmetto, FL
(Project File #49664)**

Manatee County, a political subdivision of the State of Florida, (hereinafter the "County") will receive sealed bids from individuals, corporations, partnerships, and other legal entities organized under the laws of the State of Florida or authorized to conduct business in the State of Florida.

NON-MANDATORY INFORMATION CONFERENCE

In order to insure that all prospective bidders have sufficient information and understanding of the County's needs, an **Information Conference** will be held **February 11, 2011 at 10:00 AM**
Location: Manatee County Convention and Visitors Bureau, 1 Habem Boulevard, Palma Sola Room, Palmetto, FL 34221. Attendance is not mandatory, but is highly encouraged.

A Site Inspection shall take place immediately following the Information Conference. An Inspection of the Site is a requirement to bid on this Project.

REF: B.04 An inspection of the project site shall be acknowledged in Section 00300, Bid Form, page 00300-1.

DEADLINE FOR CLARIFICATION REQUESTS: February 18, 2011
(Reference Bid Article A.06)

TIME AND DATE DUE: March 4, 2011
Manatee County Purchasing, 1112 Manatee Avenue West, Bradenton, FL 34205

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Important Note: Lobbying is prohibited (reference Bid Article A.08)

**FOR INFORMATION CONTACT:
Olga Valcich (941) 749-3055 /olga.valcich@mymanatee.org**

AUTHORIZED FOR RELEASE: 

SECTION 00010
INFORMATION TO BIDDERS

A.01 OPENING LOCATION

These bids will be **publicly opened** at **Manatee County Purchasing, 1112 Manatee Avenue West, Suite 803, Bradenton, Florida 34205** in the presence of County officials at the time and date stated, or soon thereafter. All bidders or their representatives are invited to be present.

Any bids received after the stated time and date will not be considered. It shall be the sole responsibility of the bidder to have their bid **delivered to the Manatee County Purchasing Division** for receipt on or before the stated time and date. If a bid is sent by **U.S. Mail**, the bidder shall be responsible for its timely delivery to the Purchasing Division. Bids delayed by mail shall not be considered, shall not be opened at the public opening, and arrangements shall be made for their return at the respondent's request and expense.

A.02 SEALED & MARKED

One original and two copies of your **signed bid** shall be submitted in one **sealed package**, clearly marked on the outside **"Sealed Bid #11-1106-OV / Manatee County Convention Center / HVAC and Control Replacement, Palmetto, FL."**

Address package to: Manatee County Purchasing Division
1112 Manatee Avenue West, Suite 803
Bradenton, Florida 34205

A.03 SECURING OF DOCUMENTS

Complete individual copies of the bidding documents for the project and/or products can be obtained, free of charge, at the **Manatee County Administration Building located at: 1112 Manatee Avenue West, Suite 803, Bradenton, FL 34205; Phone No. 941-749-3014 between the hours of 8:00 AM to 4:00 PM Monday through Friday,** exception of holidays. Complete set of the bidding document must be used in preparing bids. The County assumes no responsibility for errors and misinterpretations resulting from the use of incomplete sets of bidding document.

A.04 BID DOCUMENTS

Bids on <http://www.mymanatee.org>. Bid documents and the Notices of Source Selection related to those Bids are available for download in a portable document format (.PDF) file on the Manatee County web page on the Purchasing tab under "Bids." You may view and print these files using Adobe Acrobat software. You may download a free copy of this software (Adobe) from the County's web page if you do not have it. **Manatee County collaborates with the Manatee Chamber of Commerce** on distributing solicitations using the RFP Tool web page on the Chambers website: <http://www.ManateeChamber.com> to post Bid documents in a portable document format (.PDF) file. This step is in addition to the posting on Manatee County Government web pages.

A.04 BID DOCUMENTS (Continued)

Manatee County may also use an internet service provider to distribute Bids. A link to that service, <http://www.DemandStar.com>, is provided on this website under the Tab "DemandStar". Participation in the DemandStar system is not a requirement for doing business with Manatee County.

Note: The County posts the Notice of Source Selection seven calendar days prior to the effective date of the award.

IT IS THE RESPONSIBILITY OF EACH VENDOR, PRIOR TO SUBMITTING THEIR BID, TO CONTACT THE MANATEE COUNTY PURCHASING OFFICE (see contact information on page one of this document) TO DETERMINE IF ADDENDA WERE ISSUED AND TO MAKE SUCH ADDENDA A PART OF THEIR BID .

A.05 MODIFICATION OF BID SPECIFICATIONS

If a bidder wishes to recommend changes to the bid specifications, the bidder shall furnish in writing, data and information necessary to aid the County in evaluating the request to modify the specifications. The County is not obligated to make any changes to the bid specifications. Unless an addendum is issued, the bid specifications shall remain unaltered. **Bidders must fully comply with the bid specifications, terms, and conditions.**

A.06 DEADLINE FOR CLARIFICATION REQUESTS

February 18, 2011 at 5:00 PM shall be the deadline to submit all inquiries, suggestions, or requests concerning interpretation, clarification or additional information pertaining to the Invitation for Bids to the Manatee County Purchasing Office.

This deadline has been established to maintain fair treatment for all potential bidders, while maintaining the expedited nature of the Economic Stimulus that the contracting of this work may achieve.

A.07 CLARIFICATION & ADDENDA

Each bidder shall examine all Invitation for Bids documents and shall judge all matters relating to the adequacy and accuracy of such documents. Any inquiries, suggestions or requests concerning interpretation, clarification or additional information pertaining to the Invitation for Bids shall be made through the Manatee County Purchasing Office. The County shall not be responsible for oral interpretations given by any County employee, representative, or others. The issuance of a written addendum is the only official method whereby interpretation, clarification or additional information can be given.

If any addenda are issued to this Invitation for Bid, the County will Broadcast the addenda on the Demand Star distribution system to "Planholders" on this web service, and post the documents on the Purchasing Division's web page at <http://www.mymanatee.org> which can be accessed by clicking on the "Purchasing" button and then clicking on the "Bids" button.

A.07 CLARIFICATION & ADDENDA (Continued)

It shall be the responsibility of each bidder, prior to submitting their bid, to contact Manatee County Purchasing (see contact on page 1) to determine if addenda were issued and to make such addenda a part of their bid.

A.08 LOBBYING

After the issuance of any Invitation For Bid, prospective bidders, or any agent, representative or person acting at the request of such bidder shall not contact, communicate with or discuss any matter relating in any way to the Invitation For Bid with any officer, agent or employee of Manatee County other than the Purchasing Director or as directed in the Invitation For Bid. This prohibition begins with the issuance of any Invitation For Bid, and ends upon execution of the final contract or when the invitation has been canceled. Violators of this prohibition shall be subject to sanctions as provided in the Manatee County Purchasing Code.

The County reserves the right to amend or to add to the names listed as persons to contact. All amendments or additions to the names listed as persons to contact shall be issued by the Purchasing Division, in writing.

A.09 UNBALANCED BIDDING PROHIBITED

Manatee County recognizes that large and/or complex projects will often result in a variety of methods, sources and prices; however, where in the opinion of the County such variation does not appear to be justified, given bid specifications and industry and market conditions, the bid will be presumed to be unbalanced. Examples of unbalanced bids will include:

1. Bids showing omissions, alterations of form, additions not specified or required conditional or unauthorized alternate bids.
2. Bids quoting prices that substantially deviate, either higher or lower, from those included in the bids of competitive bidders for the same line item unit costs.
3. Bids where the unit costs offered are in excess of or below reasonable cost analysis values.

In the event the County determines that a bid is presumed unbalanced, it will request the opportunity to, and reserves the right to, review all sources quotes, bids, price lists, letters of intent, etc., which the bidder obtained and upon which the bidder relied upon to develop the bid. The County reserves the right to reject as non-responsive any presumptive unbalanced bids where the bidder is unable to demonstrate the validity and/or necessity of the unbalanced unit costs.

A.10 FRONT END LOADING OF BID PRICING PROHIBITED

Prices offered for performance and/or acquisition activities to occur early in the project schedule, such as: mobilization, clearing and grubbing; or maintenance of traffic, that are substantially higher than pricing of competitive bidders within the same portion of the project schedule, will be presumed to be front end loaded. Front end loaded bids could reasonably appear to be an attempt to obtain unjustified early payments creating a risk of insufficient incentive for the Contractor to complete the work or otherwise creating an appearance of an under-capitalized bidder.

In the event the County determines that a bid is presumed to be front end loaded, it will request the opportunity to, and reserves the right to, review all source quotes, bids, price lists, letters of intent, etc., which the bidder obtained and upon which the bidder relied upon to develop the pricing or acquisition timing for these bid items. The County reserves the right to reject as non-responsive any presumptive front end loaded bids where the bidder is unable to demonstrate the validity and/or necessity of the front end loaded costs.

A.11 WITHDRAWAL OF OFFERS

Vendors may withdraw offers as follows: a) Mistakes discovered before the opening of a solicitation may be withdrawn by written notice from the bidder submitting the offer. This request must be received in the office designated for receipt of offers in the solicitation document prior to the time set for delivery and opening of the offers. A copy of the request shall be retained and the unopened offer returned to that vendor. b) After the responses to a solicitation are opened or a selection has been determined, but before a contract is signed, a vendor alleging a material mistake of fact may be permitted to withdraw their offer if: (1) the mistake is clearly evident on the solicitation document; or (2) the bidder submits evidence which clearly and convincingly demonstrates that a mistake was made. Request to withdraw and offer must be in writing and approved by the Purchasing Official.

A.12 IRREVOCABLE OFFER

Any bid may be withdrawn up until the date and time set for opening of the bid. Any bid not so withdrawn shall, upon opening, constitute an irrevocable offer for a period of 90 days to sell to Manatee County the goods or services set forth in the attached specifications until one or more of the bids have been duly accepted by the County.

A.13 BID EXPENSES

All expenses for making bids to the County are to be borne by the bidder.

A.14 RESERVED RIGHTS

The County reserves the right to accept or reject any and/or all bids, to waive irregularities and technicalities, and to request resubmission. Also, the County reserves the right to accept all or any part of the bid and to increase or decrease quantities to meet additional or reduced requirements of the County.

A.14 RESERVED RIGHTS (Continued)

Any sole response received by the first submission date may or may not be rejected by the County depending on available competition and current needs of the County. For all items combined, the bid of the lowest responsive, responsible bidder will be accepted, unless all bids are rejected. The lowest responsible bidder shall mean **that bidder who makes the lowest bid to sell goods and/or services of a quality which** conforms closest to or most exceeds the quality of goods and/or services set forth in the attached specifications or otherwise required by the County, and who is fit and capable to perform the bid as made.

To be responsive, a bidder shall submit a bid which conforms in all material respects to the requirements set forth in the Invitation For Bid. To be a responsible bidder, the bidder shall have the capability in all respects to perform fully the contract requirements, and the tenacity, perseverance, experience, integrity, reliability, capacity, facilities, equipment, and credit which will assure good faith performance. Also, the County reserves the right to make such investigation as it deems necessary to determine the ability of any bidder to furnish the service requested. Information the County deems necessary to make this determination shall be provided by the bidder. Such information may include, but shall not be limited to: current financial statements, verification of availability of equipment and personnel, and past performance records.

A.15 APPLICABLE LAWS

Bidder must be authorized to transact business in the State of Florida. All applicable laws and regulations of the State of Florida and ordinances and regulations of Manatee County will apply to any resulting agreement. Any involvement with any Manatee County procurement shall be in accordance with Manatee County Purchasing Code of Laws as amended. Any actual or prospective bidder who is aggrieved in connection with the solicitation or award of a contract may protest to the Board of County Commissioners of Manatee County as required in Section 2-26/61 of the Purchasing Code.

A protest with respect to this Invitation For Bid shall be submitted in writing prior to the scheduled opening date of this bid, unless the aggrieved person did not know and could not have been reasonably expected to have knowledge of the facts giving rise to such protest prior to the scheduled opening date of this bid. The protest shall be submitted within seven calendar days after such aggrieved person knows or could have reasonably been expected to know of the facts giving rise thereto.

A.16 COLLUSION

By offering a submission to this Invitation For Bid, the bidder certifies that he has not divulged, discussed or compared their bid with other bidder, and has not colluded with any other bidder or parties to this bid whatsoever. Also, bidder certifies, and in the case of a joint bid each party thereto certifies as to their own organization, that in connection with this bid:

A.16 COLLUSION (Continued)

- a. any prices and/or cost data submitted have been arrived at independently, without consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices and/or cost data, with any other bidder or with any competitor;
- b. any prices and/or cost data quoted for this bid have not been knowingly disclosed by the bidder and will not knowingly be disclosed by the bidder, prior to the scheduled opening, directly or indirectly to any other bidder or to any competitor;
- c. no attempt has been made or will be made by the bidder to induce any other person or firm to submit or not to submit a bid for the purpose of restricting competition;
- d. the only person or persons interested in this bid, principal or principals is/are named therein and that no person other than therein mentioned has any interest in this bid or in the contract to be entered into; and
- e. no person or agency has been employed or retained to solicit or secure this contract upon an agreement or understanding or a commission, percentage, brokerage, or contingent fee excepting bona fide employees or established commercial agencies maintained by bidder for purpose of doing business.

A.17 CODE OF ETHICS

With respect to this bid, if any bidder violates or is a party to a violation of the Code of Ethics of Manatee County per Manatee County Purchasing Code Ordinance 08-43, Article 3, Ethics in Public Contracting, and/or the State of Florida per Florida Statutes, Chapter 112, Part III, Code of Ethics for Public Officers and Employees, such bidder may be disqualified from performing the work described in this bid or from furnishing the goods or services for which the bid is submitted and shall be further disqualified from submitting any future bids for work or for goods or services for Manatee County. The County anticipates that all statements made and materials submitted in a bid will be truthful. If a bidder is determined to be untruthful in its bid or any related presentation, such bidder may be disqualified from further consideration regarding this Invitation For Bid.

A.18 BID FORMS

Bids must be submitted on attached County forms, although additional pages may be attached. **If applicable to the project, Bidders must fully complete all pages of the Bid Forms for both Bid A and Bid B. Bid Forms must be executed by an authorized signatory who has the legal authority to make the offer and bind the company. Bidders must fully comply with all specifications, terms and conditions.**

A.19 LEGAL NAME

Bids shall clearly indicate the legal name, address and telephone number of the bidder. Bids shall be signed above the typed or printed name and title of the signer. The signer must have the authority to bind the bidder to the submitted bid.

A.20 DRUG FREE WORK PLACE

The Manatee County Board of County Commissioners adopted a policy regarding bidders maintaining a Drug Free Work Place, prohibiting the award of bids to any person or entity that has not submitted written certification to the County that it has complied with those requirements. A Drug Free Work Place Certification Form is attached to this bid for this purpose.

A.21 BE GREEN

All Bidders are encouraged to use as many environmentally preferable "green" products, materials, supplies, etc. as possible in order to promote a safe and healthy environment. Environmentally preferable are products or services that have a reduced adverse effect on the environment. Provide detail of your organization's initiative and its ability to meet the goal of environmental sustainability.

A.22 PUBLIC CONTRACTING AND ENVIRONMENTAL CRIMES

A person or affiliate who has been placed on the State's convicted vendor list following a conviction for a public entity crime, as that term is defined in Florida Statute § 287.133, may not submit a bid, proposal, or reply on a contract to provide any goods or services to a public entity; may not submit a bid, proposal, or reply on a contract with a public entity for the construction or repair of a public building or public work; may not submit bids, proposals or replies on leases of real property to a public entity; may not be awarded or perform work as a contractor, supplier, subcontractor, or consultant under a contract with any public entity; and may not transact business with any public entity in excess of the threshold amount provided in Florida Statute § 287.017 for CATEGORY TWO for a period of 36 months following the date of being placed on the convicted list.

In addition, the Manatee County Code prohibits the award of any contract to any person or entity who/which has, within the past 5 years, been convicted of, or admitted to in court or sworn to under oath, a public entity crime or of any environmental law that, in the reasonable opinion of the purchasing official, establishes reasonable grounds to believe the person or business entity will not conduct business in a responsible matter.

To insure compliance with the foregoing, the Code requires all persons or entities desiring to contract with the County to execute and file with the purchasing official an affidavit, executed under the pain and penalties of perjury, confirming that person, entity and any person(s) affiliated with the entity, does not have such a record and is therefore eligible to seek and be awarded business with the County.

A.22 PUBLIC CONTRACTING AND ENVIRONMENTAL CRIMES (Continued)

In the case of a business entity other than a partnership or a corporation, such affidavit shall be executed by an authorized agent of the entity. In the case of a partnership, such affidavit shall be executed by the general partner(s). A Public Contracting and Environmental Crimes Certification is attached for this purpose.

A.23 DISCOUNTS

Any and all discounts must be incorporated in the prices contained in the bid and not shown separately. The prices as shown on the bid form shall be the price used in determining award.

A.24 TAXES

Manatee County is exempt from Federal Excise and State Sales Taxes. (F.E.T. Exempt Cert. No. 59-78-0089K; FL Sales Tax Exempt Cert. NO 85-8012622206C-6); therefore, the vendor is prohibited from delineating a separate line item in his bid for any sales or service taxes. Nothing herein shall affect the vendor's normal tax liability.

A.25 DESCRIPTIVE INFORMATION

Unless otherwise specifically provided in the specifications, all equipment, materials and articles incorporated in the work covered by this contract shall be new and of the most suitable grade for the purpose intended. Unless otherwise specifically provided in the specifications, reference to any equipment, material, article or patented process, by trade name, brand name, make or catalog number, shall be regarded as establishing a standard of quality and shall not be construed as limiting competition.

A.26 AMERICANS WITH DISABILITIES ACT

The Board of County Commissioners of Manatee County, Florida, does not discriminate upon the basis of any individual's disability status. This non-discrimination policy involves every aspect of the County's functions including one's access to, participation, employment, or treatment in its programs or activities. Anyone requiring reasonable accommodation for an **Information Conference** or **Bid Opening** should contact the person named on the first page of this bid document at least twenty-four (24) hours in advance of either activity.

A.27 EQUAL EMPLOYMENT OPPORTUNITY CLAUSE

Manatee County, in accordance with the provisions of Title VI of the Civil Rights Act of 1964 and the Regulations of the Department of Commerce (15 CFR, Part 8) issued pursuant to such Act, hereby notifies all vendors that it will affirmatively ensure that in any contract entered into pursuant to this advertisement, minority business enterprises will be afforded full opportunity to submit bids in response to this advertisement and will not be discriminated against on the grounds of race, color or national origin in consideration for an award. Manatee County, in accordance with the provisions of Title VI of the Civil Rights Act of 1964 and the Regulations of the Department of Commerce (15 CFR, Part 8) issued pursuant to such Act, hereby notifies all vendors that it will affirmatively ensure that in any contract entered into pursuant to its advertisement, minority business enterprises will be afforded full opportunity to submit bids in response

A.27 EQUAL EMPLOYMENT OPPORTUNITY CLAUSE (Continued)

to this advertisement and will not be discriminated against on the grounds of race, color or national origin in consideration for an award.

A.28 MBE/WBE

The State of Florida, **Office of Supplier Diversity** provides the certification process and the database for identifying certified MBE/WBE firms. This service may be directly accessed at: <http://www.osd.dms.state.fl.us/iframe.htm>

If you have any questions regarding this State service, please contact their office at (850) 487-0915.

A.29 MATHEMATICAL ERRORS

In the event of multiplication/extension error(s), the unit price shall prevail. In the event of addition error(s) the extension totals will prevail. All bids shall be reviewed mathematically and corrected, if necessary, using these standards, prior to additional evaluation.

A.30 DISCLOSURE

Upon receipt, all inquires and responses to inquires related to this Invitation for Bid become "Public Records" and are subject to public disclosure consistent with Chapter 119, Florida Statutes.

Bids become "Public Records" ten (10) days after the bid opening or if an award decision is made earlier than this time as provided by Florida Statue 119.071. No announcement or review of the bid documents shall be conducted at the public opening of the bids.

Based on the above, Manatee County will receive bids at the date and time stated, and will make public at the opening the names of the business entities of all that submitted an offer and any amount presented as a total offer without any verification of the mathematics or the completeness of the offer. Upon the expiration of the statutory term for exemption the actual documents may be inspected or copied. When County staff have completed a mathematic validation and inspected the completeness of the offers, tabulation shall be posted on www.mymanatee.org.

NOTE: ANY OR ALL STATEMENTS CONTAINED IN THE FOLLOWING SECTIONS: BASIS OF AWARD, TERMS AND CONDITIONS OF THE CONTRACT, OR SPECIFICATIONS, WHICH VARY FROM THE INFORMATION TO BIDDERS, SHALL HAVE PRECEDENCE

END OF SECTION "A"

SECTION 00020
BASIS OF AWARD

B.01 BASIS OF AWARD

Award shall be to the responsive, responsible bidder meeting specifications and having the **lowest Total Bid Price** for the requirements listed on the Bid Form for the Work as set forth in this Invitation For Bid. Bid Prices shall include costs for furnishing all labor, equipment and/or materials for the completion of the Work in accordance with and in the manner set forth and described in the Contract Documents to the County's satisfaction within the prescribed time.

In evaluating bids, the County shall consider the qualifications of the bidders; and if required, may also consider the qualifications of the subcontractors, suppliers, and other persons and organizations proposed. County may also consider the operating costs, maintenance requirements, performance data and guarantees of major items of materials and equipment proposed for incorporation in the Work.

Whenever two or more bids are equal with respect to price, quality and service, the bid received from a local business shall be given preference in award. Whenever two or more bids which are equal with respect to price, quality and service are received, and neither of these bids are received from a local business, the award shall be determined by a chance drawing conducted by the Purchasing Office and open to the public.

Local business is defined as a business duly licensed and authorized to engage in the sale of goods and/or services to be procured, which has a place of business in Manatee County with full time employees at that location.

B.02 SUBCONTRACTORS

Subcontractors shall be bound by the terms and conditions of this contract insofar as it applies to their Work, but this shall not relieve the prime contractor from the full responsibility of the County for the proper completion of all Work to be executed under this contract.

The employment of unauthorized aliens by any vendor is considered a violation of Section 274 (e) of the Immigration and Employment Act. If the vendor knowingly employs unauthorized aliens, such violation shall be cause for unilateral cancellation of this agreement.

Contractor shall complete and submit a list of major subcontractors intended to be utilized.

If Bidder does not intend to subcontract any portion of the major work, Contractor shall so state.

(See Contractor's Questionnaire, Section 00430, question #16 in this Invitation for Bid).

B.03 QUALIFICATIONS OF BIDDERS

Each bidder must secure all licenses required (in accordance with Chapter 489 Florida Statutes) for the Work which is the subject of this bid; and, upon request, shall submit a true copy of all applicable licenses. The License requirement for this project is a **Mechanical Contractor**.

Contractor shall have a minimum of three (3) years experience in the field of removal, disposal, replacement of HVAC equipment.

To demonstrate qualifications to perform the Work, each bidder must be prepared to submit within five days of County's request; written evidence such as financial data, previous experience, present commitments and other such data as may be requested. Bidder must be able to provide evidence of Bidder's qualification to do business in the state of Florida. Each bidder shall submit as a portion of their bid, a completed Contractor's Questionnaire included as Section 00430.

A complete list of all subcontractors proposed for any portion of the Work may be requested of any Bidder deemed necessary by the County. Subcontracts shall be awarded only to those subcontractors considered satisfactory by the County.

B.04 INSPECTION OF SITE

Prior to submission of a bid, each bidder shall visit the site to become familiar with all conditions that may affect services that are required to completely execute the full intent of these specifications. Site visit shall be acknowledged in Section 00300, Bid Form, page 00300-1.

Contact: Rachel Harrison, Assistant Operations Manager, Convention and Visitors Bureau: Phone: 941-722-3244 / Ext. 238.

B.05 PREPARATION OF CONTRACT

A written notice confirming award or recommendation thereof will be forwarded to the Successful Bidder accompanied by the required number of unsigned counterparts of the Agreement. Within 10 days thereafter, Successful Bidder shall sign and deliver the required number of counterparts of the Agreement with any other required documents to County. (Note: Contract must be approved in accordance with the Manatee County Code of Laws, Chapter 2-26, Manatee County Purchasing Ordinance and the Standards and Procedures approved by the County Administrator).

END OF SECTION "B"

SECTION 00030
GENERAL TERMS AND CONDITIONS OF THE CONTRACT

C.01 CONTRACT FORMS

The agreement resulting from the acceptance of a bid shall be in the form of the agreement stated in this bid.

C.02 ASSIGNMENT OF CONTRACT

Contractor shall not assign, transfer, convey, sublet or otherwise dispose of this Contract or of his right, title, or interest therein, or his power to execute such Contract, or to assign any monies due or to become due there under to any other person, firm or corporation unless first obtaining the written consent of the County. The giving of such consent to a particular subcontractor assignment shall not dispense with the necessity of such consent to any further or other assignment.

C.03 COMPLETION OF WORK

The Work will be completed and ready for final inspection within the specified calendar days from the date the Contract Time commences to run. All Work for **Phase 1** shall be carried out completely from **May 16, 2011 through May 31, 2011**. All Work for **Phase II** shall be carried out completely from **July 1, 2011 through July 29, 2011**. Only one award shall be made.

C.04 LIQUIDATED DAMAGES

If the Contractor refuses or fails to prosecute the Work, or any separable part thereof, with such diligence as will hinder its completion within the time specified, the County may seek damages. The actual damages for delay will be impossible to determine and in lieu thereof, the Contractor shall pay to the County the sum of **\$1,288.00** as fixed, agreed, and liquidated damages for each calendar day of the delay until the Work is finally accepted by the County and the Contractor and his Surety shall be liable for the amount thereof.

C.05 PAYMENT

Contractor may apply for partial payment on monthly estimates, based on the amount of Work done or completed in compliance with the provisions of the Contract. Contractor shall submit an application, on a form provided or approved by the County, of an approximate estimate of the proportionate value of the Work done, items and locations of the Work performed up to and including the last day of the period then ending. The County will then review said estimate and make any necessary revisions so that the estimate can receive approval for payment. If the Contractor and the County do not agree on the approximate estimate of the proportionate value of the Work done for any pay period, the determination of the County will be binding. The amount of said estimate after deducting any required retainage and all previous payments shall be due and payable to the Contractor within **25 days** after the pay estimate has been approved by the County. It is the Contractor's responsibility for the care of the materials.

C.05 PAYMENT (Continued)

Any damage to or loss of said materials is the full responsibility of the Contractor. Any Periodical Pay Estimate signed by the Contractor shall be final as to the Contractor for any or all work covered by the Periodical Pay Estimate. Any requests for payment of materials stored on site must be accompanied with a paid receipt. The Contractor warrants and guarantees that title to all work, materials and equipment covered by any application for payment, whether incorporated in the project or not, will pass to the County at the time of payment free and clear of all liens, claims, security interests and encumbrances (hereafter referred to as "Liens").

The Contractor agrees to furnish an affidavit stating that all laborers, material men, and subcontractors have been paid on the project for Work covered by the application for payment and that a partial or complete release of lien, as may be necessary, be properly executed by the material men, laborers, subcontractors on the project for Work covered by the application for payment, sufficient to secure the County from any claim whatsoever arising out of the aforesaid Work.

When the Contractor has completed the Work in compliance with the terms of the Contract Documents, he shall notify the County in writing that the project is ready for final inspection. The County will then advise the Contractor as to the arrangements for final inspection and what Work, if any, is required to prepare the project or a portion thereof for final inspection. When the County determines the project or portion thereof is ready for final inspection, the County shall perform same. Upon completion of final inspection, the County will notify Contractor of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies. When all such errors have been corrected, a final re-inspection will be made. The process will be repeated until, in the opinion of the County, the project has been completed in compliance with the terms of the Contract Documents.

When final acceptance has been made by the County, the County will make final payment of the Contract amount, plus all approved additions, less approved deductions and previous payments made. The Contract will be considered complete when all work has been finished, the final inspection made, approved as-builts received, and the project finally accepted in writing by the County. The Contractor's responsibility shall then terminate except as otherwise stated.

C.06 RETAINAGE

A **retainage** of 2.5% of the total contract amount shall be withheld from payments after 75% completion of the Work. Upon substantial completion, this retainage shall be reduced to 1% of the total contract amount plus such amount as the County may reasonably deem necessary to repair, replace, complete or correct any damaged, defective, incorrect or incomplete work. Upon final acceptance, the remaining retainage shall be included in the final payment.

C.07 WARRANTY AND GUARANTEE PROVISIONS

All work, materials, and equipment furnished as defined herein shall be guaranteed and warranted by the contractor for a minimum period of three (3) years, unless otherwise specified, from final acceptance by the County to be free from defects due either to faulty materials or equipment or faulty workmanship.

All materials, equipment, and workmanship furnished and installed by the contractor is warranted and guaranteed by the contractor to be such as to meet the required standards and to accomplish the purpose and function of the project as defined, detailed, and specified herein.

The County shall, following discovery thereof, promptly give written notice to the contractor of faulty materials, equipment, or workmanship within the period of the guarantee and the contractor shall promptly replace any part of the faulty equipment, material, or workmanship at his own cost. These warranty and guarantee provisions create no limitations on the County as to any claims or actions for breach of guaranty or breach of warranty that the County might have against parties other than the contractor, and do not constitute exclusive remedies of the County against the contractor.

C.08 ROYALTIES AND PATENTS

The contractor shall pay all royalties and license fees for equipment or processes in conjunction with the equipment and/or services being furnished. Contractor shall defend all suits or claims for infringement of any patent, trademark or copyright, and shall save the County harmless from loss on account thereof, including costs and attorney's fees.

C.09 AUTHORIZED PRODUCT REPRESENTATION

The contractor, by virtue of submitting the name and specifications of a manufacturer's product, will be required to furnish the named manufacturer's product. Failure to perform accordingly may, in the County's sole discretion, be deemed a breach of contract, and shall constitute grounds for the County's immediate termination of the contract.

C.10 REGULATIONS

It shall be the responsibility of the bidder to assure compliance with any OSHA, EPA and/or other federal or state of Florida rules, regulations or other requirements, as each may apply.

C.11 CANCELLATION

Any failure of the contractor to furnish or perform the Work (including, but not limited to, commencement of the Work, failure to supply sufficient skilled workers or suitable materials or equipment) in accordance with the contract, the County may order the stop of the Work, or any portion thereof, until the cause for such order has been eliminated. If the contractor persistently fails to perform the Work in accordance with the contract, the County reserves the right to terminate the contract and select the next qualified bidder or re-advertise this procurement in part or in whole. The County reserves the right to cancel all or any undelivered or unexecuted portion of this contract with or without cause.

C.12 INDEMNIFICATION

The contractor covenants and agrees to indemnify and save harmless the County, its agents and employees, from and against all claims, suits, actions, damages, causes of action, or judgments arising out of the terms of the resulting agreement for any personal injury, loss of life, or damage to the property sustained as a result of the performance or non-performance of services or delivery of goods; from and against any orders, judgments, or decrees, which may be entered against the County, its agents or employees; and from and against all costs, attorney's fees, expenses and other liabilities incurred in the defense of any such claim, suit or action, and the investigation thereof. Nothing in the award, resulting agreement, contract or Purchase Order shall be deemed to affect the rights, privileges and immunities of the County as set forth in Florida Statute Section 768.28.

C.13 MANUALS, SCHEMATICS, HANDBOOKS

All manuals, schematics and handbooks shall be provided which are applicable to the equipment delivered. An operators manual, parts manual and technician manual must also be provided. Parts lists (manuals) must include OEM part numbers for items not manufactured by the bidder. Vendor shall furnish two (2) copies of each.

C.14 INSURANCE

The contractor will not commence work under a contract until all insurance under this section and such insurance coverage as might be required by the County has been obtained. The contractor shall obtain, and submit to Purchasing within 10 calendar days of request, at his expense, the following minimum amounts of insurance (inclusive of any amounts provided by an umbrella or excess policy):

a. Workers' Compensation/Employers' Liability

Part One - There shall be no maximum limit (other than as limited by the applicable statute) for liability imposed by Florida Workers' Compensation Act or any other coverage required by the contract documents which are customarily insured under Part One of the standard Workers' Compensation Policy.

C.14 INSURANCE (Continued)

Part Two - The minimum amount of coverage required by the contract documents which are customarily insured under Part Two of the standard Workers' Compensation Policy shall be:

<u>\$100,000</u>	(Each Accident)
<u>\$500,000</u>	(Disease-Policy Limit)
<u>\$100,000</u>	(Disease-Each Employee)

b. Commercial General Liability

The limits are to be applicable only to work performed under this contract and shall be those that would be provided with the attachment of the Amendment of Limits of Insurance (Designated Project or Premises) endorsement (ISO Form CG 25 03) a Commercial General Liability Policy with the following minimum limits.

General Aggregate:

Products/Completed Operations Aggregate	<u>\$1,000,000</u>
Personal and Advertising Injury	<u>\$300,000</u>
Each Occurrence	<u>\$300,000</u>
Fire Damage (Any One Fire)	<u>\$Nil</u>
Medical Expense (Any One Person)	<u>\$Nil</u>

c. Business Auto Policy

Each Occurrence Bodily Injury and Property Damage Liability Combined	<u>\$300,000</u>
Annual Aggregate (if applicable):	<u>\$1,000,000</u>

d. Owners Protective Liability Coverage

The minimum OPC Policy limits per occurrence and, if subject to an aggregate, annual aggregate to be provided by the contractor shall be the same as the amounts shown above as the minimum per occurrence and general policy aggregate limits respectively required for the Commercial General Liability coverage. The limits afforded by the OPC Policy and any excess policies shall apply only to the County and the County's officials, officers, agents and employees and only to claims arising out of or in connection with the work under this contract.

e. Property Insurance

If this contract includes construction of or additions to above ground buildings or structures, contractor shall provide "**Builder's Risk**" insurance with the minimum amount of insurance to be 100% of the value of such addition(s), building(s), or structure(s).

C.14 INSURANCE (Continued)f. Installation Floater

If this contract does not include construction of or additions to above ground building or structures, **but does involve** the installation of machinery or equipment, contractor shall provide an "**Installation Floater**" with the minimum amount of insurance to be 100% of the value of such addition(s), building(s), or structure(s).

g. Certificates of Insurance and Copies of Policies

Certificates of Insurance in triplicate evidencing the insurance coverage specified in the six above paragraphs a., b., c., d., e., and f., shall be filed with the Purchasing Director before operations are begun. The required certificates of insurance shall name the types of policy, policy number, date of expiration, amount of coverage, companies affording coverage, and also shall refer specifically to the bid number, project title and location of project. Insurance shall remain in force at least one year after completion and acceptance of the project by the County, in the amounts and types as stated herein, with coverage for all products and services completed under this contract.

ADDITIONAL INSURED: The contractor shall name Manatee County as additional insured in each of the applicable policies.

If the initial insurance expires prior to the completion of operations and/or services by the contractor, renewal certificates of insurance and required copies of policies shall be furnished by the contractor and delivered to the Purchasing Official thirty (30) days prior to the date of their expiration.

Nothing herein shall in any manner create any liability of the County in connection with any claim against the contractor for labor, services, or materials, or of subcontractors; and nothing herein shall limit the liability of the contractor or contractor's sureties to the County or to any workers, suppliers, material men or employees in relation to this contract.

C.15 BID BOND/CERTIFIED CHECK

By offering a submission to this Invitation For Bid, the bidder agrees should the bidder's bid be accepted, to execute the form of contract and present the same to Manatee County for approval within 10 days after being notified of the awarding of the contract. The bidder further agrees that failure to execute and deliver said form of contract **within 10 days** will result in damages to Manatee County and as guarantee of payment of same a bid bond/certified check shall be enclosed within the submitted sealed bid in the amount of five (5%) percent of the total amount of the bid.

C.15 BID BOND/CERTIFIED CHECK (Continued)

The bidder further agrees that in case the bidder fails to enter into a contract, as prescribed by Manatee County, the bid bond/certified check accompanying the bid shall be forfeited to Manatee County as agreed liquidated damages. If the County enters into a contract with a bidder, or if the County rejects any and/or all bids, accompanying bond will be promptly returned.

C.16 PERFORMANCE AND PAYMENT BONDS

The successful bidder shall furnish surety bonds as security for faithful performance of the contract awarded as a result of this bid, and for the payment of all persons performing labor and/or furnishing material in connection therewith. Surety of such bonds shall be in an amount equal to the bid award (100% each) and from a duly authorized and nationally recognized surety company, authorized to do business in Florida, satisfactory to this County. The attorney-in-fact who signs the bonds must file with the bonds a certificate and effective dated copy of power-of-attorney. (Reference Florida Statute 255.05)

Furnishing the performance and payment bonds shall be requisite to execution of a contract with the County. Said performance and payment bonds will remain in force for the duration of the contract with the premiums paid by the contractor. Failure of successful bidder to execute such contract and to supply the required bonds shall be just cause for annulment of the award.

The County may then contract with another acceptable bidder or re-advertise this Invitation For Bid. If another bidder is accepted, and notice given within 90 days after the opening of bids, this acceptance shall bind the bidder as though they were originally the successful bidder.

Failure of the County at any time, to require performance by the contractor of any provisions set out in the contract will in no way affect the right of the County, thereafter, to enforce the provisions. Bonds to remain in effect for one year after final payment becomes due.

C.17 NO DAMAGES FOR DELAY

No claim for damages or any claim other than for an extension of time shall be made or asserted against the County by reason of any delays. The Contractor shall not be entitled to an increase in the Total Contract Price or payment or compensation of any kind from the County or direct, indirect, consequential impact or other costs, expenses for damages, including but not limited to costs of acceleration or inefficiency arising because of delay, disruption, interference or hindrance from any

C.17 NO DAMAGES FOR DELAY (Continued)

cause whatsoever; provided, however, that this provision shall not preclude recovery or damages by the Contractor for hindrance or delays due solely to fraud, bad faith, or active interference on part of the County or its agents. Otherwise, the Contractor shall only be entitled to extensions of the Contract Time as the sole and exclusive remedy for such resulting delay, in accordance with and to the extend specifically provided above.

C.18 NO INTEREST

Any monies not paid by the County when claimed to be due to the Contractor under this Contract shall not be subject to interest including prejudgment interest. Any monies not paid by the County when claimed to be due to the Contractor for damages awarded in the case of construction delays shall not be subject to prejudgment interest.

C.19 CONSTRUCTION OF CONTRACT

This Contract and the rights and responsibilities hereunder shall not be construed more strongly against either party, regardless of the extent to which such party may have participated in the preparation hereof.

END OF SECTION "C"

**SECTION 00100
BID SUMMARY**

D.01 THE WORK

A). The Work of the Project as defined by the Contract Documents consists of the following:

Scope shall include but is not limited to the replacement of the rooftop mechanical condensing units and air handling units with new chillers and new air handling units, new chilled water piping, and new controls system. Minor ductwork modifications in the facility interior, replacing mini split systems which service the office spaces with chilled water fan coil units, replacing volume dampers with new volume dampers shall be included in the scope of work. Contractor shall provide a complete and operable system.

The Work shall be conducted in phases, with each phase substantially complete as indicated

1. Phase 1:

The first phase of the project shall consist of full replacement of the mechanical systems on the rooftop of the Arena area of the Civic Center (Units 3 and 4 split systems), and electrical work as required. Existing Mechanical systems shall be removed, and become the property and responsibility of the Contractor. Contractor shall remove and discard of all equipment and by-products in an environmentally acceptable manner. The County reserves the right to capture all refrigerant enclosed in the closed loop systems. **All rooftop work (new and demolition) shall be carried out completely from May 16, 2011 through May 31, 2011.** Contractor shall coordinate all work with County.

2. Phase 2:

The second phase shall consist of a full replacement of the mechanical systems on the rooftop of the Convention Rooms area of the Civic Center (Units 6, 7 and 8 split systems), interior mechanical modifications and electrical work as required. Existing mechanical systems shall be removed, and become the property and responsibility of the Contractor. Contractor shall remove and discard of all equipment and by-products in an environmentally acceptable manner. The County reserves the right to capture all refrigerant enclosed in the closed loop systems. **All rooftop and all interior work (new and demolition) shall be carried out completely from July 1, 2011 through July 29, 2011.** Contractor shall coordinate all work with County. Upon completion of the interior work, the County will be replacing the ceiling system (grid and tiles). Upon completion of the grid (approximately the first week of August), the Contractor will make final mechanical systems attachments to the gridwork. Full test and balance of the supplies, return and exhaust to meet indicated airflows is required upon replacement of ceiling.

D.01 THE WORK (Continued)**3. Phase 3:**

The third phase of the project shall consist of full-optimized control system, including new wiring, devices, programming, and full operation as demonstrated to County and Engineer, in accordance with the Construction Documents.

B). Before commencing Work of each Phase, Contactor shall submit an updated copy of the Construction Schedule showing the sequence, commencement and completion dates, and interruption of County's personnel in occupied spaces for all phases of the Work.

The Contractor shall furnish all labor, superintendence, materials, plant, power, light, heat, fuel, water, tools, appliances, equipment, supplies, shop drawings, working drawings and other means of construction necessary or proper for performing and completing the work. The Contractor shall obtain and pay for all required permits necessary for the work, other than those permits such as the DEP permit and railroad permit which may have already been obtained. He shall perform and complete the work in the manner best calculated to promote rapid construction consistent with safety or life and property and to the satisfaction of the Engineer, and in strict accordance with the Contract Documents, whether specifically indicated in the Contract Documents or not.

The Contractor shall perform the work complete, in place and ready for continuous service and shall include any repairs, replacements, and / or restoration required as a result of damages caused prior to acceptance by the County.

The Project Identification: Manatee County Convention and Visitors Bureau
1 Haben Boulevard, Palmetto, FL 34221

D.02 SUBCONTRACTORS, SUPPLIERS AND OTHERS

The identity of subcontractors, suppliers, and other persons and organizations (including those who are to furnish the principal items of material and equipment) may be requested by the County for each bid item from any of the Bidders; and the Bidder shall respond within five days after the date of such request. Such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such subcontractor, supplier, persons or organization if requested by County. If County, after due investigation, has reasonable objection to any proposed subcontractor, supplier, other person or organization, County may, before the Notice of Award is given, request the apparent successful Bidder to submit an acceptable substitute without an increase in Contract Price or Contract Time.

D.02 SUBCONTRACTORS, SUPPLIERS AND OTHERS (Continued)

If apparent successful Bidder declines to make any such substitution, County may award the contract to the next lowest qualified Bidder that proposes to use acceptable subcontractors, suppliers, and other persons who County does not make written objection to. Contractor shall not be required to employ any subcontractor, supplier, other person or organization who Contractor has reasonable objection to.

Subcontractors shall be bound by the terms and conditions of this contract insofar as it applies to their Work, but this shall not relieve the prime contractor from the full responsibility to the County for the proper completion of all Work to be executed under this contract.

D.03 BIDS

Bids are to be submitted in triplicate, one original and two copies, upon the County supplied forms. All blank spaces must be filled in as noted with amounts extended and totaled and no changes shall be made in the wording of the forms or in the items mentioned therein. In the event a change is made in your submittal, the Bidder shall write its initials by the change. Any bid may be rejected which contains any omissions, alterations, irregularities of any kind, or which shall in any manner fail to conform to bid requirements.

A bid made by an individual, either in his/her own or proper person or under a trade or firm name, shall be executed under the individual's signature. If made by a partnership, the bid shall be executed by two or more of the general partners. If made by a corporation, the bid shall be executed by its President or other legally authorized corporate officer or agent.

D.04 EXAMINATION OF CONTRACT DOCUMENTS AND SITE

It is the responsibility of each Bidder before submitting a Bid, to (a) examine the Bid Documents thoroughly; (b) visit the site to become familiar with local conditions that may affect cost, progress, performance, or furnishing of the Work; (c) consider federal, state, and local codes, laws, and regulations that may affect costs, progress, performance, or furnishing of the Work; (d) study and carefully correlate Bidder's observations with the Bid Documents; and (e) notify County of all conflicts, errors, or discrepancies in the Bid Document.

The accuracy of the existing utility locations shown on the plans is approximate and without express or implied warranty. Each Bidder may, at Bidder's own expense, make or obtain any additional examinations, investigations, explorations, tests and studies, and obtain any additional information and data which pertain to the physical conditions at or contiguous to the site or otherwise which may affect cost, progress, performance or furnishing of the Work and which Bidder deems necessary to determine his Bid for performing and furnishing the Work in accordance with the time price and other terms and conditions of the Contract Documents.

D.04 EXAMINATION OF CONTRACT DOCUMENTS AND SITE (Continued)

County will provide each Bidder access to the site to conduct such explorations and tests. Bidder shall fill all holes, clean up and restore the site to its former condition upon completion of such explorations. The lands upon which the Work is to be performed, rights-of-way and easements for access thereto, and other lands designated for use by Contractor in performing the Work identified in the Contract Documents.

All additional lands and access thereto required for temporary construction facilities or storage of materials and equipment are to be provided by Contractor. Easements for permanent structures or permanent changes in existing structures are to be obtained and paid for by County unless otherwise provided in the Contract Documents.

D.05 MATERIALS AND WORKMANSHIP

All materials and apparatus required for this Work, except as specifically specified otherwise, shall be new, of first class quality, and shall be furnished, delivered, connected and finished in every detail. Construction shall be prescribed by good industry practice and in accordance with manufacturer's recommendations for the type being installed.

Use skilled workman trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this section.

D.06 REGULATIONS AND MATERIAL DISPOSAL

It shall be the responsibility of the contractor to assure compliance with any OSHA, EPA, federal, state, and/or local rules, regulations or other requirements as each may apply.

D.07 DISCRETIONARY WORK

This Bid Item entails minor increases (that may be directed by staff) to existing bid item quantities or minor modification items not bid which were unforeseen and necessary during the construction to provide a safe, complete project in accordance with Bid Documents. (This will not affect the requirement for change orders involving major modifications to the project.) Payment for all Work under this item shall be made only at the County's discretion in order to satisfactorily complete the project. In general, this item is for unanticipated conflicts and/or design changes required during construction which are necessary to complete the project without changing the initial scope of Work and without costly delays.

END OF SECTION "D"

SECTION 00150
MANATEE COUNTY LOCAL PREFERENCE LAW AND VENDOR REGISTRATION

E.01 Vendor Registration

All vendors are encouraged to register with Manatee County using the on-line "Vendor Registration" web page on www.mymanatee.org.

Enclosed are a copy of the current Manatee County law that details the County's Local Preference and the County's definition of a Local Business.

If you assert that your firm meets the stated definition of a Local Business, we ask that in addition to registering on the County's Web page, you fill out the attached "**Affidavit As To Local Business Form**" that is included in this section, have the completed document notarized, and mail the original to the following address: Manatee County Administration Center, 1112 Manatee Avenue West, Suite 803, Bradenton, FL 34205.

Your cooperation in registering your business with Manatee County will enhance our opportunities to identify sources for goods and services, plus identify Local Businesses. This information is used for soliciting quotations up to \$250,000.00 and for competitive solicitations of larger purchases.

You will note that Manatee County collaborates with the Manatee Chamber of Commerce, posting bids on www.manateechamber.com as well as using the same vendor categories for registration.

Our staff can assist you with your registration as needed. Our office hours are 8:00 A.M. to 5:00 P.M., Monday through Friday on regular business days. Please call (941) 749-3014 if you wish to have a purchasing staff member assist you.

Quick steps to registration: **www.mymanatee.org**

A link to "Purchasing" is listed under "Quick Links" on page one of the County Web Site.

On the left hand side of the Purchasing Web page, click on "Vendor Registration".

This will bring up the Vendor Registration form for on-line input. Please note that the definition of a "Local Business" changed on March 17, 2009. The Web page will be updated to include the current Law which has been provided in this section of the bid.

Thank you for reviewing this information and considering registering your business with Manatee County. Registration is not mandatory; however, by taking the time to register, you are helping the County to provide timely notifications of quotation, bid and proposal opportunities to your business.

E.02 Section 2-26-6. Local preference, tie bids, local business defined.

(a) Whenever a responsible local business bidder and a responsible non-local business bidder are found, upon the opening of bids, to have both submitted the lowest responsive bid, the bid of the local bidder shall be awarded the contract. Should more than one responsible local business bidder match the responsible non-local business bidder's lowest responsive bid, or should no responsible local business bidder match the lowest responsive bid but two or more responsible non-local business bidders submit lowest responsive bids for equal amounts, then the award of the contract shall be determined by a chance drawing, coin toss, or similar tie-breaking method conducted by the purchasing office and open to the public. Any bidders seeking to be recognized as local businesses for purposes of this local business preference provision may be required by the terms of the bid announcement to certify they meet the definition of local business set forth in this section, and to register as a local business with the county in the manner prescribed by the county to facilitate the county's ability to track the award of contracts to local businesses and to allow the county to provide future notifications to its local businesses concerning other bidding opportunities.

(b) Nothing herein shall be deemed to prohibit the inclusion of requirements with respect to operating and maintaining a local place of business in any invitation for bids when the bidder's location materially affects the provisions of the services or supplies that are required by the invitation.

(c) Local business is defined as a business legally authorized to engage in the sale of the goods and/or services to be procured, and which certifies within its bid that for at least six (6) months prior to the announcement of the solicitation of bids it has maintained a physical place of business in Manatee, Desoto, Hardee, Hillsborough, Pinellas or Sarasota County with at least one full-time employees at that location.

(d) Each solicitation for bids made by the county shall contain terms expressly describing the local business preference policies of the county, and shall provide that by electing to submit a bid pursuant to a request for bids, all bidders are deemed to understand and agree to those policies.

(e) For all contracts for architecture, professional engineering, or other professional services governed by Florida Statute § 287.055, the Consultants' Competitive Negotiation Act, the county shall include the local business status of a firm among the factors considered when selecting which firms are "most highly qualified." In determining which firm is the "most qualified" for purposes of negotiating a satisfactory contract, preference shall be given to a local business where all other relevant factors are equal.

(f) Local preference shall not apply to the following categories of contracts:

1. Goods or services provided under a cooperative purchasing agreement or similar "piggyback" contract;
2. Contracts for professional services subject to Florida Statute § 287.055, the Consultants' Competitive Negotiation Act, except as provided for in subsection (e) above;

E.02 Section 2-26-6. Local preference, tie bids, local business defined. (Continued)

3. Purchases or contracts which are funded, in whole or in part, by a governmental or other funding entity, where the terms and conditions of receipt of the funds prohibit the preference;
 4. Purchases or contracts made pursuant to a non-competitive award process, unless otherwise provided by this section;
 5. Any bid announcement which specifically provides that the general local preference policies set forth in this section are suspended due to the unique nature of the goods or services sought, the existence of an emergency as found by either the county commission or county administrator, or where such suspension is, in the opinion of the county attorney, required by law.
- (g) To qualify for local preference under this section, **a local business must certify to the County that it:**
1. Has not within the five years prior to the bid announcement admitted guilt or been found guilty by any court or state or federal regulatory enforcement agency of violation of any criminal law, or a law or administrative regulation regarding fraud;
 2. Is not currently subject to an unresolved citation or notice of violation of any Manatee County Code provision, except citations or notices which are the subject of a current legal appeal, as of the date of the bid announcement;
 3. Is not delinquent in the payment of any fines, liens, assessments, fees or taxes to any governmental unit or taxing authority within Manatee County, except any such sums which are the subject of a current legal appeal.

Ref: Ordinance 09-21 and 09-23 **PASSED AND DULY ADOPTED** in open session, with a quorum present and voting, on the 17th day of March, 2009.

Contractors Note: Contractors who have previously submitted an **AFFIDAVIT AS TO LOCAL BUSINESS** are not required to resubmit an AFFIDAVIT, provided that any and all information has remained unchanged.

END OF SECTION "00150"

**MANATEE COUNTY GOVERNMENT
AFFIDAVIT AS TO LOCAL BUSINESS
(Complete and Initial Items B-F)**

A. Authorized Representative

I, [name] _____, am the [title] _____

and the duly authorized representative of: [name of business] _____
_____, and that I possess direct personal knowledge to make informed responses to these certifications and the legal authority to make this Affidavit on behalf of myself and the business for which I am acting; and by electing to submit a bid pursuant to this Invitation for Bids, shall be deemed to understand and agree to the local business preference policies of Manatee County; and that I have the direct knowledge to state that this firm complies with all of the following conditions to be considered to be a Local Business as required by the Manatee County Code of Law, Section 2-26-6.

B. Place of Business: I certify that the above business is legally authorized to engage in the sale of goods and/or services and has a physical place of business in Manatee, DeSoto, Hardee, Hillsborough, Pinellas or Sarasota County with at least one (1) fulltime employee at that location. The physical address of the location which meets the above criteria is: _____ [Initial] _____

C. Business History: I certify that business operations began at the above physical address with at least one fulltime employee on [date] _____ [Initial] _____

D. Criminal Violations: I certify that within the past five years of the date of this Bid announcement, this business has not admitted guilt nor been found guilty by any court or local, state or federal regulatory enforcement agency of violation of any criminal law or administrative regulation regarding fraud. [Initial] _____

E. Citations or Code Violations: I certify that this business is not currently subject to any unresolved citation or notice of violation of any Manatee County Code provision, with the exception of citations or notices which are the subject of a legal current appeal within the date of this bid announcement. [Initial] _____

F. Fees and Taxes: I certify that within this business is not delinquent in the payment of fines, liens, assessments, fees or taxes to any governmental unit or taxing authority within Manatee County, with the exception of those which are the subject of a legal current appeal. [Initial] _____

Each of the above certifications is required to meet the qualification of "Local Business" under Manatee County Code of Law, 2-26-6.

Signature of Affiant _____

STATE OF FLORIDA

COUNTY OF _____

Sworn to (or affirmed) and subscribed before me this _____ day of _____, 20____, by (name of person making statement).

(Notary Seal) Signature of Notary: _____

Name of Notary (Typed or Printed) _____

Personally Known _____ OR Produced Identification _____ Type of Identification Produced _____

Submit executed copy to Manatee County Purchasing, Suite 803, 1112 Manatee Avenue W., Bradenton, FL 34205.

**BID FORM – IFB #11-1106-OV
SECTION 00300**

**For: Manatee County Convention Center / HVAC and Control Replacement
Palmetto, FL (Project File: 49664)**

TOTAL BID PRICE: _____

We propose to furnish Manatee County a complete and operable HVAC and Control Replacement System as stated in Phase 1, Phase II and Phase III Bid Form in accordance with the Specifications and Plans provided in this Invitation for Bid.

We, the undersigned, hereby declare that we have carefully reviewed the bid documents, and with full knowledge and understanding of the aforementioned herewith submit this bid, meeting each and every specification, term, and condition contained in the Invitation for Bids.

We understand that the bid technical specifications, terms, and conditions in their entirety shall be made a part of any agreement or contract between Manatee County and the successful bidder. Failure to comply shall result in contract default, whereupon, the defaulting contractor shall be required to pay for any and all re-procurement costs, damages, and attorney fees as incurred by the County.

Communications concerning this Bid shall be addressed as follows:

Person's Name: _____

Address: _____ Phone: _____

Date: _____ FLContractorLicense# _____

Bidder is a WBE/MBE Vendor? _____ Certification _____

COMPANY'S NAME: _____

AUTHORIZED SIGNATURE(S): _____

Name and Title of Above Signer(s) _____

CO. MAILING ADDRESS: _____

STATE OF INCORPORATION _____ (if applicable)

TELEPHONE: () _____ FAX: () _____

Email address: _____

Acknowledge Addendum No. _____ Dated: _____ Acknowledge Addendum No. _____ Dated _____

SIGN AND CONFIRM DATE OF PROJECT VISIT: _____ DATE: _____

BID FORM

(Submit in Triplicate)

Section 00300

Base Bid

Manatee County Convention Center / HVAC and Control Replacement / Palmetto, FL 34221 (Project File: #49664)

ITEM	DESCRIPTION	U/M	EST. QTY.	UNIT PRICE	EXTENDED PRICE
1	Phase I - Arena Mechanical Systems and Ancillary Work rendering a complete and operable system	LS	1	\$	\$
2	Phase II - Conference Area Mechanical Systems Replacement and Ancillary Work rendering a complete and operable system	LS	1	\$	\$
3	Phase III - Control System Implementation rendering a complete and operable system	LS	1	\$	
4	Discretionary Work				\$80,000.00
TOTAL BID PRICE					\$
<p>Bidders Note: <u>Phase I:</u> All rooftop work (new and demolition) shall be carried out completely from May 16, 2011 through May 31, 2011.</p> <p><u>Phase II:</u> All rooftop and all interior work (new and demolition) shall be carried out completely from July 1, 2011 through July 29, 2011.</p>					

Authorized Signature: _____

Bidder (Please Print): _____

**BID FORM
(Submit in Triplicate)
Section 00300
Bid Alternate**

Manatee County Convention Center HVAC AND CONTROL REPLACEMENT / PALMETTO, FL 34221		
Bid Alternate Item	Bid Alternate Description	LUMP SUM
1	<p><u>ALTERNATE 1:</u> Provide a Deduct from the Base Bid for Phase 1 and 2 for use with Schedule 80 PVC Chiller Water Pipe (Base Bid shall be based on Schedule 40 Steel Pipe)</p>	\$
2	<p><u>ALTERNATE 2:</u> Provide a Deduct from the Base Bid for PHASE 2 only for replacement of existing Split Systems on the Ground level (Units 1, 2, 2A and 9) in lieu of Chilled Water Blower Coils, Chilled Water Piping and Ancillary Controls. (Base Bid shall be based on installation of Chilled Water Piping and Chilled Water AHUs)</p>	\$

Authorized Signature: _____

Bidder (Please Print): _____

**SWORN STATEMENT
THE FLORIDA TRENCH SAFETY ACT**

THIS FORM MUST BE SIGNED IN THE PRESENCE OF A NOTARY PUBLIC OR BY AN OFFICER AUTHORIZED TO ADMINISTER OATHS.

- 1. This Sworn Statement is submitted with IFB No. #11-1106-OV
- 2. This Sworn Statement is submitted by _____
whose business address is _____
and, if applicable, its Federal Employer Identification Number (FEIN) is _____.
If the entity has no FEIN, include the Social Security Number of the individual signing this sworn statement _____.
- 3. Name of individual signing this Sworn Statement is: _____,
Whose relationship to the above entity is: _____.
- 4. The Trench Safety Standards that will be in effect during the construction of this project shall include, but are not limited to: Laws of Florida, Chapters 90-96, TRENCH SAFETY ACT, and OSHA RULES AND REGULATIONS 29 CFR 1926.650 Subpart P, effective October 1, 1990.
- 5. The undersigned assures that the entity will comply with the applicable Trench Safety Standards and agrees to indemnify and hold harmless the Owner and Engineer, and any of their agents or employees from any claims arising from the failure to comply with said standard.
- 6. The undersigned has appropriated the following costs for compliance with the applicable standards:

Trench Safety Measure (Description)	Units of Measure (LF, SY)	Unit Quantity	Unit Cost	Extended Cost
a. _____	_____	_____	\$ _____	_____
b. _____	_____	_____	\$ _____	_____
c. _____	_____	_____	\$ _____	_____
d. _____	_____	_____	\$ _____	_____

- 7. The undersigned intends to comply with these standards by instituting the following procedures:

_____.

THE UNDERSIGNED, in submitting this Bid, represents that they have reviewed and considered all available geotechnical information and made such other investigations and tests as they may deem necessary to adequately design the trench safety system(s) to be utilized on this project.

(AUTHORIZED SIGNATURE / TITLE)

SWORN to and subscribed before me this ____ day of _____, 20____.
(impress official seal)

Notary Public, State of Florida
My commission expires: _____

SECTION 00430
CONTRACTOR'S QUESTIONNAIRE
(Submit in Triplicate)

The Bidder warrants the truth and accuracy of all statements and answers herein contained.
(Include additional sheets if necessary.)

THIS QUESTIONNAIRE MUST BE COMPLETED AND SUBMITTED WITH YOUR BID.

1. LICENSE # and COMPANY'S NAME: _____
CO. PHYSICAL ADDRESS: _____
TELEPHONE NUMBER: (____) _____ FAX (____) _____
EMAIL ADDRESS: _____

2. Bidding as an; individual ___ a partnership ___ a corporation; ___ a joint venture; ___

3. If a partnership: list names and addresses of partners; if a corporation: list names of officers, directors, shareholders, and state of incorporation; if joint venture: list names and address of ventures' and the same if any venture are a corporation for each such corporation, partnership, or joint venture:

4. Your organization has been in business under this firm's name as a _____
for how many years? _____

Years of experience as a Mechanical Contractor? _____

5. Describe and give the date and owner of the last three government projects you've completed which are similar in cost, type, size, and nature as the one proposed (for a public entity). Include contact name and phone number:

6. Have you ever been assessed liquidated damages under a contract during the past five (5) years? If so, state when, where (contact name, address, and phone number) and why.

7. Have you ever failed to complete work awarded to you? If so, state when, where and provide Contact name, address, phone number and why?

8. Have you ever been debarred or prohibited from bidding on a governmental entity's construction project? If yes, name the entity and describe the circumstances:

9. Name three individuals, governmental entities, or corporations for which you have performed similar work and to which you refer. Include contact name and phone number:

- 1.

- 2.

- 3.

10. What specific steps have you taken to examine the physical conditions at or contiguous to the site, including but not limited to, the location of existing underground facilities? State date of site visit.

11. What specific physical conditions, including, but not limited to, the location of existing underground facilities have you found which will, in any manner, affect cost, progress, performance, or finishing of the work?

12. If any, list (with contract amount) WBE/MBE to be utilized:

13. What equipment do you own to accomplish this Work?

14. What equipment will you purchase/rent for the Work? (Specify which)

17. List the following in connection with the Surety which is providing the Bond(s):

Surety's Name: _____

Surety's Address: _____

Name, address and phone number of Surety's resident agent for service of process in Florida:

Phone: (____) _____

Email: _____

SECTION 00491
Drug Free Work Place Certification

SWORN STATEMENT PURSUANT TO SECTION 6-101 (7) (B),
MANATEE COUNTY PURCHASING CODE

THIS FORM MUST BE SIGNED AND SWORN TO IN THE PRESENCE OF A NOTARY PUBLIC OR OTHER OFFICIAL AUTHORIZED TO ADMINISTER OATHS.

This sworn statement is submitted to the Manatee County Board of County Commissioners by _____

[Print individual's name and title]

_____ for _____

Whose business address is

_____?

and (if applicable) its Federal Employer Identification Number (FEIN) is _____
(If the entity has no FEIN, include the Social Security Number of the individual signing this sworn statement: _____)

I understand that no person or entity shall be awarded or receive a county contract for public improvements, procurement of goods or services (including professional services) or a county lease, franchise, concession or management agreement, or shall receive a grant of county monies unless such person or entity has submitted a written certification to the County that it will provide a drug free work place by:

(1) providing a written statement to each employee notifying such employee that the unlawful manufacture, distribution, dispensation, possession or use of a controlled substance as defined by . 893.02(4), Florida Statutes, as the same may be amended from time to time, in the person's or entity's work place is prohibited specifying the actions that will be taken against employees for violation of such prohibition. Such written statement shall inform employees about:

- (i) the dangers of drug abuse in the work place;
- (ii) the person's or entity's policy of maintaining a drug free environment at all its work places, including but not limited to all locations where employees perform any task relating to any portion of such contract, business transaction or grant;
- (iii) any available drug counseling, rehabilitation, and employee assistance programs; and
- (iv) the penalties that may be imposed upon employees for drug abuse violations.

2) Requiring the employee to sign a copy of such written statement to acknowledge his or her receipt of same and advice as to the specifics of such policy. Such person or entity shall retain the statements signed by its employees. Such person or entity shall also post in a prominent place at all of its work places a written statement of its policy containing the foregoing elements (i) through (iv).

(3) Notifying the employee in the statement required by subsection (1) that as a condition of employment the employee will:

- (i) abide by the terms of the statement; and
- (ii) notify the employer of any criminal drug statute conviction for a violation occurring in the work place no later than five (5) days after such a conviction.

(4) Notifying the County within ten (10) days after receiving notice under subsection (3) from an employee or otherwise receiving actual notice of such conviction.

(5) Imposing appropriate personnel action against such employee up to and including termination; or requiring such employee to satisfactorily participate in a drug abuse assistance or rehabilitation program approved for such purposes by a federal, state, or local health, law enforcement, or other appropriate agency.

(6) Making a good faith effort to continue to maintain a drug free work place through implementation of sections (1) through (5) stated above.

I UNDERSTAND THAT THE SUBMISSION OF THIS FORM TO THE CONTRACTING OFFICER FOR MANATEE COUNTY IS VALID THROUGH DECEMBER 31 OF THE CALENDAR YEAR IN WHICH IT IS FILED. I ALSO UNDERSTAND THAT ANY CONTRACT OR BUSINESS TRANSACTION SHALL PROVIDE FOR SUSPENSION OF PAYMENTS, OR TERMINATION, OR BOTH, IF THE CONTRACTING OFFICER OR THE COUNTY ADMINISTRATOR DETERMINES THAT:

- (1) Such person or entity has made false certification.
- (2) Such person or entity violates such certification by failing to carry out the requirements of sections (1), (2), (3), (4), (5), or (6) or subsection 3-101 (7) (B); or
- (3) Such a number of employees of such person or entity have been convicted of violations occurring in the work place as to indicate that such person or entity has failed to make a good faith effort to provide a drug free work place as required by subsection 3-101(7) (B).

[Signature]

STATE OF FLORIDA
COUNTY OF _____

Sworn to and subscribed before me this _____ day of _____, 2010

by _____.

Personally known _____ OR produced identification _____

[Type of identification]

My commission expires _____

Notary Public Signature

[Print, type or stamp Commissioned name of Notary Public]

Signatory Requirement: In the case of a business entity other than a partnership or a corporation, this affidavit shall be executed by an authorized agent of the entity. In the case of a partnership, this affidavit shall be executed by the general partner(s). In the case of a corporation, this affidavit shall be executed by the corporate president.

PUBLIC CONTRACTING AND ENVIRONMENTAL CRIMES CERTIFICATION
SWORN STATEMENT PURSUANT TO ARTICLE 5,
MANATEE COUNTY PURCHASING CODE

THIS FORM MUST BE SIGNED AND SWORN TO IN THE PRESENCE OF A NOTARY PUBLIC OR OTHER OFFICIAL AUTHORIZED TO ADMINISTER OATHS.

This sworn statement is submitted to the Manatee County Board of County Commissioners by

_____ [print individual's name and title]

_____ for _____ [print name of entity submitting sworn statement]

Whose business is: _____

and (if applicable) its Federal Employer Identification Number (FEIN) is _____ If the entity has no FEIN, include the Social Security Number of the individual signing this sworn statement: _____

I understand that no person or entity shall be awarded or receive a county contract for public improvements, procurement of goods or services (including professional services) or a county lease, franchise, concession or management agreement, or shall receive a grant of county monies unless such person or entity has submitted a written certification to the County that it has not:

- (1) been convicted of bribery or attempting to bribe a public officer or employee of Manatee County, the State of Florida, or any other public entity, including, but not limited to the Government of the United States, any state, or any local government authority in the United States, in that officer's or employee's official capacity; or
- (2) been convicted of an agreement or collusion among bidders or prospective bidders in restraint of freedom of competition, by agreement to bid a fixed price, or otherwise; or
- (3) been convicted of a violation of an environmental law that, in the sole opinion of the County's Purchasing Official, reflects negatively upon the ability of the person or entity to conduct business in a responsible manner; or
- (4) made an admission of guilt of such conduct described in items (1), (2) or (3) above, which is a matter of record, but has not been prosecuted for such conduct, or has made an admission of guilt of such conduct, which is a matter of record, pursuant to formal prosecution. An admission of guilt shall be construed to include a plea of nolo contendere; or
- (5) where an officer, official, agent or employee of a business entity has been convicted of or has admitted guilt to any of the crimes set forth above on behalf of such and entity and pursuant to the direction or authorization of an official thereof (including the person committing the offense, if he is an official of the

business entity), the business shall be chargeable with the conduct herein above set forth. A business entity shall be chargeable with the conduct of an affiliated entity, whether wholly owned, partially owned, or one which has common ownership or a common Board of Directors. For purposes of this Form, business entities are affiliated if, directly or indirectly, one business entity controls or has the power to control another business entity, or if an individual or group of individuals controls or has the power to control both entities. Indicia of control shall include, without limitation, interlocking management or ownership, identity of interests among family members, shared organization of a business entity following the ineligibility of a business entity under this Article, or using substantially the same management, ownership or principles as the ineligible entity.

Any person or entity, who claims that this Article is inapplicable to him/her's/it because a conviction or judgement has been reversed by a court of competent jurisdiction, shall prove the same with documentation satisfactory to the County's Purchasing Official. Upon presentation of such satisfactory proof, the person or entity shall be allowed to contract with the County.

I UNDERSTAND THAT THE SUBMISSION OF THIS FORM TO THE CONTRACTING OFFICER FOR MANATEE COUNTY IS VALID THROUGH DECEMBER 31 OF THE CALENDAR YEAR IN WHICH IT IS FILED. I ALSO UNDERSTAND THAT ANY CONTRACT OR BUSINESS TRANSACTION SHALL PROVIDE FOR SUSPENSION OF PAYMENTS, OR TERMINATION, OR BOTH, IF THE CONTRACTING OFFICER OR THE COUNTY ADMINISTRATOR DETERMINES THAT **SUCH PERSON OR ENTITY HAS MADE FALSE CERTIFICATION.**

[Signature]

STATE OF FLORIDA
COUNTY OF _____

Sworn to and subscribed before me this _____ day of _____, 2010 by _____.

Personally known _____ OR produced _____
[Type of identification]

My commission expires _____
Notary Public Signature

[Print, type or stamp Commissioned name of Notary Public]

Signatory Requirement - In the case of a business entity other than a partnership or a corporation, this affidavit shall be executed by an authorized agent of the entity. In the case of a partnership, this affidavit shall be executed by the general partner(s). In the case of a corporation, this affidavit shall be executed by the corporate president.

SECTION 00500
**FORM OF AGREEMENT
 BETWEEN THE
 COUNTY OF MANATEE, FLORIDA
 AND THE CONTRACTOR AS IDENTIFIED BELOW
 ON THE BASIS OF A STIPULATED UNIT COST CONTRACT PRICE**

THIS AGREEMENT is made and entered into by and between the COUNTY OF MANATEE, a political subdivision of the state of Florida, hereinafter referred to as the "COUNTY" and _____, hereinafter referred to as the "CONTRACTOR," duly authorized to transact business in the state of Florida, with offices located at _____ (Phone).

Article 1. WORK

CONTRACTOR shall furnish all labor, materials, supplies, and other items required to complete the Work for IFB No. IFB#11-1106-OV / Manatee County Convention Center / HVAC and Control Replacement, Palmetto, FL 34221 in strict accordance with Contract Documents and any duly authorized subsequent addenda thereto, all of which are made a part hereof.

Article 2. ENGINEER

The County of Manatee, Project Management Department, is responsible as the COUNTY and Jerry N. Zoller, ARCHITECT / PLANNER hereinafter referred to as "ENGINEER," designed this project and is responsible for technical/engineering reviews and decisions. The ENGINEER is a member of the COUNTY'S project management team which is collectively responsible in ensuring the Work is completed in accordance with the Contract Documents. All communications involving this project will be addressed to:

County of Manatee
 Property Management Department
 Attn: Mr. Frank Monhart, AIA
 Project Manager
 IFB#11-1106-OV
 1112 Manatee Avenue West
 Bradenton, FL 34208
 Phone (941) 748-4501, Ext. 5844

Jerry N. Zoller, AIA, P.A.
 914 14th Street West
 Attn: Mr. Jerry N. Zoller
 Bradenton, FL 34208
 Phone: 941-748-4465

Where the terms ENGINEER and/or COUNTY are used in the Contract Documents, it shall mean the COUNTY'S project management team.

Article 3. CONTRACTOR'S REPRESENTATIONS

In order to induce COUNTY to enter into this Agreement, CONTRACTOR makes the following representations:

- 3.1 CONTRACTOR has familiarized itself with the nature and extent of the Bid Documents, Work, site, locality and all local conditions and laws and regulations that in any manner may affect cost, progress, performance or furnishing of the Work.
- 3.2 CONTRACTOR has studied carefully all drawings of the physical conditions upon which CONTRACTOR is entitled to rely.
- 3.3 CONTRACTOR has obtained and carefully studied (or assumes responsibility for obtaining and carefully studying) all such examinations, investigations, explorations, tests, reports and studies which pertain to the physical conditions at or contiguous to the site or which otherwise may affect the cost, progress, performance or furnishing of the Work as CONTRACTOR considers necessary for the performance or furnishing of the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Bid Documents; and no additional examinations, investigations, explorations, tests, reports, studies or similar information or data are or will be required by CONTRACTOR for such purposes.
- 3.4 CONTRACTOR has reviewed and checked all information and data shown or indicated on the Bid Documents with respect to existing underground facilities at or contiguous to the site and assumes responsibility for the accurate location of said underground facilities. Any additional examinations, investigations, explorations, tests, reports, studies or similar information or data in respect of said underground facilities conducted by the CONTRACTOR will be done at the CONTRACTOR'S expense.

- 3.5 CONTRACTOR has correlated the results of all such observations, examinations, investigations, explorations, tests, reports and studies with the terms and conditions of the Bid.
- 3.6 CONTRACTOR has given COUNTY written notice of all conflicts, errors or discrepancies that have been discovered in the Bid Documents and the written resolution thereof by OWNER is acceptable to CONTRACTOR.
- 3.7 CONTRACTOR shall schedule and perform the Work subject to COUNTY'S approval and shall hold COUNTY harmless from all liabilities incurred due to CONTRACTOR'S failure to coordinate with the COUNTY.

Article 4. CONTRACT DOCUMENTS

The Contract Documents which comprise the entire Agreement between COUNTY and CONTRACTOR concerning the Work consist of the following:

- 4.1 This Agreement and Bid Document **IFB#11-1106-OV**
- 4.2 Performance and/or other Bonds and Insurance Certificate(s)
- 4.3 Drawings (not attached)
- 4.4 Addenda numbers ____ to ____ inclusive.
- 4.5 CONTRACTOR'S Bid Form and any other information submitted by Contractor prior to Notice of Award.

- 4.6 The following which may be delivered or issued after the effective date of the Agreement and are not attached hereto: all written Change Orders and other documents amending, modifying, or supplementing the Contract Documents.
- 4.7 The documents listed in paragraphs above are attached to this Agreement (except as noted otherwise above). There are no Contract Documents other than those listed above in this Article 4.

Article 5. MISCELLANEOUS

- 5.1 Terms used in this Agreement are defined in Article 1 of the General Conditions.
- 5.2 No assignment by a party hereto of any rights under or interest in the Contract Documents will be binding on another party hereto without the written consent of the party sought to be bound; and specifically but without limitation, monies that may become due and monies that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law); and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignee from any duty or responsibility under the Contract Documents.
- 5.3 COUNTY and CONTRACTOR each binds itself, its partners, successors, assigns and legal representatives to the other party hereto, its partners, successors, assigns and legal representatives in respect of all covenants, agreements and obligations contained in the Contract Documents.

The OWNER will pay, and the CONTRACTOR will accept in full consideration for the performance of the Work (IFB No. #11-1106-OV) Manatee County Convention Center / HVAC and Control Replacement, Palmetto, FL) subject to additions and deduction as provided therein, the sum of _____ Dollars and Cents (\$_____) for Bid “____” based on Completion Time of _____ calendar days and the sum of \$1,288.00 as liquidated damages for each calendar day of delay.

CONTRACTOR

BY: _____
Signature

Name and Title of Signer (printed)

Date: _____

MANATEE COUNTY GOVERNMENT

BY: _____ For the County
Signature

R. C. “Rob” Cuthbert, C.P.M., CPPO, Purchasing Official
Name and Title of Signer

Date: _____

SECTION 00700
GENERAL CONDITIONS

ARTICLE I - DEFINITIONS

Whenever used in the Bid Documents, the following terms have the meaning indicated which are applicable to both the singular and plural thereof:

Addendum - Written or graphic instruments issued prior to the opening of bids which clarify or change the bidding documents or the contract documents.

Agreement - The written Agreement between County and Contractor covering the Work to be performed; other contract documents are attached to the Agreement and made a part thereof as provided therein.

Amendment - A written amendment of the contract documents, signed by County and Contractor on or after the effective date of the Agreement and normally dealing with the non-engineering or non-technical rather than strictly work related aspects of the contract documents.

Application for Payment - The form accepted by Project Representative which is to be used by Contractor in requesting progress or final payments and which is to include such supporting documentation as is required by the contract documents.

Award - Acceptance of the bid from the person, firm, or corporation which in the County's sole and absolute judgment will under all circumstances best serve the public interest. Award shall be made by a majority vote of a quorum of Manatee County Board of County Commissioners in open session; or by the Purchasing Official in accordance with Manatee County Code of Laws.

Bid - The offer of the bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

Bidder - One who submits a bid directly to the County, as distinct from a sub-bidder, who submits a bid to a Bidder.

Bidding Documents - Consists of the Invitation For Bid, which includes but is not limited to: the bid form, drawings, Contract Documents, terms and conditions, and the proposed contract documents (including all Addenda issued prior to receipt of bids); and becomes a part of the Agreement.

Bonds - Performance and payment bonds and other instruments of security.

Change Order - A document recommended by Project Representative which is signed by Contractor and County and authorizes an addition, deletion, or revision in the Work or an adjustment in the contract price or the contract time, issued on or after the effective date of the Agreement.

Compensable Delay - Any delay beyond the control and without the fault or negligence of the Contractor resulting from County-caused changes in the Work, differing site conditions, suspensions of the Work, or termination for convenience by County.

Contract Documents - The Agreement, Addenda (which pertain to the contract documents), Contractor's bid (including documentation accompanying the bid and any post-bid documentation submitted prior to the Notice of Award), the bonds, the specifications and the drawings, together with all amendments, modifications and supplements issued on or after the effective date of the Agreement.

Contract Price - The monies payable by County to Contractor under the contract documents as stated in the Agreement.

Contract Time - The number of days or the date stated in the Notice to Proceed for the completion of the Work.

Contractor - The person, firm or corporation with whom County has entered into an Agreement.

County - Manatee County, Florida, Board of County Commissioners.

Days - All references to days are to be considered calendar days except as specified differently.

Defective - An adjective which when modifying the work refers to work that is unsatisfactory, faulty or deficient, or does not conform to the contract documents, or does not meet the requirements of any inspection, reference standard, test or approval referred to in the contract documents, or has been damaged prior to Project Representative's recommendation of final payment (unless responsibility for the protection thereof has been assumed by County).

Discretionary – Payment for all work that shall be made only at the County's discretion in order to satisfactorily complete the project in accordance with the Plans and Specifications.

Drawings - The drawings which show the character and scope of the Work to be performed and which have been prepared or approved by Engineer and are referred to in the bidding and contract documents.

Effective Date of the Agreement - The date indicated in the Agreement on which it becomes effective (date of execution).

Excusable Delay - Any delay beyond the control and without the negligence of the Contractor, the County, or any other contractor caused by events or circumstances such as, but not limited to, acts of God or of the public enemy, fires, floods, freight embargoes, acts of government other than County, or epidemics. Labor disputes and above average rainfall shall give rise only to excusable delays.

Float or Slack Time - The time available in the progress schedule during which an unexpected activity can be completed without delaying substantial completion of the Work.

Inexcusable Delay - Any delay caused by events or circumstances within the control of the Contractor, such as inadequate crewing, slow submittals, etc., which might have been avoided by the exercise of care, prudence, foresight, or diligence on the part of the Contractor.

Non-prejudicial Delay - Any delay impacting a portion of the Work within the available total float or slack time and not necessarily preventing completion of the Work within the contract time.

Notice of Award - The written notice to the successful bidder stating Award has been approved by the Board of County Commissioners; or by the Purchasing Official in accordance with Ordinance 09-52, Manatee County Purchasing Code.

Notice of Intent to Award - The written notice to the apparent low bidder stating Award has been recommended with final Award to be authorized by the Board of County Commissioners.

Notice to Proceed - Written notice by County (after execution of contract) to Contractor fixing the date on which the contract time will commence to run and on which Contractor shall start to perform (ten (10) days from date of such notice) Contractor's obligations under the contract documents.

Preconstruction Conference - Prior to starting the Work, a meeting scheduled by County with Contractor to review the Work schedules, to establish procedures for handling shop drawings and other submissions, for processing periodical pay estimates, and such other matters as may be pertinent to the project.

Prejudicial Delay - Any excusable or compensable delay impacting the Work and exceeding the total float available in the progress schedule, thus preventing completion of the Work within the contract time unless the Work is accelerated.

Pre-operation Testing - All field inspections, installation checks, water tests, performance tests and necessary corrections required of Contractor to demonstrate that individual components of the work have been properly constructed and do operate in accordance with the contract documents for their intended purposes.

Project - The total construction of which the Work to be provided under the contract documents may be the whole or a part as indicated elsewhere in the contract documents.

Project Representative - The authorized representative of County who is assigned to the project or any part thereof.

Shop Drawings - All drawings, diagrams, illustrations, schedules and other data which are specifically prepared by or for Contractor to illustrate some portion of the Work and all illustrations, brochures, standard schedules, performance charts, instructions, diagrams and other information prepared by a supplier and submitted by Contractor to illustrate material or equipment for some portion of the Work.

Specifications - Those portions of the contract documents consisting of written technical descriptions of materials, equipment, construction systems, standards and workmanship as applied to the Work and certain administrative details applicable thereto.

Subcontractor - An individual or corporation having a direct contact with Contractor or with any other subcontractor for the performance of a part of the Work at the site. Such person or firm has contractual relations with the Contractor, not with the County.

Substantial Completion - The Work (or a specified part thereof) has progressed to the point when, in the opinion of the Engineer as evidenced by Engineer's definitive certificate of Substantial Completion, it is sufficiently complete in accordance with contract documents so that the work can be utilized for the purposes for which it is intended; or if there be no such certificate issued, when final payment is due.

Successful Bidder - The lowest qualified, responsible and responsive bidder to whom an award is made.

Supplier - A manufacturer, fabricator, supplier, distributor, materialman or vendor.

Underground Facilities - All pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels or other such facilities or attachments and any encasement containing such facilities which have been installed underground to furnish any of the following services or materials: electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, sewage and drainage removal, traffic or other control systems or water.

Unit Price Work - Work to be paid for on the basis of unit prices.

Work - The entire completed construction or the various separately identifiable parts thereof required to be furnished under the contract documents. Work is the result of performing services, furnishing labor and furnishing and incorporating materials and equipment into the construction, all as required by the contract documents.

Work Directive Change - A written directive to contractor, issued on or after the effective date of the Agreement and signed by County and recommended by Project Representative ordering an addition, deletion or revision in the Work, or responding to differing or unforeseen physical conditions under which the Work is to be performed or to emergencies. A work directive change may not change the contract price or the contract time; but is evidence that the parties expect that the change directed or documented by a work directive change will be incorporated in a subsequently issued change order following negotiations by the parties as to its effect, if any, on the contract price or contract time.

ARTICLE 2 - PRELIMINARY MATTERS

Computation of Time: When time is referred to in the contract documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or legal holiday, such day will be omitted from the computation.

- 2.1 The Contractor must submit a proposed schedule of the Work at the preconstruction conference. The purpose of this schedule is to enable the County to govern the Work, to protect the functions of the local government and its citizens and to aid in providing appropriate surveillance. The County shall have the right to reschedule work provided such rescheduling is in accord with the remainder of terms of the contract. The schedule shall show, as a minimum, the approximate dates on which each segment of the work is expected to be started and finished, the proposed traffic flows during each month, the anticipated earnings by the Contractor for each month and the approximate number of crews and equipment to be used. The County, after necessary rescheduling and obtaining additional information for specific purposes, shall review and approve the schedule. The Contractor shall also forward to the County, as soon as practicable after the first day of each month, a summary report of the progress of the various parts of the work under the contract, in fabrication and in the field, stating the existing status, estimated time of completion and cause of delay, if any. Together with the summary report, the Contractor shall submit any necessary revisions to the original schedule for the County's review and approval. In addition, more detailed schedules may be required by the County for daily traffic control.
- 2.2 A Notice to Proceed may be given at any time within thirty (30) days after the effective date of the Agreement. The contract time will commence at the time specified in such notice. Contractor shall start to perform the Work on the date specified in the notice to proceed, but no work shall be done at the site prior to the date on which the contract time commences to run.
- 2.3 If at any time the materials and appliances to be used appear to the County as insufficient or improper for securing the quality of work required or the required rate of progress, the County may order the Contractor to increase his efficiency or to improve the character of his work and the Contractor shall conform to such an order. The failure of the County to demand any increase of such efficiency of any improvement shall not release the County from his obligation to secure the quality of work or the rate of progress necessary to complete the Work within the limits imposed by the contract. The County may require the Contractor to remove from the Work such employees as the County deems incompetent, careless, insubordinate or otherwise objectionable, or whose continued employment on the Work is deemed to be contrary to the County's interest.
- 2.4 The County reserves the right to let other Contracts in connection with this Work. The Contractor shall afford other Contractors reasonable opportunity for the introduction and storage of their materials and execution of their Work, and promptly connect and coordinate the Work with theirs.

ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, RE-USE

- 3.1 The contract documents comprise the entire Agreement between County and Contractor concerning the work. The contract documents are complementary; what is called for by one is as binding as if called for by all. The contract documents will be construed in accordance with the laws and ordinances of the State of Florida and the County of Manatee.

Should a conflict exist within the contract documents, the precedence in ascending order of authority are as follows: 1) Standard Printed Contract Documents, 2) Special Conditions, 3) General Conditions and 4) Drawings. Note: Computed dimensions shall govern over scaled dimensions.

- 3.2 It is the intent of the contract documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the contract documents. Any work, materials or equipment that may reasonably be inferred from the contract documents as being required to produce the intended result will be supplied whether or not specifically called for. When words which have a well-known technical or trade meaning are used to describe work, materials, or equipment, such words shall be interpreted in accordance with that meaning. Reference to standard specifications, manuals or codes of any technical society, organization or association, or to the laws or regulations of any governmental authority, whether such reference be specific or by implication, shall mean the latest standard specification, manual, code or laws or regulations in effect at the time of opening of bids, except as may be otherwise specifically stated. However, no provision of any referenced standard specification, manual or code (whether or not specifically incorporated by reference in the contract documents) shall be effective to change the duties and responsibilities of County, Contractor or Engineer, or any of their agents or employees from those set forth in the Contract Documents.

- 3.3 The contract documents may be amended to provide for additions, deletions and revisions in the Work or to modify the terms and conditions thereof in one or more of the following ways:

- 3.3.1 A Formal Written Amendment
- 3.3.2 A Change Order
- 3.3.3 Administrative Contract Adjustment (ACA)

- 3.4 In addition, the requirements of the contract documents may be supplemented and minor variations and deviations in the Work may be authorized in one or more of the following ways:

- 3.4.1 Discretionary Work – Field Directive
- 3.4.2 Engineer's approval of a Shop Drawing or sample.

ARTICLE 4 - CONTRACTOR'S RESPONSIBILITIES

- 4.1 Contractor shall keep on the Work at all times during its progress a competent resident superintendent; who shall be the Contractor's representative at the site and shall have authority to act on behalf of Contractor. All communications given to the superintendent shall be as binding as if given to Contractor.
- 4.2 Contractor shall provide competent, suitable qualified personnel to survey and lay out the Work and perform construction as required by the contract documents. Contractor shall at all times maintain good discipline and order at the site. Except in connection with the safety or protection of persons or the Work or property at the site or adjacent thereto and except as otherwise indicated in the contract documents, all Work at the site shall be performed during regular working hours and Contractor will not permit overtime work or the performance of work on Saturday, Sunday or legal holiday without County's written consent given after prior notice to Engineer (at least 72 hours in advance).
- 4.2.1 Contractor shall pay for all additional engineering charges to the County for any overtime work which may be authorized. Such additional engineering charges shall be a subsidiary obligation of Contractor and no extra payment shall be made by County on account of such overtime work. At County's option, overtime costs may be deducted from Contractor's monthly payment request or Contractor's retainage prior to release of final payment.
- 4.3 Unless otherwise specified, Contractor shall furnish and assume full responsibility for all bonds, insurance, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities and all other facilities and incidentals necessary for the furnishing, performance, testing, start-up and completion of the Work.
- 4.4 All materials and equipment shall be of good quality and new, except as otherwise provided in the contract documents. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the kind and quality of materials and equipment. All materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the instruction of the applicable supplier except as otherwise provided in the contract documents.
- 4.5 Contractor shall be fully responsible to County for all acts and omissions of the subcontractors, suppliers and other persons and organizations performing or furnishing any of the Work under a direct or indirect contract with Contractor just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents shall create any contractual relationship between County or Engineer and any such subcontractor, supplier or other person or organization, nor shall it create any obligation on the part of County to pay or to see to the payment of any monies due any such subcontractor, supplier or other person or organization.

- 4.6 **Permits:** Unless otherwise provided, Contractor shall obtain and pay for all construction permits and licenses. County shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work.
- 4.7 During the progress of the Work, Contractor shall keep the premises free from accumulation of waste materials rubbish and other debris resulting from the Work. At the completion of the Work, Contractor shall remove all waste materials, rubbish and debris from and about the premises as well as all tools, appliances, construction equipment and machinery and surplus materials and shall leave the site clean and ready for occupancy by County. Contractor shall restore to original conditions all property not designated for alteration by the Contract Documents.
- 4.8 Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.
- 4.9 **Safety and Protection:** Contractor shall comply with the Florida Department of Commerce Safety Regulations and any local safety regulations. Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Contractor shall take all necessary precautions for the safety of and shall provide the necessary protection to prevent damage, injury or loss to:
- 4.9.1 all employees on the work and other persons and organizations who may be affected thereby;
 - 4.9.2 all the work and materials and equipment to be incorporated therein, whether in storage on or off the site; and
 - 4.9.3 other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities and underground facilities not designated for removal, relocation or replacement in the course of construction.

Contractor shall comply with all applicable laws and regulations of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall provide and maintain all passageways, guard fences, lights and other facilities for the protection required by public authority or local conditions. Contractor shall provide reasonable maintenance of traffic way for the public and preservation of the County's business, taking into full consideration all local conditions. Contractor's duties and responsibilities for the safety and protection of the work shall continue until such time as all the work is completed.

- 4.10 **Emergencies:** In emergencies affecting the safety or protection of persons or the work or property at the site or adjacent thereto, Contractor, without special instruction or authorization from Engineer or County, is obligated to act to prevent threatened damage, injury or loss. Contractor shall give County prompt written notice if Contractor believes that any significant changes in the work or variations from the contract documents have been caused thereby. If County determines that a change in the contract documents is required because of the action taken in response to an emergency, a Work Directive Change or Change Order will be issued to document the consequences of the changes or variation.
- 4.11 For substitutes not included with the bid, but submitted after the effective date of the Agreement, Contractor shall make written application to Engineer for acceptance thereof, certifying that the proposed substitute will perform adequately the functions and achieve the results called for by the general design, be similar and of equal substance to that specified and be suited to the same use as that specified. The application will also contain an itemized estimate of all costs and delays or schedule impacts that will result directly or indirectly from review, acceptance and provisions of such substitute, including costs of redesign and claims of other contractors affected by the resulting change, all of which will be considered by the Engineer in evaluating the proposed substitute. Engineer may require Contractor to furnish at Contractor's expense, additional data about the proposed substitute. In rendering a decision, County/Engineer and Contractor shall have access to any available float time in the construction schedule. In the event that substitute materials or equipment not included as part of the bid, but proposed after the effective date of the agreement, are accepted and are less costly than the originally specified materials or equipment, then the net difference in cost shall be credited to the County and an appropriate change order executed.
- 4.11.1 If a specific means, method, technique, sequence of procedure of construction is indicated in or required by the contract documents, Contractor may furnish or utilize a substitute means, method, sequence, technique or procedure of construction acceptable to Engineer if Contractor submits sufficient information to allow Engineer to determine that the substitute proposed is equivalent to that indicated or required by the contract documents.
- 4.11.2 Engineer will be allowed a reasonable time within which to evaluate each proposed substitute. Engineer will be the sole judge of acceptability and no substitute will be ordered, installed or utilized without Engineer's prior written acceptance which will be evidenced by either a change order or an approved shop drawing. County may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- 4.11.3 Contractor shall reimburse County for the charges of Engineer and Engineer's Consultants for evaluating each proposed substitute submitted after the effective date of the Agreement and all costs resulting from any delays in the work while the substitute was undergoing review.

- 4.12 The Contractor shall furnish, free of charge, all labor, stakes, surveys, batter boards for structures, grade lines and other materials and supplies and shall set construction stakes and batter boards for establishing lines, position of structures, slopes and other controlling points necessary for the proper prosecution of the construction work. Where rights-of-way, easements, property lines or any other conditions which make the lay-out of the project or parts of the project critical are involved, the Contractor will employ a competent surveyor who is registered in the State of Florida for lay-out and staking. These stakes and marks shall constitute the field control by and in accord with which the Contractor shall govern and execute the work. The Contractor will be held responsible for the preservation of all stakes, marks and if for any reason any of the stakes or marks or batter boards become destroyed or disturbed, they will be immediately and accurately replaced by the Contractor.
- 4.13 The Contractor has, by careful examination, satisfied himself as to the nature and location of the work and all other matters which can in any way affect the work under this contract, including, but not limited to details pertaining to boring, as shown on the drawings, are not guaranteed to be more than a general indication of the materials likely to be found adjacent to holes bored at the site of the work, approximately at the locations indicated. The Contractor shall examine boring data, where available, and make his own interpretation of the subsoil investigations and other preliminary data, and shall base his bid on his own opinion of the conditions likely to be encountered. In no event shall an extension of time be considered for any conditions that existed at the time of bidding, nor shall the Contractor receive extra compensation for completion of the project as intended by the drawings and in keeping with the contract documents. No verbal agreement or conversation with any officer, agent or employee of the County, before or after the execution of this contract, shall affect or modify any of the terms or obligations herein contained.
- 4.14 If the Contractor, in the course of the work, finds that the drawings and/or Contract Documents cannot be followed, he shall immediately inform the County in writing, and the County shall promptly check the accuracy of the information. Any work done after such discovery, until any necessary changes are authorized, will be done at the Contractor's risk.

ARTICLE 5 - OWNER'S RESPONSIBILITIES

- 5.1 County shall furnish the data required of County under the contract documents promptly and shall make payments to the Contractor within a reasonable time (no more than 45 days) after the Work has been accepted by the County. The form of all submittals, notices, change orders and other documents permitted or required to be used or transmitted under the contract documents shall be determined by the County/Engineer. Standard County forms shall be utilized.
- 5.2 The County shall provide the lands upon which the Work under this contract is to be done, except that the Contractor shall provide all necessary additional land required for the erection of temporary construction facilities and storage of his materials, together with right of access to same.

- 5.3 The County shall have the right to take possession of and use any completed portions of the work, although the time for completing the entire work or such portions may not have expired, but such taking possession and use shall not be deemed an acceptance of any work not completed in accordance with the Contract Documents.

ARTICLE 6 - CHANGES IN THE WORK

- 6.1 Without invalidating the Agreement and without notice to any surety, County may, at any time, order additions, deletions or revisions in the Work. These will be authorized by a written amendment, a change order, or a work directive change. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the contract documents (except as otherwise specifically provided).
- 6.2 Contractor shall not be entitled to an increase in the contract price or an extension of the contract time with respect to any Work performed that is not required by the contract documents as amended, modified and supplemented.
- 6.3 County and Contractor shall execute appropriate change orders (or written amendments) covering changes in the Work which are ordered by County, or which may be required because of acceptance of defective Work.
- 6.4 At any time Engineer may request a quotation from Contractor for a proposed change in the Work and within twenty-one (21) calendar days after receipt, Contractor shall submit a written and detailed proposal for an increase or decrease in the contract price or contract time for the proposed change. Engineer shall have 21 calendar days after receipt of the detailed proposal to respond in writing. The proposal shall include an itemized estimate of all costs and time for performance that will result directly or indirectly from the proposed change. Unless otherwise directed, itemized estimates shall be in sufficient detail to reasonably permit an analysis by Engineer of all material, labor, equipment, subcontracts, overhead costs and fees, and shall cover all Work involved in the change, whether such Work was deleted, added, changed or impacted. Notwithstanding the request for quotation, Contractor shall carry on the Work and maintain the progress schedule. Delays in the submittal of the written and detailed proposal will be considered non-prejudicial.

ARTICLE 7 - CHANGE OF CONTRACT PRICE

- 7.1 The contract price constitutes the total compensation (subject to authorized adjustments) payable to Contractor for performing the Work. All duties, responsibilities and obligations assigned to or undertaken by Contractor shall be at his expense without change in the contract price.
- 7.2 The contract price may only be changed by change order or by a written amendment. Any claim for an increase or decrease in the contract price shall be based on written notice delivered by the party making the claim to the other party. Notice of the amount of the claim with supporting data shall be delivered within ten (10) days from the beginning of such occurrence and shall be accompanied by claimant's written statement that the amount claimed covers all known amounts (direct, indirect and consequential) to which the claimant is entitled as a result of the occurrence of said event.

- 7.3 The value of any Work covered by a change order or of any claim for an increase or decrease in the contract price shall be determined in one of the following ways (at County's discretion):
- 7.3.1 Where the Work involved is covered by unit prices contained in the contract documents, cost will be determined by application of such unit prices to the quantities of the items involved.
 - 7.3.2 By mutual acceptance of lump sum.
 - 7.3.3 On the basis of the cost of the Work, plus a 20% Contractor's fee for overhead and profit. (Contractor shall submit an itemized cost breakdown together with supporting data.)
- 7.4 Either County or Contractor may make a claim for an adjustment in the contract price. The unit price of an item of unit price Work shall be subject to re-evaluation and adjustment under the following conditions:
- 7.4.1 If the total cost of a particular item of unit price Work amounts to 5% or more of the contract price and the variation in the quantity of the particular item of unit price Work performed by Contractor differs by more than 15% from the estimated quantity of such item indicated in the Agreement; and
 - 7.4.2 If there is no corresponding adjustment with respect to any other item of Work; and
 - 7.4.3 If a Contractor believes that it has incurred additional expense as a result thereof; or
 - 7.4.4 If County believes that the quantity variation entitles it to an adjustment in the unit price; or
 - 7.4.5 If the parties are unable to agree as to the effect of any such variations in the quantity of unit price Work performed.

ARTICLE 8 - CHANGE OF CONTRACT TIME

- 8.1 Contract time may only be changed by a change order or a written amendment. Any claim for an extension or shortening of the contract time shall be based on written notice delivered by the party making the claim to the other party. Notice of the extent of the claim with supporting data shall be delivered within fifteen (15) days from detection or beginning of such occurrence and shall be accompanied by the claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant has reason to believe it is entitled as a result of the occurrence of said event.

- 8.2 The contract time will be extended in an amount equal to time lost due to delays beyond the control of Contractor. Such delays shall include, but not be limited to, acts or neglect by County or others performing additional work; or to fires, floods, epidemics, abnormal weather conditions or acts of God.
- 8.3 All time limits stated in the contract documents are of the essence.

ARTICLE 9 - WARRANTY, TEST/INSPECTION, CORRECTION

- 9.1 Contractor warrants (for a minimum period of three years or as otherwise stated herein) and guarantees to County that all work will be in accordance with the contract documents and will not be defective; that County, representatives of County, governmental agencies with jurisdictional interests will have access to the work at reasonable time for their observation, inspecting and testing (Contractor shall give Engineer timely notice of readiness of the work for all required approvals and shall assume full responsibility, including costs, in obtaining required tests, inspections, and approval certifications and/or acceptance, unless otherwise stated by County).
- 9.2 If any work (including work of others) that is to be inspected, tested, or approved is covered without written concurrence of Engineer, it must, if requested by Engineer, be uncovered for observation. Such uncovering shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice. Neither observations by Engineer nor inspections, tests, or approvals by others shall relieve Contractor from Contractor's obligations to perform the work in accordance with the contract documents.
- 9.3 If the work is defective, or Contractor fails to supply sufficient skilled workers, or suitable materials or equipment, or fails to furnish or perform the work in such a way that the completed work will conform to the contract documents, County may order Contractor to stop the work, or any portion thereof and terminate payments to the Contractor until the cause for such order has been eliminated. Contractor shall bear all direct, indirect and consequential costs for satisfactory reconstruction or removal and replacement with non-defective work, including, but not limited to fees and charges of engineers, architects, attorneys and other professionals and any additional expenses experienced by County due to delays to other Contractors performing additional work and an appropriate deductive change order shall be issued. Contractor shall further bear the responsibility for maintaining schedule and shall not be entitled to an extension of the contract time and the recovery of delay damages due to correcting or removing defective work.
- 9.3.1 If Contractor fails within seven (7) days after written notice to correct defective work, or fails to perform the work in accordance with the contract documents, or fails to comply with any other provision of the contract documents, County may correct and remedy any such deficiency. To the extent necessary to complete corrective and remedial action, County may exclude Contractor from all or part of the site, take possession of all or part of the work, Contractor's tools, construction equipment and machinery at the site or for which County has paid

Contractor but which are stored elsewhere. All direct, indirect and consequential costs of County in exercising such rights and remedies will be charged against Contractor in an amount approved as to reasonableness by Engineer and a change order will be issued incorporating the necessary revisions.

- 9.3.2 If within three years after the date of completion or such longer period of time as may be prescribed by laws or regulations or by the terms of any applicable special guarantee required by the contract documents, any work is found to be defective, Contractor shall promptly, without cost to County and in accordance with County's written instructions, either correct such defective work or if it has been rejected by County, remove it from the site and replace it with non-defective work. If Contractor does not promptly comply with the terms of such instruction, County may have the defective work corrected/removed and all direct, indirect and consequential costs of such removal and replacement will be paid by Contractor.

ARTICLE 10 - SUSPENSION/TERMINATION OF WORK

- 10.1 County may, at any time and without cause, suspend the work or any portion thereof for a period of not more than ninety (90) days by written notice to Contractor, which will fix the date on which work will be resumed. Contractor shall be allowed an increase in the contract price or an extension of the contract time, or both, directly attributable to any suspension if Contractor makes an approved claim therefore.
- 10.2 County may terminate the contract if Contractor commences a voluntary case under any chapter of the Bankruptcy Code or any similar action by filing a petition under any other federal or state law relating to the bankruptcy or insolvency; if a petition is filed against the Contractor under any chapter of the Bankruptcy Code or similar relief under any other federal or state law; if Contractor persistently fails to perform the work in accordance with the contract documents; if Contractor disregards laws or regulations of any public body having jurisdiction or the Engineer; or otherwise violates in any substantial way any provisions of the contract.
- 10.2.1 County may, after giving Contractor (and the surety, if there is one) seven (7) days written notice and to the extent permitted by laws and regulations, terminate the services of Contractor; exclude Contractor from the site and take possession of the work and of all Contractor's tools, construction equipment and machinery at the site and use the same to the full extent they could be used (without liability to Contractor for trespass or conversion); incorporate in the work all materials and equipment stored at the site or for which county has paid Contractor but which are stored elsewhere, and finish the work as County may deem expedient. In such case, Contractor shall not be entitled to receive any further payment beyond an amount equal to the value of material and equipment not incorporated in the work, but delivered and suitably stored, less the aggregate of payments previously made. If the direct and indirect costs of completing the work exceed the unpaid balance of the contract price, Contractor shall pay the difference to County. Such costs incurred by County shall be verified by County and incorporated in

a change order; but in finishing the work, County shall not be required to obtain the lowest figure for the work performed. Contractor's obligations to pay the difference between such costs and such unpaid balance shall survive termination of the Agreement.

- 10.3 If, through no act or fault of Contractor, the work is suspended for a period of more than ninety (90) days by County or under an order of court or other public authority, or Engineer fails to act on any application or fails to pay Contractor any sum finally determined to be due; then Contractor may, upon seven (7) days written notice to County terminate the Agreement and recover from County payment for all work executed, any expense sustained plus reasonable termination expenses. In lieu of terminating the Agreement, if Engineer has failed to act on any application of payment or County has failed to make any payment as aforesaid, Contractor may upon seven (7) days written notice to County stop the work until payment of all amounts then due.

ARTICLE 11 - CONTRACT CLAIMS

- 11.1 The rendering of a decision by Engineer with respect to any such claim, dispute or other matter (except any which have been waived by the making or acceptance of final payment) will be a condition precedent to any exercise by County or Contractor of such right or remedies as either may otherwise have under the contract documents or by laws or regulations in respect of any such claim, dispute or other matter. No action, either at law or at equity, shall be brought in connection with any such claim, dispute or other matter later than thirty (30) days after the date on which County/Engineer has rendered such written decision in respect thereof. Failure to bring an action within said thirty (30) day period shall result in Engineer's decision being final and binding on the Contractor. In no event may any such action be brought after the time at which instituting such proceedings would be otherwise barred by the applicable statute of limitations.
- 11.2 Before bringing any action in court pertaining to any claim, dispute or other matter in question(s) arising out of or relating to the contract documents or the breach thereof, or Engineer's final decision, except for claims which have been waived by the making and acceptance of final payment, the Contractor shall first submit written notice(s) of contract claims to the Purchasing Official for a decision; the Contractor may request a conference with the Purchasing Official. Claims include, without limitation, disputes arising under the contract and those based upon breach of contract, mistake, misrepresentation, or other cause for modification or revision. Contract claims shall use the process detailed in Section 2-26-63, Manatee County Purchase Code, Ordinance 09-52.

ARTICLE 12 - RESIDENT PROJECT REPRESENTATIVE - DUTIES, RESPONSIBILITIES

- 12.1 Resident Project Representative is Engineer/County's Agent, who will act as directed by and under the supervision of the Engineer, and who will confer with County/Engineer regarding his actions. Resident Project Representative's dealing in matters pertaining to the on-site work shall, in general, be only with the

County/Engineer and Contractor and dealings with subcontractors shall only be through or with the full knowledge of Contractor.

12.2 Resident Project Representative will:

- 12.2.1 Review the progress schedule, schedule of shop drawing submissions and schedule of values prepared by Contractor and consult with County/Engineer concerning their acceptability.
- 12.2.2 Attend preconstruction conferences. Arrange a schedule of progress meetings and other job conferences as required in consultation with County/Engineer and notify those expected to attend in advance. Attend meetings and maintain and circulate copies of minutes thereof.
- 12.2.3 Serve as County/Engineer's liaison with Contractor, working principally through Contractor's superintendent and assist him in understanding the intent of the contract documents. As requested by County/Engineer, assist in obtaining additional details or information when required at the job site for proper execution of the Work.
- 12.2.4 Receive and record date of receipt of shop drawings and samples, receive samples which are furnished at the site by Contractor and notify County/Engineer of their availability for examination.
- 12.2.5 Advise County/Engineer and Contractor or his superintendent immediately of the commencement of any work requiring a shop drawing or sample submission if the submission has not been approved by the County/Engineer.
- 12.2.6 Conduct on-site observations of the work in progress to assist County/Engineer in determining if the work is proceeding in accordance with the contract documents and that completed work will conform to the contract documents.
- 12.2.7 Report to County/Engineer whenever he believes that any work is unsatisfactory, faulty or defective or does not conform to the contract documents, or does not meet the requirements of any inspections, tests or approvals required or if work has been damaged prior to final payment; and advise County/Engineer when he believes work should be corrected or rejected or should be uncovered of observation or requires special testing, inspection or approval.
- 12.2.8 Verify that tests, equipment and system start-ups and operating and maintenance instructions are conducted as required by the contract documents and in the presence of the required personnel, and that Contractor maintains adequate records thereof; observe, record and report to Engineer appropriate details relative to the test procedures and start-ups.

- 12.2.9 Accompany visiting inspectors representing public or other agencies having jurisdiction over the project; record the outcome of these inspections and report to County/Engineer.
- 12.2.10 Transmit to Contractor, County/Engineer's clarifications and interpretations of the contract documents.
- 12.2.11 Consider and evaluate Contractor's suggestions or modifications in drawings or Contract Documents and report them with recommendations to County/Engineer.
- 12.2.12 Maintain at the job site orderly files for correspondence, reports of job conferences, shop drawings and sample submissions, reproductions of original contract documents including all addenda, change orders, field orders, additional drawings issued subsequent to the execution of the contract, County/Engineer's clarifications and interpretations of the contract documents, progress reports and other project related documents.
- 12.2.13 Keep a diary or log book, recording hours on the job site, weather conditions, data relative to questions of extras or deductions; list of visiting officials and representatives or manufacturers, fabricators, suppliers and distributors; daily activities, decisions, observations in general and specific observations in more detail as in the case of observing test procedures. Send copies to County/Engineer.
- 12.2.14 Record names, addresses and telephone numbers of all Contractors, subcontractors and major suppliers of materials and equipment.
- 12.2.15 Furnish County/Engineer periodic reports as required of progress of the work and Contractor's compliance with the approved progress schedule and schedule of shop drawing submissions.
- 12.2.16 Consult with County/Engineer in advance of scheduling major tests, inspections or start of important phases of the work.
- 12.2.17 Report immediately the occurrence of any accident.
- 12.2.18 Review applications for payment with Contractor for compliance with the established procedure for their submission and forward them with recommendations to County/Engineer, noting particularly their relation to the schedule of values, work completed and materials and equipment delivered at the site but not incorporated in the work.
- 12.2.19 During the course of the work, verify that certificates, maintenance and operations manuals and other data required to be assembled and furnished by Contractor are applicable to the items actually installed, and deliver this material to County/Engineer for his review prior to final acceptance of the work.

- 12.2.20 Before County/Engineer issues a Certificate of Substantial Completion, submit to Contractor a list of observed items requiring completion or correction.
- 12.2.21 Conduct final inspection in the company of County/Engineer and Contractor and prepare a final list of items to be completed or corrected.
- 12.2.22 Verify that all items on final list have been completed or corrected and make recommendations to County/Engineer concerning acceptance.
- 12.3 Except upon written instructions of County/Engineer, Resident Project Representative;
 - 12.3.1 Shall not authorize any deviation from the contract documents or approve any substitute materials or equipment;
 - 12.3.2 Shall not exceed limitations on County/Engineer's authority as set forth in the contract documents;
 - 12.3.3 Shall not undertake any of the responsibilities of Contractor, Subcontractors or Contractor's Superintendent, or expedite the work;
 - 12.3.4 Shall not advise on or issue directions relative to any aspect of the means, methods, techniques, sequences or procedures of construction unless such is specifically called for in the contract documents;
 - 12.3.5 Shall not advise on or issue directions as to safety precautions and programs in connection with the work;
 - 12.3.6 Shall not authorize County to occupy the project in whole or in part; and
 - 12.3.7 Shall not participate in specialized field or laboratory tests.

ARTICLE 13 - APPRENTICES

- 13.1 If Successful Contractor employs Apprentices, he shall be governed and shall fully comply with the provisions of Florida State Statute 446.011.

END OF SECTION

PROJECT MANUAL

MANATEE CONVENTION CENTER HVAC REPLACEMENT



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JANUARY 11, 2011

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SECTION 01100 SUMMARY

PART 1 – GENERAL

1.01 SUMMARY

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes:

1. Project information.
2. Work covered by Contract Documents.
3. Phased construction.
4. Works by Owner.
5. Work under separate contracts.
6. Future work.
7. Purchase contracts.
8. Owner-furnished products.
9. Contractor-furnished and installed products.
10. Access to site.
11. Coordination with occupants.
12. Work restrictions.
13. Specifications and drawing conventions.

B. Related Section:

1. Division 01 Section “Temporary Facilities and Controls” for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

- A. Project Identification: Manatee County Convention and Civic Center
Mechanical Systems Replacement
Manatee County Project #

- 1. Project Location: Manatee County Convention and Civic Center
1 Haben Boulevard
Palmetto, FL 34221
- B. Owner: Manatee County Government
 - 1. Owner's Representative: Frank Monhart, AIA
Project Manager Construction Services Division
Property Management Department
1112 Manatee Avenue West, Suite #868
Bradenton, FL 34205
- C. Engineer: Global MEP and Fire Engineering, Inc.
8450 Linger Lodge Road
Bradenton, FL 34202
- D. Other Owner Consultants: The Owner has retained the following design professionals who have prepared designated portions of the Contract Documents:
 - 1. Architect: Jerry N. Zoller, AIA, P.A.
914 14th Street West
Bradenton, FL 34205

1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of the Project is defined by the Contract Documents and consists of the following:
 - 1. Scope shall include but is not limited to the replacement of the rooftop mechanical condensing units and air handling units with new chillers and new air handling units, new chilled water piping, and new controls system. Minor ductwork modifications in the facility interior, replacing mini split systems serving the office spaces with chilled water fan coil units, replacing volume dampers with new volume dampers shall be included in the scope of work. Contractor shall provide a complete and operable system.
- B. Type of Contract:
 - 1. Project will be constructed under a single prime contract.

1.5 PHASED CONSTRUCTION

- A. The Work shall be conducted in phases, with each phase substantially complete as indicated:
 - 1. Phase 1: The first phase of the project shall consist of full replacement of the mechanical systems on the rooftop of the Arena area of the Civic Center (Units 3 and 4 split systems), controls, and electrical work as required. Existing mechanical systems indicated to be removed become the property and responsibility of the Contractor. Contractor shall remove and discard of all equipment and by-products in an environmentally acceptable manner. The

County reserves the right to capture all refrigerant enclosed in the closed loop systems. All rooftop work (new and demolition) shall be carried out completely from May 16th through May 31st. Coordinate with Owner.

2. Phase 2: The second phase shall consist of a full replacement of the mechanical systems on the rooftop of the of the Convention Rooms area of the Civic Center (Units 6, 7, and 8 split systems), interior mechanical modifications, controls, and electrical work as required. Existing mechanical systems indicated to be removed become the property and responsibility of the Contractor. Contractor shall remove and discard of all equipment and by-products in an environmentally acceptable manner. The County reserves the right to capture all refrigerant enclosed in the closed loop systems. All rooftop and all interior work (new and demolition) shall be carried out completely from June 21st through July 29th. Coordinate with Owner. Upon completion of the interior work, the County will be replacing the ceiling system (grid and tiles). Upon completion of the grid (approximately the first week of August), the Contractor will make final mechanical systems attachments to the gridwork. Full test and balance of the supplies, return and exhaust to meet indicated airflows is required upon replacement of ceiling.
 3. Phase 3: The third phase of the project shall consist of full-optimized control system, including new wiring, devices, programming, and full operation as demonstrated to owner and Engineer, in accordance with the Construction Documents.
- B. Before commencing Work of each phase, submit an updated copy of the Contractor's construction schedule showing the sequence, commencement and completion dates, and interruption of Owner's personnel in occupied spaces for all phases of the Work.

1.6 WORKS BY OWNER

- A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or standard operation by Owner. Coordinate the Work of this Contract with facility operations performed by Owner.
- B. Preceding Work: The Contraction shall diligently coordinate new mechanical systems ordering, fabrication, transportation and receipt of equipment to assure the strict timeline for replacement of all rooftop equipment meets the available schedule. It is the responsibility of the contractor to observe all required facility accesses.

1.7 ACCESS TO SITE

- A. General: Contractor shall have limited use of Project site for construction operations and staging. Contractor shall coordinate all site use and accesses with the Owner. All use of the site for staging shall be at the risk of the contractor.
- B. Use of Site: Limit use of Project site to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated. This facility

shall maintain operation throughout the period of construction for this project.

1. Limits: Confine construction operations to occupied and unoccupied spaces of building interior and building exterior.
 2. Limits: Limit site disturbance, including crane operations, staging and clearing of project waste to areas pre approved by Manatee County personnel, and facility staff.
 3. Driveways, Walkways and Entrances: Keep driveways loading areas, and entrances serving premises clear and available to Owner, Owner's employees, public, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. All deliveries to site shall be the full responsibility of the contractor. No Manatee County or facility personnel shall be involved in and project related deliveries or correspondence.
- C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations. All construction shall be covered by dust tight barrier to minimize impact on facility. All roof work shall be performed as to minimize impact on weathertight condition. Any damage occurred to roof shall be the responsibility of the contractor to correct in a manner as not to impact the warranty of the roof.

1.8 COORDINATION WITH OCCUPANTS

- A. Full Owner Occupancy: Owner will occupy site during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.
1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
 2. Contractor shall maintain a construction schedule, provide to Owner and Engineer. Schedule shall outline all start and complete dates. Notify the Owner not less than 72 hours in advance of activities that will affect Owner's operations.
- B. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.

1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
 2. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.
- C. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.
1. Engineer will prepare a Certificate of Substantial Completion for all Work. Owner acceptance of the completed Work does not constitute acceptance or Substantial Completion.
 2. Before Certificate of Substantial Completion, mechanical, controls, and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of Work.
 3. Upon completion, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

1.9 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
1. Comply with limitations on use of public streets and other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work in the existing building to working hours of 7:00 a.m. to 6:00 p.m., Monday through Friday and weekends. For all work in occupied areas:
1. Weekend Hours: as required. Previous Owner acceptance is required, in written form.
 2. Hours for Systems Shutdowns: Coordinate any outages with Owner at least 72 hours in advance.
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner.
1. Notify Owner not less than 72 hours in advance of proposed utility interruptions.
 2. Obtain Owner's written permission before proceeding with utility

interruptions.

- D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner, even for non-standard working hours.
 - 1. Notify Owner not less than 72 hours in advance of proposed disruptive operations.
 - 2. Obtain Owner's written permission before proceeding with disruptive operations.
- E. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet of entrances, operable windows, or outdoor air intakes, or on roof.
- F. Controlled Substances: Use of tobacco products and other controlled substances on the Project site is not permitted.
- G. Employee Identification: Provide identification tags for Contractor personnel working on the Project site. Require personnel to utilize identification tags at all times.
- H. Employee Screening: Comply with Owner's requirements regarding drug and background screening of Contractor personnel working on the Project site.
 - 1. Maintain list of approved screened personnel with Owner's Representative prior to any operations on site.

1.10 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 - 1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 - 2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- C. Drawing Coordination: Requirements for materials and products identified on the Drawings are described in detail in the Specifications. One or more of the following are used on the Drawings to identify materials and products:
 - 1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.

2. Abbreviations: Materials and products are identified by abbreviations. If there is any confusion with contract documents, contractor shall follow written Request for Information Procedures.
3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF 01100

SECTION 01150 MEASUREMENT AND PAYMENT

PART 1 – GENERAL

1.01 SUMMARY

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for measurement and payment. Contractor shall prepare invoice payment request matching items and totals to be outlined in a detailed Schedule of Values, to be submitted prior to commencement of work. Schedule of Values shall include detailed breakdown of Contractor efforts, outlining work required for each item of the Bid Form, itemized by discipline of work, major pieces of equipment, work items, subcontractor work, quantities, etc.
- B. Related Sections:
 - 1. Division 01 Section “Summary” for Phased requirements of work to be completed, and construction timelines.
 - 2. Bid Form outlining Phased construction items for specific requirements and limitations.
- C. The scope of this section of the Contract Documents is to further define the items included in each Bid Item in the Bid Form section of the Contract Documents. Payment will be made based on the specified items included in the description in this section for each bid item.
- D. All contract prices included in the Bid Form section will be full compensation for all required work, identified or not, required, including but not limited to shop drawings, working drawings, labor, materials, tools, equipment, incidentals and mobilization necessary to complete the requirements of this project, as shown on the Drawings and Specifications in the Contract Documents. Actual quantities of each item bid on a unit price basis will be determined upon completion of the construction in the manner set up for each item in this section of the Specifications. Payment for all items listed in the Bid Form will constitute full compensation for all work required to render a complete product, specified to be performed under this Contract. Contractor shall itemize each Bid Form Item in a detailed Schedule of Values, to include estimated and measured values.

1.3 BID FORM ITEMS

- A. Item 1 – Phase 1 – Replacement of Arena Mechanical Systems.
 - 1. Measurement and payment for this Bid Item shall include full compensation

for all required work included to complete this portion of this project, rendering a complete and operable system. All overhead required for this portion of this project shall be included, and indicated in itemized breakdown. Payment for all work included under this Bid Item shall represent full compensation in accordance with the lump sum price bid for the work required.

- B. Item 2 – Phase 2 – Replacement of Convention Rooms Mechanical Systems, and interior modifications.
 - 1. Measurement and payment for this Bid Item shall include full compensation for all required work included to complete this portion of this project, rendering a complete and operable system. All overhead required for this portion of this project shall be included, and indicated in itemized breakdown. Payment for all work included under this Bid Item shall represent full compensation in accordance with the lump sum price bid for the work required.

- C. Item 3 – Phase 3 – Controls System Implementation.
 - 1. Measurement and payment for this Bid Item shall include full compensation for all required work included to complete this portion of this project, rendering a complete and operable system. All overhead required for this portion of this project shall included, and indicated in itemized breakdown. Payment for all work included under this Bid Item shall represent full compensation in accordance with the lump sum price bid for the work required.

- D. Item 4 – Discretionary Work.
 - 1. Payment for all work included in this Bid Item and listed in the Bid Form shall be made only at the Owner’s discretion, in order to satisfactorily complete any additions to the Plans and Specifications in order to render the project.

1.4 SUBMITTALS

- A. Submit three copies of each item request for consideration.
 - 1. Schedule of Values:
 - a. Schedule of Values shall be submitted for Owner and Engineer review prior to commencement of Work. Schedule shall itemize work for each Bid Form item.
 - 2. Request for Payment:
 - a. Request for Payment shall indicate each item on the approved Schedule of Values. A percentage of completion for each line item for the Schedule of Values shall be the basis for payment request

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF 01150

SECTION 01152 REQUEST FOR PAYMENT

PART 1 – GENERAL

1.01 SUMMARY

1.1 RELATED DOCUMENTS

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

1.2 SUBMITTALS

- A. Submit Applications for Payment to the Project Manager or as directed at the preconstruction meeting, in accordance with the schedule established by Conditions of the Contract and Agreement between Owner and Contractor. Contractor redline drawings shall be reviewed by Engineer prior to approval of each Payment Application.
- B. Submit payment requests in the form provided by the Owner with itemized data typed in accordance with the Bid Form.
 - 1. Provide construction photographs in accordance with Contract Documents to substantiate request for payment.

1.3 SUBMITTAL PROCEDURE

- A. Submit applications for payment at the times stipulated in the Agreement, and as approved by Owner.
- B. Number: Submit three (3) copies of each application; all signed and certified by the Contractor.

1.4 FINAL PAYMENT

- A. Submit request for Substantial Completion for approval by Engineer and Owner prior to submittal of Final Payment.
- B. Submit contractor redline drawings for approval by Engineer and Owner prior to submittal.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF 01152

SECTION 01250 SUBSTITUTION PROCEDURES

PART 1 – GENERAL

1.01 SUMMARY

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Sections:
 - 1. Division 01 Section “Product Requirements” for requirements for submitting comparable product submittals for products by listed manufacturers.
 - 2. Divisions 02 through 49 Sections for specific requirements and limitations for substitutions.

1.3 DEFINITIONS

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

1.4 SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use CSI Form 13.1A.
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
 - b. Coordination information, including a list of changes or modifications needed

- to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
- c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable specification section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.
 - g. List of similar installations for completed projects with project names and addresses and names and addresses of engineers and owners.
 - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - i. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - j. Cost information, including a proposal of change, in the Contract Sum. Outline original cost of equipment in base bid, and any adjustments for substitution, if the Owner accepts substitution.
 - k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
 - l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Engineer's Action: If necessary, Engineer will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Engineer will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Change Order, Construction Change Directive, or

Engineer's Supplemental Instructions for minor changes in the Work.

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

1.5 QUALITY ASSURANCE

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

1.6 PROCEDURES

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

PART 2 – PRODUCTS

2.1 SUBSTITUTIONS

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

Documentation in advance of substitution.

- B. Substitutions for Convenience: Engineer will consider requests for substitution if received within 30 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Engineer.
1. Conditions: Engineer will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Engineer will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution does not require extensive revisions to the Contract Documents.
 - b. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - c. Substitution request is fully documented and properly submitted.
 - d. Requested substitution will not adversely affect Contractor's construction schedule.
 - e. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - f. Requested substitution is compatible with other portions of the Work.
 - g. Requested substitution has been coordinated with other portions of the Work.
 - h. Requested substitution provides specified warranty.
 - i. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
 - j. Owner and Engineer approve any cost modifications to the Construction Documentation in advance of substitution.

PART 3 – EXECUTION

NOT USED

END OF 01250

SECTION 01310 PROJECT MANAGEMENT AND COORDINATION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General project coordination procedures.
 - 2. Administrative and supervisory personnel.
 - 3. Coordination drawings.
 - 4. Requests for Information (RFIs).
 - 5. Project meetings.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor. Prime contractor shall assume responsibility for general coordination, and scheduling project meetings as required.
- C. Related Sections:
 - 1. Division 01 Section "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
 - 2. Division 01 Section "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 3. Division 01 Section "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

- A. RFI: Request from Owner, Engineer, or Contractor seeking information from each other during construction.

1.4 COORDINATION

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.

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

6. Preinstallation conferences.
 7. Project closeout activities.
 8. Startup and adjustment of systems.
 9. Project closeout activities.
- E. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

1.5 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings in accordance with requirements in individual Sections, where installation is not completely shown on Shop Drawings, where space constraints, existing conditions and availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
 - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
 - b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
 - c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
 - e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
 - f. Indicate required installation sequences.
 - g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to

Engineer indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

- B. Coordination Drawing Organization: Organize coordination drawings as follows:
1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire protection, fire alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
 2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
 3. Mechanical Equipment Installations: Provide coordination drawings for mechanical space showing plans and elevations of mechanical, plumbing, fire protection, fire alarm equipment and interconnections, and electrical equipment.
 4. Structural Penetrations: Indicate penetrations and openings required for all new structural work. Indicate all planned repairs to weatherproofing.
 5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
 6. Mechanical and Plumbing Work: Show the following:
 - a. Sizes and bottom elevations of ductwork connections, piping sizing and connections, and conduit runs, including insulation, bracing, flanges, and support systems.
 - b. Dimensions and sizes of major components, such as dampers, valves, diffusers, access doors, cleanouts, condensate drains, and electrical distribution equipment.
 - c. Fire-rated enclosures around ductwork.
 7. Electrical Work: Show the following:
 - a. Runs of vertical and horizontal conduit 1-1/4 inch diameter and larger.
 - b. Fire Alarm duct smoke detector, and other fire alarm device locations.
 - c. Panel board, switchboard, switchgear, transformer, busway, generator, and motor control center locations.

- d. Location of pull boxes and junction boxes, dimensioned from column center lines.
8. Fire Protection System: Show the following:
 - a. Locations of any piping mains, branch lines, pipe drops, and sprinkler heads for areas requiring modification in order to meet the Contract Documents.
 9. Review: Engineer will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are the Contractor's responsibility. If the Engineer determines that the coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, the Engineer will so inform the Contractor, who shall make changes as directed and resubmit.
 10. Coordination Drawing Prints: Prepare coordination drawing prints in accordance with requirements of Division 01 Section "Submittal Procedures."

1.6 KEY PERSONNEL

- A. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and email addresses. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.
 1. Post copies of list in project meeting room, in temporary field office, and send to Owner's representative and Engineer. Keep list current at all times.

1.7 REQUESTS FOR INFORMATION (RFIs)

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified. Contractor shall maintain a formal RFI log, sequentially numbering each RFI.
 1. Engineer will return RFIs submitted to Engineer by other entities controlled by Contractor with no response.
 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
 3. RFI log shall be kept current. RFI log shall include date of RFI submission, date of response, and status of each RFI throughout the project (indicated in Part F.).
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
 1. Project name.

2. Project number.
 3. Date.
 4. Name of Contractor.
 5. Name of Engineer.
 6. RFI number, numbered sequentially.
 7. RFI subject.
 8. Specification Section number and title and related paragraphs, as appropriate.
 9. Drawing number and detail references, as appropriate.
 10. Field dimensions and conditions, as appropriate.
 11. Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 12. Contractor's signature.
 13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: AIA Document G716.
- D. Engineer's Action: Engineer will review each RFI, determine action required, and respond. Allow seven working days for Engineer's response for each RFI. RFIs received by Engineer after 1:00 p.m. will be considered as received the following working day.
1. The following RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for coordination information already indicated in the Contract Documents.
 - d. Requests for adjustments in the Contract Time or the Contract Sum.
 - e. Requests for interpretation of Engineer's actions on submittals.
 - f. Incomplete RFIs or inaccurately prepared RFIs.

2. Engineer's action may include a request for additional information, in which case Engineer's time for response will date from time of receipt of additional information.
3. Engineer's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Engineer in writing within 10 days of receipt of the RFI response.
- E. On receipt of Engineer's action, update the RFI log and immediately distribute the RFI response to affected parties, including Owner and Engineer. Review response and notify Engineer within seven days if Contractor disagrees with response.
- F. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Use CSI Log Form 13.2B.
 1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Engineer.
 4. RFI number including RFIs that were dropped and not submitted.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date Engineer's response was received.
 8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
 9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.8 PROJECT MEETINGS

- A. General: Owner shall schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Owner shall notify Contractor and Engineer of scheduled meeting dates and times.
 2. Agenda: Owner shall prepare and distribute the agenda to all invited attendees.

3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Meeting minutes shall be distributed to everyone concerned, including Contractor and Engineer, within seven days of the meeting.
- B. Preconstruction Conference: Owner will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Engineer.
1. Conduct the conference to review responsibilities and personnel assignments.
 2. Attendees: Authorized representatives of Owner, Engineer, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Phasing.
 - c. Critical work sequencing and long-lead items.
 - d. Designation of key personnel and their duties.
 - e. Lines of communications.
 - f. Procedures for processing field decisions and Change Orders.
 - g. Procedures for RFIs.
 - h. Procedures for testing and inspecting.
 - i. Procedures for processing Applications for Payment.
 - j. Distribution of the Contract Documents.
 - k. Submittal procedures.
 - l. Sustainable design requirements.
 - m. Preparation of record documents.
 - n. Use of the premises and existing building.
 - o. Work restrictions.
 - p. Working hours.

- q. Owner's occupancy requirements.
 - r. Responsibility for temporary facilities and controls.
 - s. Procedures for moisture and mold control.
 - t. Procedures for disruptions and shutdowns.
 - u. Construction waste management and recycling.
 - v. Parking availability.
 - w. Office, work, and storage areas.
 - x. Equipment deliveries and priorities.
 - y. First aid.
 - z. Security.
 - aa. Progress cleaning.
4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
- 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Engineer and Owner of scheduled meeting dates.
 - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.

- h. Review of mockups.
 - i. Possible conflicts.
 - j. Compatibility problems.
 - k. Time schedules.
 - l. Weather limitations.
 - m. Manufacturer's written recommendations.
 - n. Warranty requirements.
 - o. Compatibility of materials.
 - p. Acceptability of substrates.
 - q. Temporary facilities and controls.
 - r. Space and access limitations.
 - s. Regulations of authorities having jurisdiction.
 - t. Testing and inspecting requirements.
 - u. Installation procedures.
 - v. Coordination with other work.
 - w. Required performance results.
 - x. Protection of adjacent work.
 - y. Protection of construction and personnel.
- 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 - 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
 - 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Project Closeout Conference: Schedule and conduct a Project closeout conference, at a time convenient to Owner and Engineer, but no later than 30 days prior to the scheduled date of Substantial Completion.
- 1. Conduct the conference to review requirements and responsibilities related to

Project closeout.

2. Attendees: Authorized representatives of Owner, Engineer, and their consultants; Contractor and its superintendent; major subcontractors; and suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
 - a. Preparation of record documents.
 - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - c. Submittal of written warranties and release of all liens.
 - d. Requirements for preparing sustainable design documentation.
 - e. Requirements for preparing operations and maintenance data.
 - f. Requirements for demonstration and training.
 - g. Preparation of Contractor's punch list.
 - h. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
 - i. Submittal procedures.
 - j. Coordination of separate contracts.
 - k. Owner's partial occupancy requirements.
 - l. Responsibility for removing temporary facilities and controls.
 4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- E. Progress Meetings: Conduct progress meetings at regular intervals.
1. Coordinate dates of meetings with preparation of payment requests.
 2. Attendees: In addition to representatives of Owner and Engineer, each contractor, subcontractor, major supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

- a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time, and the period for construction as outlined by the County.
 - 1) Review schedule for next period.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Progress cleaning.
 - 10) Quality and work standards.
 - 11) Status of correction of deficient items.
 - 12) Field observations.
 - 13) Status of RFIs.
 - 14) Status of proposal requests.
 - 15) Pending changes.
 - 16) Status of Change Orders.
 - 17) Pending claims and disputes.
 - 18) Documentation of information for payment requests.
4. Minutes: Entity responsible for conducting the meeting will record and

distribute the meeting minutes to each party present and to parties requiring information.

- a. **Schedule Updating:** Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
- F. **Coordination Meetings:** Conduct Project coordination meetings at regular intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
1. **Attendees:** In addition to representatives of Owner and Engineer, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. **Agenda:** Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. **Combined Contractor's Construction Schedule:** Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - b. **Schedule Updating:** Revise combined Contractor's construction schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
 - c. **Review present and future needs of each contractor present, including the following:**
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site utilization.

- 8) Temporary facilities and controls.
 - 9) Work hours.
 - 10) Hazards and risks.
 - 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Change Orders.
3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF 01310

SECTION 01320 CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Start-up construction schedule.
 - 2. Contractor's construction schedule.
 - 3. Daily construction reports.
 - 4. Material location reports.
 - 5. Field condition reports.
 - 6. Special reports.
- B. Related Sections:
 - 1. Division 01 Section "Submittal Procedures" for submitting schedules and reports.

1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
 - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
 - 2. Predecessor Activity: An activity that precedes another activity in the network.
 - 3. Successor Activity: An activity that follows another activity in the network.
- B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum, unless otherwise approved by Engineer.
- C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical

path of the Project.

- D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- E. Event: The starting or ending point of an activity.
- F. Float: The measure of leeway in starting and completing an activity.
 - 1. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
 - 2. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- G. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
 - 1. Six paper copies.
- B. Start-up construction schedule.
 - 1. Approval of cost-loaded start-up construction schedule will not constitute approval of schedule of values for cost-loaded activities.
- C. Start-up Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.
- D. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
 - 1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.
- E. CPM Reports: Concurrent with CPM schedule, submit each of the following reports.

Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.

- 1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
- 2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or

actual start date if known.

3. Total Float Report: List of all activities sorted in ascending order of total float.

F. Field Condition Reports: Submit at time of discovery of differing conditions.

G. Special Reports: Submit at time of unusual event.

H. Qualification Data: For scheduling consultant.

1.5 QUALITY ASSURANCE

A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Engineer's request is required by the successful bidder.

B. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:

1. Review software limitations and content and format for reports.
2. Verify availability of qualified personnel needed to develop and update schedule.
3. Discuss constraints, including phasing, work stages, area separations, major equipment delivery, and Owner occupancy.
4. Review delivery dates for furnished products and equipment.
5. Review schedule for work of Owner's separate contracts.
6. Review time required for review of submittals and resubmittals.
7. Review requirements for tests and inspections by independent testing and inspecting agencies.
8. Review time required for completion and startup procedures.
9. Review and finalize list of construction activities to be included in schedule.
10. Review submittal requirements and procedures.
11. Review procedures for updating schedule.

1.6 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.

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

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Substantial Completion.
 - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Activities: Treat interior work and exterior (rooftop) work as a separate numbered activity for each principal element of the Work. Comply with the following:
 - 1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Engineer.
 - 2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 - 3. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
 - 4. Startup and Testing Time: Include not less than 15 days for startup and testing.
 - 5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Engineer's administrative procedures necessary for certification of Substantial Completion.
 - 6. Punch List and Final Completion: Include not more than 20 days for punch list and final completion.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
 - 1. Phasing: Arrange list of activities on schedule by phase.
 - 2. Work under More Than One Contract: Include a separate activity for each contract.

3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
6. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Coordination with existing construction.
 - b. Limitations of continued occupancies.
 - c. Uninterruptible services.
 - d. Partial occupancy before Substantial Completion.
 - e. Use of premises restrictions.
 - f. Provisions for future construction.
 - g. Seasonal variations.
 - h. Environmental control.
7. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
 - a. Subcontract awards.
 - b. Submittals.
 - c. Purchases.
 - d. Permitting.
 - e. Fabrication.
 - f. Sample testing.
 - g. Deliveries.
 - h. Installation.
 - i. Tests and inspections.
 - j. Adjusting.
 - k. Curing.

1. Startup and placement into final use and operation.
- m. Owner Training.
8. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
 - a. Structural completion.
 - b. Permanent space enclosure.
 - c. Completion of mechanical installation.
 - d. Completion of electrical installation.
 - e. Substantial Completion.
- D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion, and the following interim milestones:
 1. The Phases indicated on Specification 01100.
- E. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
 1. Unresolved issues.
 2. Unanswered RFIs.
 3. Rejected or unreturned submittals.
 4. Notations on returned submittals.
- F. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required achieving compliance, and dating by which recovery will be accomplished.

2.2 START-UP CONSTRUCTION SCHEDULE

- A. Bar-Chart Schedule: Submit start-up horizontal bar-chart-type construction schedule within seven days of date established for the Notice to Proceed.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal Gantt-chart-type, Contractor's construction schedule within 30 days of date established for the Notice to Proceed. Base schedule on the start-up construction schedule and additional information received since the start of Project.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
 - 1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

2.4 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

- A. General: Prepare network diagrams using AON (activity-on-node) format.
- B. Start-up Network Diagram: Submit diagram within 14 days of date established for the Notice to Proceed. Outline significant construction activities for the first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.
- C. CPM Schedule: Prepare Contractor's construction schedule using a time-scaled CPM network analysis diagram for the Work.
 - 1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 60 days after date established for the Notice to Proceed.
 - a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Engineer's approval of the schedule.
 - 2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
 - 3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
 - 4. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule in order to correlate with Contract Time.
- D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the start-up network diagram, prepare a skeleton network to identify probable critical paths.
 - 1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:

- a. Preparation and processing of submittals.
 - b. Mobilization and demobilization.
 - c. Purchase of materials.
 - d. Delivery.
 - e. Fabrication.
 - f. Utility interruptions.
 - g. Installation.
 - h. Work by Owner that may affect or be affected by Contractor's activities.
 - i. Testing.
 - j. Punch list and final completion.
 - k. Activities occurring following final completion.
2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
 3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
 4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
- E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall project schedule.
- F. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:
1. Contractor or subcontractor and the Work or activity.
 2. Description of activity.
 3. Principal events of activity.
 4. Immediate preceding and succeeding activities.
 5. Early and late start dates.
 6. Early and late finish dates.
 7. Activity duration in workdays.
 8. Total float or slack time.

9. Average size of workforce.
 10. Dollar value of activity (coordinated with the schedule of values).
- G. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
1. Identification of activities that have changed.
 2. Changes in early and late start dates.
 3. Changes in early and late finish dates.
 4. Changes in activity durations in workdays.
 5. Changes in the critical path.
 6. Changes in total float or slack time.
 7. Changes in the Contract Time.

2.5 REPORTS

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

- B. **Material Location Reports:** At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a Statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site.
- C. **Field Condition Reports:** Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.6 SPECIAL REPORTS

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

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. **Scheduling Consultant:** Engage a professional or a consultant to provide planning, evaluation, and reporting using CPM scheduling.
 - 1. **In-House Option:** Owner may waive the requirement to retain a consultant if Contractor employs skilled personnel with experience in CPM scheduling and reporting techniques. Submit qualifications.
 - 2. **Meetings:** Scheduling consultant shall attend all meetings related to Project progress, alleged delays, and time impact.
- B. **Contractor's Construction Schedule Updating:** At twice a month intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
 - 1. **Revise schedule immediately after each meeting or other activity where revisions have been recognized or made.** Issue updated schedule concurrently with the report of each such meeting.
 - 2. **Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.**
 - 3. **As the Work progresses, indicate final completion percentage for each activity.**
- C. **Distribution:** Distribute copies of approved schedule to Engineer, Owner, separate contractors, testing and inspecting agencies, and other parties identified by

Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF 01320

SECTION 01323 PHOTOGRAPHIC DOCUMENTATION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:

- 1. Preconstruction photographs.
- 2. Periodic construction photographs.
- 3. Final completion construction photographs.
- 4. Preconstruction video recordings.
- 5. Periodic construction video recordings.
- 6. Web-based construction photographic documentation.

- B. Related Sections:

- 1. Division 01 Section "Submittal Procedures" for submitting photographic documentation.
- 2. Division 01 Section "Closeout Procedures" for submitting photographic documentation as project record documents at Project closeout.

1.3 ALLOWANCES

- A. Costs: Photographic documentation services are included under the cash allowance for construction photographic services.

1.4 UNIT PRICES

- A. Basis for Bids: Base number of construction photographs on average of 20 photographs per week over the duration of Project.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For photographer.
- B. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph or video recording. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.

- C. Digital Photographs: Submit image files within three days of taking photographs.
1. Digital Camera: Minimum sensor resolution of 8 megapixels.
 2. Format: Minimum 400 dpi minimum, in unaltered original files, with same aspect ratio as the sensor, uncropped, date- and time- stamped, in folder named by date of photograph, accompanied by key plan file.
 3. Identification: Provide the following information with each image description in file metadata tag:
 - a. Name of Project.
 - b. Name and contact information for photographer.
 - c. Name of Engineer.
 - d. Name of Contractor.
 - e. Date photograph was taken.
 - f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
 - g. Unique sequential identifier keyed to accompanying key plan.
- D. Construction Photographs: Submit two prints of each photographic view within seven days of taking photographs.
1. Format: 8-by-10-inch smooth-surface matte prints on single-weight commercial- grade photographic paper, punched for standard three-ring binder.
 2. Identification: On back of each print, provide an applied label or rubber-stamped impression with the following information:
 - a. Name of Project.
 - b. Name and contact information for photographer.
 - c. Name of Engineer.
 - d. Name of Contractor.
 - e. Date photograph was taken if not date stamped by camera.
 - f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
 - g. Unique sequential identifier keyed to accompanying key plan.

- E. Video Recordings: Submit video recordings within seven days of recording.
1. Submit video recordings in digital video disc format acceptable to Owner.
 2. Identification: With each submittal, provide the following information:
 - a. Name of Project.
 - b. Name and address of photographer.
 - c. Name of Engineer.
 - d. Name of Contractor.
 - e. Date video recording was recorded.
 - f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
 - g. Weather conditions at time of recording.
 3. Transcript: Prepared on 8-1/2-by-11-inch paper, punched and bound in heavy-duty, three-ring, vinyl-covered binders. Mark appropriate identification on front and spine of each binder. Include a cover sheet with same label information as corresponding video recording. Include name of Project and date of video recording on each page.

1.6 QUALITY ASSURANCE

- A. Photographer Qualifications: An individual who has been regularly engaged as a professional photographer of construction projects for not less than three years.
- B. Web-Based Photographic Documentation Service Provider: A firm specializing in providing photographic equipment, Web-based software, and related services for construction projects, with record of providing satisfactory services similar to those required for Project.

1.7 COORDINATION

- A. Auxiliary Services: Cooperate with photographer and provide auxiliary services requested, including access to Project site and use of temporary facilities, including temporary lighting required to produce clear, well-lit photographs.

1.8 USAGE RIGHTS

- A. Obtain and transfer copyright usage rights from photographer to Owner for unlimited reproduction of photographic documentation.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

- A. Digital Images: Provide images in JPG format, produced by a digital camera with

minimum sensor size of 8 megapixels, and at an image resolution of not less than 400 dpi.

- B. Digital Video Recordings: Provide high-resolution, digital video disc in format acceptable to Owner.

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

- A. Photographer: Engage a qualified photographer to take construction photographs.
- B. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.
 - 1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- C. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
 - 1. Date and Time: Include date and time in file name for each image.
 - 2. Field Office Images: Maintain one set of images accessible in the field office at Project site, available at all times for reference. Identify images in the same manner as those submitted to Owner and Engineer.
- D. Preconstruction Photographs: Before starting construction, take photographs of Project site, including existing items to remain during construction, from different vantage points, as directed by Engineer.
 - 1. Flag construction areas and construction limits before taking construction photographs.
 - 2. Take 20 photographs to show existing conditions adjacent to work locations before starting the Work.
 - 3. Take 20 photographs minimum of existing building, either on or adjoining property to accurately record physical conditions at start of construction.
 - 4. Take additional photographs as required to record settlement or cracking of structures, pavements, and improvements.
- E. Periodic Construction Photographs: Take 20 photographs monthly, coinciding with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.
- F. Engineer and Owner-Directed Construction Photographs: From time to time, Owner will instruct photographer about number and frequency of photographs and general

directions on vantage points. Select actual vantage points and take photographs to show the status of construction and progress since last photographs were taken.

- G. Time-Lapse Sequence Construction Photographs: Take 20 photographs as indicated, to show status of construction and progress since last photographs were taken.
1. Frequency: Take photographs weekly, with timing each month adjusted to coincide with the cutoff date associated with each Application for Payment.
 2. Vantage Points: Following suggestions by Owner and Contractor, photographer to select vantage points. During each of the following construction phases, take not less than two of the required shots from same vantage point each time to create a time-lapse sequence as follows:
 - a. Commencement of the Work, through completion of structural construction.
 - b. All welding and structural framing.
 - c. Exterior building enclosure.
 - d. Interior Work, through date of Substantial Completion.
- H. Final Completion Construction Photographs: Take 20 color photographs after date of Substantial Completion for submission as project record documents. Owner will inform photographer of desired vantage points.
1. Do not include date stamp.
- I. Additional Photographs: Owner may request photographs in addition to periodic photographs specified.
1. Three days' notice will be given, where feasible.
 2. In emergency situations, take additional photographs within 24 hours of request.
 3. Circumstances that could require additional photographs include, but are not limited to, the following:
 - a. Special events planned at Project site.
 - b. Immediate follow-up when on-site events result in construction damage or losses.
 - c. Photographs to be taken at fabrication locations away from Project site. These photographs are not subject to unit prices or unit-cost allowances.
 - d. Substantial Completion of a major phase or component of the Work.
 - e. Owner's request for special publicity photographs.

3.2 CONSTRUCTION VIDEO RECORDINGS

- A. Video Recording Photographer: Engage a qualified videographer to record construction video recordings.
- B. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to show area of construction. Display continuous running time and date. At start of each video recording, record weather conditions from local newspaper or television and the actual temperature reading at Project site.
- C. Narration: Describe scenes on video recording by narration of video. Include description of items being viewed, recent events, and planned activities. At each change in location, describe vantage point, location, direction (by compass point), and elevation or story of construction.
 - 1. Confirm date and time at beginning and end of recording.
 - 2. Begin each video recording with name of Project, Contractor's name, videographer's name, and Project location.
- D. Transcript: Provide a typewritten transcript of the narration. Display images and running time captured from video recording opposite the corresponding narration segment.
- E. Preconstruction Video Recording: Before starting construction, record video recording of Project site and surrounding properties from different vantage points, as directed by Engineer or Owner.
 - 1. Flag excavation areas and construction limits before recording construction video recordings.
 - 2. Show existing conditions adjacent to Project site before starting the Work.
 - 3. Show existing buildings either on or adjoining Project site to accurately record physical conditions at the start of construction.
 - 4. Show protection efforts by Contractor.
- F. Periodic Construction Video Recordings: Record video recording monthly, with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last video recordings were recorded. Minimum recording time shall be 30 minutes(s).

*** END OF SECTION ***

SECTION 01330 SUBMITTAL PROCEDURES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Sections:
 - 1. Division 01 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
 - 2. Division 01 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.
 - 3. Division 01 Section "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
 - 4. Division 01 Section "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Engineer's responsive action. Action submittals are those submittals indicated in individual Specification Sections as action submittals.
- B. Informational Submittals: Written and graphic information and physical samples that do not require Engineer's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as informational submittals.
- C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.
- D. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 ACTION SUBMITTALS

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or modifications to submittals noted by the Engineer and additional time for handling and reviewing submittals required by those corrections.
1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
 2. Initial Submittal: Submit concurrently with start-up construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
 3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
 4. Format: Arrange the following information in a tabular format:
 - a. Scheduled date for first submittal.
 - b. Specification Section number and title.
 - c. Submittal category: Action, informational.
 - d. Name of subcontractor.
 - e. Description of the Work covered.
 - f. Activity or event number.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Engineer's Digital Data Files: Electronic copies of CAD Drawings of the Contract Drawings will be provided by Engineer for Contractor's use in preparing submittals.
1. Engineer will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project record drawings.
 - a. Engineer makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other

- submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Engineer's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Engineer will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Resubmittal Review: Allow 15 days for review of each resubmittal.
 4. Sequential Review: Where sequential review of submittals by Engineer's consultants, Owner, or other parties is indicated, allow 15 days for initial review of each submittal.
 5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Engineer and to Engineer's consultants, allow 15 days for review of each submittal. Submittal will be returned to Engineer before being returned to Contractor.
- D. Identification and Information: Place a permanent label or title block on each paper copy submittal item for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Engineer.

3. Include the following information for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name of Engineer.
 - d. Name of Construction Manager.
 - e. Name of Contractor.
 - f. Name of subcontractor.
 - g. Name of supplier.
 - h. Name of manufacturer.
 - i. Submittal number or other unique identifier, including revision identifier.
 - 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).
 - j. Number and title of appropriate Specification Section.
 - k. Drawing number and detail references, as appropriate.
 - l. Location(s) where product is to be installed, as appropriate.
 - m. Other necessary identification.
- E. Identification and Information: Identify and incorporate information in each electronic submittal file as follows:
 1. Assemble complete submittal package into a single indexed file with links enabling navigation to each item.
 2. Name file with submittal number or other unique identifier, including revision identifier.
 - a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).
 3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Engineer.

4. Include the following information on an inserted cover sheet:
 - a. Project name.
 - b. Date.
 - c. Name and address of Engineer.
 - d. Name of Construction Manager.
 - e. Name of Contractor.
 - f. Name of firm or entity that prepared submittal.
 - g. Name of subcontractor.
 - h. Name of supplier.
 - i. Name of manufacturer.
 - j. Number and title of appropriate Specification Section.
 - k. Drawing number and detail references, as appropriate.
 - l. Location(s) where product is to be installed, as appropriate.
 - m. Related physical samples submitted directly.
 - n. Other necessary identification.
5. Include the following information as keywords in the electronic file metadata:
 - a. Project name.
 - b. Number and title of appropriate Specification Section.
 - c. Manufacturer name.
 - d. Product name.
- F. Options: Identify options requiring selection by the Engineer.
- G. Deviations: Identify deviations from the Contract Documents on submittals.
- H. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Engineer observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
 1. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Engineer.

- I. Transmittal: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Engineer will return submittals, without review, received from sources other than Contractor.
 1. Transmittal Form: Use AIA Document G810.
 2. Transmittal Form: Provide locations on form for the following information:
 - a. Project name.
 - b. Date.
 - c. Destination (To:).
 - d. Source (From:).
 - e. Names of subcontractor, manufacturer, and supplier.
 - f. Category and type of submittal.
 - g. Submittal purpose and description.
 - h. Specification Section number and title.
 - i. Indication of full or partial submittal.
 - j. Drawing number and detail references, as appropriate.
 - k. Transmittal number, numbered consecutively.
 - l. Submittal and transmittal distribution record.
 - m. Remarks.
 - n. Signature of transmitter.
 3. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Engineer on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- J. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
 1. Note date and content of previous submittal.
 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 3. Resubmit submittals until they are marked with approval notation from

Engineer's action stamp.

- K. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- L. Use for Construction: Use only final submittals that are marked with approval notation from Engineer's action stamp.
- M. Submittal Log: Contractor shall maintain a current Submittal Log outlining a sequential submission numbering of all submittals, the date of the submission, the date of the Engineer's response, and the status of the submission response (approved, rejected, revise and resubmit), and any further action required on the log. The Submittal Log shall be forwarded to the Owner, the Engineer, and all respondent parties on Distribution List on a weekly basis.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
 - 1. Action Submittals: Submit six paper copies of each submittal, unless otherwise indicated. Engineer will return four copies.
 - 2. Informational Submittals: Submit two paper copies of each submittal, unless otherwise indicated. Engineer will not return copies.
 - 3. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Division 01 Section "Closeout Procedures."
 - 4. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 - a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.
 - b. Provide a notarized statement on original paper copy certificates and certifications where indicated.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
 - 1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.

2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.
 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams showing factory-installed wiring.
 - b. Printed performance curves
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on the accompanying shop drawings.
 5. Submit Product Data before or concurrent with Samples.
 6. Submit Product Data in the following format:
 - a. PDF electronic file.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.

- d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
2. Submit Shop Drawings in the following format:
 - a. Six opaque (bond) copies of each submittal. Engineer will return four copies.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of applicable Specification Section.
 3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
 4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit one full set of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Engineer will return submittal with options selected.

5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
1. Type of product. Include unique identifier for each product indicated in the Contract Documents.
 2. Manufacturer and product name, and model number if applicable.
 3. Number and name of room or space.
 4. Location within room or space.
 5. Submit product schedule in the following format:
 - a. Three paper copies of product schedule or list, unless otherwise indicated. Engineer will return two copies.
- F. Contractor's Construction Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation."
- G. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Use CSI Form 1.5A. Include the following information in tabular form:
1. Name, address, and telephone number of entity performing subcontract or supplying products.
 2. Number and title of related Specification Section(s) covered by subcontract.
 3. Drawing number and detail references, as appropriate, covered by subcontract.
 4. Submit subcontract list in the following format:
 - a. Number of Copies: Three paper copies of subcontractor list, unless otherwise indicated. Engineer will return two copies.
- H. Coordination Drawings: Comply with requirements specified in Division 01 Section "Project Management and Coordination."

- I. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of engineers and owners, and other information specified.
- J. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on American Welding Society (AWS) forms. Include names of firms and personnel certified.
- K. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- L. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- M. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- N. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- O. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- P. Product Test Reports: Submit written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- Q. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - 1. Name of evaluation organization.
 - 2. Date of evaluation.
 - 3. Time period when report is in effect.
 - 4. Product and manufacturers' names.
 - 5. Description of product.
 - 6. Test procedures and results.
 - 7. Limitations of use.

- R. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- S. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- T. Field Test Reports: Submit reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- U. Maintenance Data: Comply with requirements specified in Division 01 Section "Operation and Maintenance Data."
- V. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Engineer.
- B. Project Closeout and Maintenance/Material Submittals: Refer to requirements in Division 01 Section "Closeout Procedures."
- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ENGINEER'S ACTION

- A. General: Engineer will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Engineer will review each submittal, make marks to indicate corrections or modifications required, and return it. Engineer will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
- C. Informational Submittals: Engineer will review each submittal and will not return it,

or will return it if it does not comply with requirements. Engineer will forward each submittal to appropriate party.

- D. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Engineer.
- E. Incomplete submittals are not acceptable, will be considered nonresponsive, and will be returned without review.
- F. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

*** END OF SECTION ***

SECTION 01500 TEMPORARY FACILITY AND CONTROLS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Sections:
 - 1. Division 01 Section "Summary" for work restrictions and limitations on utility interruptions.

1.3 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including but not limited to, testing agencies and authorities having jurisdiction.
- B. Sewer Service: Pay sewer service use charges for sewer usage by all entities for construction operations.
- C. Water Service: Pay water service use charges for water used by all entities for construction operations.
- D. Electric Power Service: Pay electric power service use charges for electricity used by all entities for construction operations.
- E. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.
- F. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.4 INFORMATIONAL SUBMITTALS

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.
- B. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of

EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

- C. **Moisture-Protection Plan:** Describe procedures and controls for protecting materials and construction from water absorption and damage, including delivery, handling, and storage provisions for materials subject to water absorption or water damage, discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water damaged Work.
 - 1. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
- D. **Dust-Control and HVAC-Control Plan:** Submit coordination drawing and narrative that indicates the dust-control and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation for all interior work. Identify further options if proposed measures are later determined to be inadequate. Include the following:
 - 1. Locations of dust-control partitions at each phase of the work.
 - 2. HVAC system isolation schematic drawing.
 - 3. Location of proposed air filtration system discharge.
 - 4. Other dust-control measures.
 - 5. Waste management plan.

1.5 QUALITY ASSURANCE

- A. **Electric Service:** Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. **Tests and Inspections:** Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.6 PROJECT CONDITIONS

- A. **Temporary Use of Permanent Facilities:** Engage installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. **Chain-Link Fencing:** Minimum 2-inch, 0.148-inch- thick, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top

rails.

- B. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10 mils minimum thickness, with flame-spread rating of 15 or less per ASTM E 84.
- C. Dust Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches. Cover all finished surfaces where workers will be present.
- D. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading, as required.
- B. Storage and Fabrication Sheds: Provide storage, furnished, and equipped to accommodate materials and equipment for construction operations.
 - 1. Store combustible materials apart from building.

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, with individual space thermostatic control.
- C. Air Filtration Units: HEPA primary and secondary filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
 - 1. Locate facilities to limit site disturbance as specified in Division 01 Section "Summary."
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- D. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- E. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
 1. Toilets: Use of Owner's existing toilet facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- F. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
 1. Prior to commencing work, isolate the HVAC system in area where work is to be performed in accordance with approved coordination drawings.
 - a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas, as required.
 - b. Maintain negative air pressure within interior work area using HEPA-equipped air filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
 2. Maintain dust partitions during the Work in interior spaces. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust containment devices.
 3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.
- G. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.
- H. Electric Power Service: Contractor may connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.
- I. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations (welding).
- J. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions for work in interior spaces.
1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241, as required.
- B. Temporary Use of Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.
1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
 2. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.
 3. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course.
- C. Traffic Controls: Comply with requirements of authorities having jurisdiction.
1. Protect existing site improvements to remain including curbs, pavement, and utilities.
 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- D. Parking: Contractor shall coordinate parking for construction personnel; Owner will not provide for contractor parking.

- E. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
 - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
 - 2. Remove snow and ice as required to minimize accumulations.
- F. Project Signs: Provide Project sign as directed by the Owner. Unauthorized signs are not permitted.
 - 1. Identification Signs: Provide Project identification sign.
 - a. Provide temporary, directional signs for construction personnel and visitors.
 - 2. Maintain and touchup signs so they are legible at all times.
- G. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with Division 01 Section "Execution" for progress cleaning requirements.
- H. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel. Contractor's use of Owner's lift and hoist are not permitted.
 - 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- I. Elevator Use: Elevators are not available at this project site.
- J. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.
 - 1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas so no evidence remains of correction work.
- K. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
 - 1. Comply with work restrictions specified in Division 01 Section "Summary."

- B. Temporary Erosion and Sedimentation Control: Comply with requirements of 2003 EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent
- C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways.
 - 1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.
 - 2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
 - 3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from the project site during the course of the project.
 - 4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- E. Site Enclosure Fence: Prior to commencing earthwork, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
 - 1. Extent of Fence: As indicated on Drawings.
 - 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.
- F. Security Enclosure and Lockup: Contractor shall coordinate with Owner for access and maintained security of the facility. Lock entrances at end of each work day.
- G. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- H. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
 - I. Covered Work Area: Contractor shall coordinate all overhead work with Owner and facility personnel. All overhead and crane work shall be scheduled at least 72 hours in advance of work. Contractor shall not proceed with crane lifting without facility personnel present to confirm safety of facility personnel and site.
- J. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from fumes and noise.

1. Construct dustproof partitions with two layers of 6-mil polyethylene sheet on each side. Cover floor with two layers of 6-mil polyethylene sheet, extending sheets 18 inches up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant treated plywood.
2. Insulate partitions to control noise transmission to occupied areas.
3. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
4. Protect air-handling equipment.
5. Provide walk-off mats at each entrance through temporary partition.

3.5 MOISTURE AND MOLD CONTROL

- A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Contractor shall document visible signs of mold that may appear during construction.
- B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
 1. Protect porous materials from water damage.
 2. Protect stored and installed material from flowing or standing water.
 3. Keep porous and organic materials from coming into prolonged contact with concrete.
 4. Remove standing water from decks.
 5. Keep deck openings covered or dammed.
- C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
 1. Do not load or install new construction and porous materials or components, or items with high organic content, into partially enclosed building.
 2. Keep interior spaces reasonably clean and protected from water damage.
 3. Periodically collect and remove waste containing cellulose or other organic matter.
 4. Discard or replace water-damaged material.
 5. Do not install material that is wet.
 6. Discard, replace or clean stored or installed material that begins to grow mold.

7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.
- D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
 2. Use permanent HVAC system to control humidity.
 3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
 - a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective.
 - b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record daily readings over a forty-eight hour period. Identify materials containing moisture levels higher than allowed. Report findings in writing to Engineer.
 - c. Remove materials that can not be completely restored to their manufactured moisture level within 48 hours.

3.6 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Operate Project-identification-sign lighting daily from dusk until 12:00 midnight.
- D. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- E. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."

END OF SECTION

SECTION 01600 PRODUCT REQUIREMENTS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

- B. Related Sections:

- 1. Division 01 Section "Substitution Procedures" for requests for substitutions.

1.3 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.4 ACTION SUBMITTALS

- A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced.

Include Specification Section number and title and Drawing numbers and titles.

1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
 2. Engineer's Action: If necessary, Engineer will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Engineer will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
 - a. Form of Approval: As specified in Division 01 Section "Submittal Procedures."
 - b. Use product specified if Engineer does not issue a decision on use of a comparable product request within time allocated.
- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 01 Section "Submittal Procedures." Basis of Design product substitution shall only be allowed where substitution has been approved prior to receipt of bids. Engineer shall review substitution documentation, and provide written response to Bidder prior to date of receipt of bids. Without prior approval, in writing from Engineer, a Basis of Design substitution will not be accepted for this project.

1.5 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
 2. If a dispute arises between contractors over concurrently selectable but incompatible products, Engineer will determine which products shall be used.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to

deterioration, theft, and other losses.

3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.

1.7 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents. Product warranties shall start no at approval of Substantial Completion of complete project, no exceptions.
1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 2. Specified Form: When specified forms are included with the Specifications,

prepare a written document using indicated form properly executed.

3. Refer to Divisions 02 through 49. Sections for specific content requirements and particular requirements for submitting special warranties.

- C. Submittal Time: Comply with requirements in Division 01 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
 1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 4. Where products are accompanied by the term "as selected," Engineer will make selection.
 5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
 6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
- B. Product Selection Procedures:
 1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 3. Products:

- a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that comply with requirements. Comparable products or substitutions for Contractor's convenience will not be considered, unless otherwise indicated.
 - b. Nonrestricted List: Where Specification includes a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
4. Manufacturers:
- a. Restricted List: Where Contract Documents include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered, unless otherwise indicated.
 - b. Nonrestricted List: Where Contract Documents do not include a list of available manufacturers, provide a product that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.
5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
- C. Visual Matching Specification: Where Specifications require "match Engineer's sample", provide a product that complies with requirements and matches Engineer's sample. Engineer's decision will be final on whether a proposed product matches.
1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Division 01 Section "Substitution Procedures" for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Engineer from manufacturer's full range" or similar phrase, select a product that complies with requirements. Engineer will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration: Engineer will consider Contractor's request for

comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Engineer may return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of engineers and owners, if requested.
5. Samples, if requested.

PART 3 – EXECUTION

NOT USED

END OF 01600

SECTION 01730 EXECUTION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

- 1. Construction layout.
- 2. Field engineering and surveying.
- 3. Installation of the Work.
- 4. Cutting and patching.
- 5. Coordination of Owner-installed products.
- 6. Progress cleaning.
- 7. Starting and adjusting.
- 8. Protection of installed construction.
- 9. Correction of the Work.

- B. Related Sections:

- 1. Division 01 Section "Submittal Procedures" for submitting surveys.
- 2. Division 01 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 INFORMATIONAL SUBMITTALS

- A. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:

1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
 3. Products: List products to be used for patching and firms or entities that will perform patching work.
 4. Dates: Indicate when cutting and patching will be performed.
 5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate how long services and systems will be disrupted.
- B. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.
- 1.5 QUALITY ASSURANCE
- A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
1. Structural Elements: When cutting and patching structural elements, notify Engineer of locations and details of cutting and await directions from the Engineer before proceeding. Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
 - a. Primary operational systems and equipment.
 - b. Fire separation assemblies.
 - c. Air or smoke barriers.
 - d. Fire-suppression systems.
 - e. Mechanical systems piping and ducts.
 - f. Control systems.
 - g. Communication systems.
 - h. Conveying systems.

- i. Electrical wiring systems.
 - j. Operating systems of special construction.
 - k. Ground Ring System.
 3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:
 - a. Water, moisture, or vapor barriers.
 - b. Membranes and flashings.
 - c. Exterior curtain-wall construction.
 - d. Equipment supports.
 - e. Piping, ductwork, vessels, and equipment.
 - f. Noise- and vibration-control elements and systems.
 4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Engineer's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
 - B. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.
 - C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.
- 1.6 WARRANTY
- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
 1. For projects requiring compliance with sustainable design and construction practices and procedures, utilize products for patching that comply with

requirements of Division 01 Section "Sustainable Design Requirements."

- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to the Engineer for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning project work, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
 - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
 - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - a. Description of the Work.
 - b. List of detrimental conditions, including substrates.
 - c. List of unacceptable installation tolerances.
 - d. Recommended corrections.
 - 2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 - 3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 - 4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 - 5. Proceed with installation only after unsatisfactory conditions have been

corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Dimensioning on Contract Documents is for identification purposes only. Contractor shall confirm all measurements prior to any fabrications for this project. Take field measurements as required fitting the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of the Contractor, submit a request for information to Engineer according to requirements in Division 01 Section "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Engineer promptly.
- B. General: Engage qualified professionals to lay out the Work using accepted surveying practices.
 - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 - 2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - 3. Inform installers of lines and levels to which they must comply.
 - 4. Check the location, level and plumb, of every major element as the Work progresses.
 - 5. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Engineer or Owner.

3.4 FIELD ENGINEERING

- A. Identification: Owner will identify existing benchmarks, control points, and property corners.
- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
 - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Engineer. Report lost or destroyed permanent benchmarks or control points promptly.
 - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

3.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 - 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

- F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- G. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Engineer.
 - 2. Allow for building movement, including thermal expansion and contraction.
 - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Temporary Support: Provide temporary support of work to be cut.
- C. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- D. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching in accordance with requirements of Division 01 Section "Summary."
- E. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

- F. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 6. Proceed with patching after construction operations requiring cutting are complete.
- G. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, prepare substrate and apply

primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

H. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 OWNER-INSTALLED PRODUCTS

- A. Site Access: Provide access to Project site for Owner's construction personnel.
- B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.
 1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
 2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.8 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - a. Utilize containers intended for holding waste materials of type to be stored.
 4. Coordinate progress cleaning for joint-use areas where more than one installer has worked.

- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Division 01 Section "Temporary Facilities and Controls" and Division 01 Section "Construction Waste Management and Disposal."
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.9 STARTING AND ADJUSTING

- A. Coordinate startup and adjusting of equipment and operating components with requirements in Division 01 Section "General Commissioning Requirements."
- B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

- E. Manufacturer's Field Service: Comply with qualification requirements in Division 01 Section "Quality Requirements."

3.10 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.11 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes.
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF 01730

SECTION 01733 CUTTING AND PATCHING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes general procedural requirements for cutting and patching.

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 SUBMITTALS

- A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:
 - 1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
 - 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
 - 3. Products: List products to be used and firms or entities that will perform the Work.
 - 4. Dates: Indicate when cutting and patching will be performed.
 - 5. Utility Services and Mechanical/Electrical Systems: List services/systems that cutting and patching procedures will disturb or affect. List services/systems that will be relocated and those that will be temporarily out of service. Indicate how long services/systems will be disrupted.
 - 6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.
 - 7. Engineer's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.5 QUALITY ASSURANCE

- A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
- B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operating elements include the following:
 - 1. Primary operational systems and equipment.
 - 2. Fire-suppression systems.
 - 3. Mechanical systems piping and ducts.
 - 4. Control systems.
 - 5. Communication systems.
 - 6. Conveying systems.
 - 7. Electrical wiring systems.
 - 8. Operating systems of special construction in Division 13 Sections.
- C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Miscellaneous elements include the following:
 - 1. Water, moisture, or vapor barriers.
 - 2. Membranes and flashings.
 - 3. Exterior curtain-wall construction.
 - 4. Equipment supports.
 - 5. Piping, ductwork, vessels, and equipment.
 - 6. Noise- and vibration-control elements and systems.
- D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Engineer's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- E. Cutting and Patching Conference: Before proceeding, meet at Project site with parties

involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.6 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
 - 1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
 - 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

3.3 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

- B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 4. Excavating and Backfilling: Comply with requirements in applicable Division 2 Sections where required by cutting and patching operations.
 - 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - 6. Proceed with patching after construction operations requiring cutting are complete.

- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.
 - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 - 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.
- D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF 01733

SECTION 01740 CONSTRUCTION WASTE AND DISPOSAL

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Salvaging nonhazardous demolition and construction waste.
 - 2. Recycling nonhazardous demolition and construction waste.
 - 3. Disposing of nonhazardous demolition and construction waste.

1.3 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 ACTION SUBMITTALS

- A. Waste Management Plan: Submit plan within 30 days of date established for the Notice to Proceed.

1.5 INFORMATIONAL SUBMITTALS

- A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Use Form CWM-8 for demolition waste. Include the following information:

1. Material category.
 2. Generation point of waste.
 3. Total quantity of waste in tons.
 4. Quantity of waste salvaged, both estimated and actual in tons.
 5. Quantity of waste recycled, both estimated and actual in tons.
 6. Total quantity of waste recovered (salvaged plus recycled) in tons.
 7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- E. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- F. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- G. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered. Substantial completion shall not be awarded without this document.
- 1.6 QUALITY ASSURANCE
- A. Waste Management Coordinator Qualifications: Experienced firm, with a record of successful waste management coordination of Projects with similar requirements.
- B. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
- C. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
- D. Waste Management Conference: Conduct conference at Project site to comply with

requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to waste management including, but not limited to, the following:

1. Review and discuss waste management plan including responsibilities of waste management coordinator.
2. Review requirements for documenting quantities of each type of waste and its disposition.
3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
5. Review waste management requirements for each trade.

1.7 WASTE MANAGEMENT PLAN

- A. General: Develop a waste management plan according to ASTM E 1609 and requirements of this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis.
- B. Waste Identification: Indicate anticipated types and quantities of demolition waste generated by the Work. Use Form CWM-2 for demolition waste. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Use Form CWM-4 for demolition waste. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
 1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
 2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
 3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
 4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
 5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.

6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
 1. Comply with Division 01 Section "Temporary Facilities and Controls" for operation, termination, and removal requirements.
- B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan.
- C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.
 1. Distribute waste management plan to everyone concerned.
 2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
 2. Comply with Division 01 Section "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site weekly and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
 1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.

2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - B. Burning: Do not burn waste materials.
 - C. Burning: Burning of waste materials is permitted only at designated areas, provided required permits are obtained. Provide full-time monitoring for burning materials until fires are extinguished.
 - D. Disposal: Transport waste materials and dispose of at designated spoil areas on Owner's property.
 - E. Disposal: Transport waste materials off Owner's property daily and legally dispose of them.

END OF 01740

SECTION 01770 CLOSEOUT PROCEDURES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

- 1. Substantial Completion procedures.
- 2. Final completion procedures.
- 3. Warranties.
- 4. Final cleaning.

- B. Related Sections:

- 1. Division 01 Section "Photographic Documentation" for submitting final completion construction photographic documentation.
- 2. Division 01 Section "Execution" for progress cleaning of Project site.
- 3. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
- 4. Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
- 5. Division 01 Section "Demonstration and Training" for requirements for instructing Owner's personnel.
- 6. Divisions 02 through 49 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.3 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete with request.

- 1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
- 2. Advise Owner of pending insurance changeover requirements.

3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 5. Prepare and submit Project Record Documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
 6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
 7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 8. Complete startup testing of systems.
 9. Submit test/adjust/balance records.
 10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 11. Advise Owner of changeover in heat and other utilities.
 12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
 13. Complete final cleaning requirements, including touchup painting.
 14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Engineer will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Engineer, which must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected. All reinspection costs shall be the responsibility of the Contractor.
 2. Results of completed inspection will form the basis of requirements for final completion.

1.4 FINAL COMPLETION

- A. Preliminary Procedures: Before requesting final inspection for determining final completion, complete the following:
1. Submit a final Application for Payment according to Division 01 Section "Payment Procedures."
 2. Submit certified copy of Engineer's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Engineer. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 4. Submit pest-control final inspection report and warranty.
 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings.
- B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Engineer will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
 3. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Engineer.
 - d. Name of Contractor.

- e. Page number.
- 4. Submit list of incomplete items in the following format:
 - a. Electronic file.
 - b. Three paper copies of product schedule or list, unless otherwise indicated. Engineer will return response.

1.6 WARRANTIES

- A. Submittal Time: Submit written warranties on request of Engineer for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
 - 1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
 - 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 - 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
 - 4. Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide table of contents at beginning of document.
- C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
 - 1. Use cleaning products that meet Green Seal GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
 - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - h. Sweep concrete floors broom clean in unoccupied spaces.
 - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
 - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - k. Remove labels that are not permanent.

- l. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - 1) Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates.
 - m. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - n. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
 - o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - q. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter upon inspection.
 - 1) Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report upon completion of cleaning.
 - r. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
 - s. Leave Project clean and ready for occupancy.
- C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests. Prepare a report.
- D. Construction Waste Disposal: Comply with waste disposal requirements in Division 01 Section "Construction Waste Management and Disposal."

END OF 01770

SECTION 01780 OPERATION AND MAINTENANCE

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory.
 - 2. Emergency manuals.
 - 3. Operation manuals for systems, subsystems, and equipment.
 - 4. Product maintenance manuals.
 - 5. Systems and equipment maintenance manuals.
- B. Related Sections:
 - 1. Division 01 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
 - 2. Divisions 02 through 49 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

- A. Manual Content: Operations and maintenance manual content is specified in individual specification sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
 - 1. Where applicable, clarify and update reviewed manual content to correspond to modifications and field conditions.
- B. Format: Submit operations and maintenance manuals in the following format:
 - 1. PDF electronic file. Assemble each manual into a composite electronically-

indexed file. Submit on digital media acceptable to Engineer.

- a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically-linked operation and maintenance directory.
 - b. Enable inserted reviewer comments on draft submittals.
2. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Engineer will return two copies.
- C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Engineer will comment on whether general scope and content of manual are acceptable.
- D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Engineer will return copy with comments.
1. Correct or modify each manual to comply with Engineer's comments. Submit copies of each corrected manual within 15 days of receipt of Engineer's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Organization: Include a section in the directory for each of the following:
1. List of documents.
 2. List of systems.
 3. List of equipment.
 4. Table of contents.
- B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and

Maintenance Documentation for Building Systems."

- 2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS
- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
1. Title page.
 2. Table of contents.
 3. Manual contents.
- B. Title Page: Include the following information:
1. Subject matter included in manual.
 2. Name and address of Project.
 3. Name and address of Owner.
 4. Date of submittal.
 5. Name and contact information for Contractor.
 6. Name and contact information for Construction Manager.
 7. Name and contact information for Engineer.
 8. Name and contact information for Commissioning Agent.
 9. Names and contact information for major consultants to the Engineer that designed the systems contained in the manuals.
 10. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

- E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
 2. File Names and Bookmarks: Enable bookmarking of individual documents based upon file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel upon opening file.
- F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.
1. Binders: Heavy-duty, three-ring, vinyl-covered, loose leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
 2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
 3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
 4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
 5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.

- b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
2. Performance and design criteria if Contractor is delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

- B. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

- C. Operating Procedures: Include the following, as applicable:
 - 1. Startup procedures.
 - 2. Equipment or system break-in procedures.
 - 3. Routine and normal operating instructions.
 - 4. Regulation and control procedures.
 - 5. Instructions on stopping.
 - 6. Normal shutdown instructions.
 - 7. Seasonal and weekend operating instructions.
 - 8. Required sequences for electric or electronic systems.
 - 9. Special operating instructions and procedures.
- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.4 PRODUCT MAINTENANCE MANUALS

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Product Information: Include the following, as applicable:
 - 1. Product name and model number.
 - 2. Manufacturer's name.
 - 3. Color, pattern, and texture.
 - 4. Material and chemical composition.
 - 5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
 2. Types of cleaning agents to be used and methods of cleaning.
 3. List of cleaning agents and methods of cleaning detrimental to product.
 4. Schedule for routine cleaning and maintenance.
 5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
1. Standard maintenance instructions and bulletins.
 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 3. Identification and nomenclature of parts and components.
 4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
1. Test and inspection instructions.
 2. Troubleshooting guide.

3. Precautions against improper maintenance.
 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 5. Aligning, adjusting, and checking instructions.
 6. Demonstration and training video recording, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.
- B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
1. Engage a factory-authorized service representative to assemble and prepare

- information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
1. Do not use original project record documents as part of operation and maintenance manuals.
 2. Comply with requirements of newly prepared record Drawings in Division 01 Section "Project Record Documents."
- G. Comply with Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF 01780

SECTION 01785 PROJECT RECORD DOCUMENTS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for project record documents, including the following:
 - 1. Record Drawings.
 - 2. Record Specifications.
 - 3. Record Product Data.
 - 4. Miscellaneous record submittals.
- B. Related Sections:
 - 1. Division 01 Section "Execution" for final property survey.
 - 2. Division 01 Section "Closeout Procedures" for general closeout procedures.
 - 3. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
 - 4. Divisions 02 through 49 Sections for specific requirements for project record documents of the Work in those Sections.

1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit one set(s) of marked-up record prints.
 - 2. Number of Copies: Submit copies of record Drawings as follows:
 - a. Initial Submittal: Submit one paper copy set of marked-up record prints.
 - b. Final Submittal: Submit one paper copy set of marked-up record prints. Print each Drawing, whether or not changes and additional information were recorded.
 - c. Final Submittal: Submit one paper copy set of marked-up record prints and one set of record digital data files.

- B. Record Specifications: Submit one paper copy of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit one hard copy of each submittal.
 - 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.
- D. Miscellaneous Record Submittals: Refer to other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit one paper copy of each submittal.
- E. Reports: Submit written report indicating items incorporated in Project record documents concurrent with progress of the Work, including modifications, when modifications occurred, concealed conditions, field changes, product selections, and other notations incorporated.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings.
 - 1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an acceptable drawing technique.
 - c. Record data as soon as possible after obtaining it.
 - d. Record and check the markup before enclosing concealed installations.
 - e. Cross-reference record prints to corresponding archive photographic documentation.
 - 2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Depths of foundations below first floor.

- d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order or Discretionary Work Change Directive.
 - k. Changes made following Engineer's written orders.
 - l. Details not on the original Contract Drawings.
 - m. Field records for variable and concealed conditions.
 - n. Record information on the Work that is shown only schematically.
3. Mark the Contract Drawings and Shop Drawings completely and accurately. Utilize personnel proficient at recording graphic information in production of marked-up record prints.
 4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing record Drawings where Engineer determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.
1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
 2. Consult Engineer for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared record Drawings into record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.
- C. Format: Identify and date each record Drawing; include the designation "PROJECT

RECORD DRAWING" in a prominent location.

1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Format: Annotated PDF electronic file.
3. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Engineer.
 - e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
 5. Note related Change Orders, record Product Data, and record Drawings where applicable.
- B. Format: Submit record Specifications as hard copy.

2.3 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.

2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 3. Note related Change Orders, record Specifications, and record Drawings where applicable.
- B. Format: Submit record Product Data as a bound hard copy.
1. Include record Product Data directory organized by specification section number and title, electronically linked to each item of record Product Data.

2.4 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.
- B. Format: Submit miscellaneous record submittals as bound hard copy.
1. Include miscellaneous record submittals directory organized by specification section number and title, electronically linked to each item of miscellaneous record submittals.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and modifications to project record documents as they occur; do not wait until the end of Project.
- B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Engineer's reference during normal working hours.

END OF 01785

SECTION 01790 DEMONSTRATION AND TRAINING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
 - 1. Demonstration of operation of systems, subsystems, and equipment.
 - 2. Training in operation and maintenance of systems, subsystems, and equipment.
 - 3. Demonstration and training video recordings.

B. Related Sections:

- 1. Divisions 02 through 49 Sections for specific requirements for demonstration and training for products in those Sections.

1.3 INFORMATIONAL SUBMITTALS

- A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
 - 1. Indicate proposed training modules utilizing manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.
- B. Qualification Data: For facilitator.
- C. Attendance Record: For each training module, submit list of participants and length of instruction time.
- D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.4 CLOSEOUT SUBMITTALS

- A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.
 - 1. Identification: On each copy, provide an applied label with the following information:

- a. Name of Project.
 - b. Name and address of videographer.
 - c. Name of Engineer.
 - d. Name of Construction Manager.
 - e. Name of Contractor.
 - f. Date of video recording.
2. Transcript: Prepared on 8-1/2-by-11-inch paper, punched and bound in heavy-duty, three-ring, vinyl-covered binders. Mark appropriate identification on front and spine of each binder. Include a cover sheet with same label information as the corresponding video recording. Include name of Project and date of video recording on each page.
 3. At completion of training, submit complete training manual(s) for Owner's use.

1.5 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 01 Section "Quality Requirements," experienced in operation and maintenance procedures and training.
- C. Videographer Qualifications: A professional videographer who is experienced photographing demonstration and training events similar to those required.
- D. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:
 1. Inspect and discuss locations and other facilities required for instruction.
 2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
 3. Review required content of instruction.
 4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.6 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Engineer.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
 - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - a. System, subsystem, and equipment descriptions.
 - b. Performance and design criteria if Contractor is delegated design responsibility.
 - c. Operating standards.
 - d. Regulatory requirements.
 - e. Equipment function.
 - f. Operating characteristics.
 - g. Limiting conditions.
 - h. Performance curves.
 - 2. Documentation: Review the following items in detail:
 - a. Emergency manuals.
 - b. Operations manuals.
 - c. Maintenance manuals.

- d. Project record documents.
 - e. Identification systems.
 - f. Warranties and bonds.
 - g. Maintenance service agreements and similar continuing commitments.
3. Emergencies: Include the following, as applicable:
- a. Instructions on meaning of warnings, trouble indications, and error messages.
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside of normal operating limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.
4. Operations: Include the following, as applicable:
- a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Instructions on stopping.
 - h. Normal shutdown instructions.
 - i. Operating procedures for emergencies.
 - j. Operating procedures for system, subsystem, or equipment failure.
 - k. Seasonal and weekend operating instructions.
 - l. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.

5. Adjustments: Include the following:
 - a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
 - a. Diagnostic instructions.
 - b. Test and inspection procedures.
7. Maintenance: Include the following:
 - a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning
 - e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.
8. Repairs: Include the following:
 - a. Diagnosis instructions.
 - b. Repair instructions.
 - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - d. Instructions for identifying parts and components.
 - e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in

coordination with requirements in Division 01 Section "Operations and Maintenance Data."

- B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.

- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

1. Engineer will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
2. Owner will furnish an instructor to describe Owner's operational philosophy.
3. Owner will furnish Contractor with names and positions of participants.

- C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Schedule training with Owner with at least seven days' advance notice.

- D. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of an oral performance-based test.

- E. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

3.3 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

- A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.

1. At beginning of each training module, record each chart containing learning objective and lesson outline.

- B. Video Recording Format: Provide high-quality color video recordings with menu navigation in format acceptable to Engineer.

- C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to show area of demonstration and training. Display continuous running time.

- D. Narration: Describe scenes on video recording by audio narration by microphone

while video recording is recorded. Include description of items being viewed.

- E. Transcript: Provide a transcript of the narration. Display images and running time captured from videotape opposite the corresponding narration segment.
- F. Pre-Produced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

END OF 01790

SECTION 15010 BASIC MECHANICAL REQUIREMENTS

PART 1 – GENERAL

1.1 SUMMARY

- A. This Section specifies the basic requirements for mechanical installations and includes requirements common to other sections contained in Division 15.
- B. Related documents include basic mechanical requirements specifically applicable to Division 15 Sections, in addition to Division 1—General Requirements, General Conditions and Supplementary General Conditions.
- C. This Division of the specifications includes mechanical:
 - 1. Heating, Ventilating, Air Conditioning (HVAC).
 - 2. Plumbing.
- D. The headings of the paragraphs and sections as contained in the drawings and these specifications are for purpose of convenience only and shall not be deemed to expand, limit or change the provisions of such paragraphs and sections.
- E. In the event that the Drawings, Specifications or Owner's contractual requirements contradict one another, the Contractor shall submit a request for information prior to submitting its bid. Upon award of contract, the more costly requirements shall be applicable.

1.2 INTENT OF SPECIFICATIONS AND DRAWINGS

- A. The drawings show the general run of pipes, ducts, etc., and the approximate location of systems. Do not scale the drawings to determine exact positions and clearances. Locate equipment and accessories in such a manner as to provide easy access for proper service and maintenance. Additionally, coordinate rooftop equipment locations with structure.
- B. It is the intent of these specifications and drawings to call for finished work, tested, and ready for operation. Wherever the word "provide" is used, it shall mean "furnish and install complete and ready for use." Methods of construction and details of workmanship, where not specifically described in the drawings or specifications, shall be subject to Architect's/Engineer's approval. Minor details not shown or specified, but necessary for the proper installation and operation, shall be included in the work, the same as if specified herein or shown.

1.3 FIELD MEASUREMENTS

- A. Base all measurements, both horizontal and vertical from established bench marks. All work shall agree with these established lines and levels. Verify all measurements at site and check the correctness of same as related to the work. All material take-offs for the site shall be field measured prior to bids.

1.4 SCOPE OF WORK

- A. The scope of the work included under this Division of the Specifications shall include complete mechanical systems as shown on the plans and as specified herein.
- B. Systems shall include all appurtenances as required to achieve the operating conditions as shown and specified.
- C. The construction of this Project shall be in complete conformance with Title XLVIII Chapter 1013 of the 2010 Florida Statutes and Rule 6A-2.0010 which includes, but is not limited to the Florida Building Code 2007 with 2009 Supplements. This also includes the Building, Mechanical, Plumbing, Gas-Fuel and Fire Prevention codes.
- D. All electrical work required to support mechanical equipment or is otherwise necessary to operate mechanical equipment, shall be the responsibility of the Mechanical Contractor including, but not limited to, electrical motors for all motor-operated equipment required under this Division, motor controllers, all starters not provided by the Electrical Contractor (coordinate with Electrical Contractor), pilot lights and relays, line and low voltage control wiring, raceways, connections to switches, and other electrical devices furnished with temperature control systems except as otherwise provided for in other Divisions of this Specification. All starters furnished by the Mechanical Contractor shall meet all requirements specified in the Electrical Documents.
- E. Prior to submitting its bid, the Contractor shall inform the Architect/Engineer of any work that does not conform to applicable codes and regulations. After acceptance of the Contractor's bid by the Owner, the Contractor shall include, in the Work, without additional cost to the Owner, any labor, materials, services, equipment, etc., in order to comply with applicable laws, ordinances, rules and regulations required by the Authority Having Jurisdiction, whether or not specifically specified herein or shown on drawings.

1.5 REMOVALS AND RELOCATIONS

- A. Demolition of existing piping, equipment, etc., shall be done as indicated on the Drawings. Existing piping and/or equipment to be removed shall be offered to the Owner for first right of refusal. If the Owner wishes to utilize the existing equipment elsewhere, this Contractor shall move the equipment to a site designated by the Owner. If the Owner refuses, all material to be removed shall be discarded by the Contractor in a safe and proper manner.
- B. All demolition work shall be completely coordinated with the Owner. Demolition and reconnections requiring shut-down of existing systems shall be scheduled with the Owner/Engineer. If shut-down can only be accommodated on the weekend, or after normal working hours, such work shall be done at no additional cost to the Owner. If it is not possible to schedule sufficient Owner coordinated and approved downtime to complete the entire demolition and reconnection scope such that all or a part of the facility's service(s) will be disrupted, affecting the normal business operation of the facility (i.e., loss of HVAC or plumbing), the Contractor shall provide temporary accommodations (i.e., temporary HVAC or portable toilets, etc), for the duration of the shutdown at no additional cost to the Owner.

- C. Locations, capacities, sizes, etc. of existing equipment, piping, etc., were obtained from field surveys and as built drawings. Verify all conditions at site prior to commencing with work. Notify Engineer of any discrepancies prior to starting work or ordering material.
- D. Survey existing facilities and utilities as necessary to determine location of shut-off or disconnect devices, drains, vents, etc. Drain, refill, and purge existing water piping circuits to make new piping connections.
- E. Temporarily store all items to be relocated, if required. Contractor shall be responsible for safe storage of all such items and shall replace any items lost or damaged during storage removal or reinstallation.

1.6 MINOR MODIFICATIONS

- A. Drawings are diagrammatic and indicate the general arrangement of systems and work included in the contract. If directed by the Architect or Engineer, the Contractor shall, without extra charge, make reasonable modifications in the layout as needed to prevent conflict with work of other trades or for proper execution of the work.

1.7 SUBMITTALS AND SHOP DRAWINGS

- A. Submit all Division 15 submittals at one time. Submit Manufacturer's published technical data, catalog cuts, wiring diagrams, shop drawings, samples and testing and balancing logs for all elements of the HVAC work.
- B. All shop drawings shall be submitted to the Architect/Engineer by Contractor no later than 30 days from the day of contract award. Failure of the Contractor to submit shop drawings in ample time for checking shall not entitle it to an extension of contract time, and no claim for extension by reason of such default shall be allowed.
- C. No equipment, piping, ductwork or components shall be ordered, shipped, fabricated, delivered, erected, connected or placed into service other than from shop drawings reviewed and taken no exception to by the Engineer.
- D. It shall be understood that review of shop drawings by the Engineer does not supersede the requirement to provide a complete and functioning system in compliance with the Contract Documents and applicable codes.
- E. Equipment Supports: Submit detailed shop drawings indicating equipment weight and dimensions, support material, connections, anchoring, and vibration isolation.
- F. Submittals shall include, but not be limited to the following:
 - 1. All equipment; cooling, heating, plumbing, electrical motors, starters, controls, etc.
 - 2. Voltage, phase, and amps of each electrical item, such as motors, etc.

3. All auxiliary equipment.
 4. Pipe, ductwork, valves, insulation, etc.
- G. Each submittal of shop drawings or equipment shall be accompanied by a cover letter stating deviations, if any, from the contract documents. In any such cover letter, a schedule, in the same format as on the drawings, with the basis of design performance characteristics and the submitted equipment performance characteristics shall be included.
- H. At the time of each shop drawing or equipment submittal, the Contractor shall call the Engineer's attention (in writing) to, and plainly mark on shop drawings, any and all deviations from the Contract Documents. Any such deviation shall be described in a cover letter accompanying each submittal.
- I. System layouts and methods of support shall be shown on shop drawings and shall have the review of the Engineer prior to fabrication and installation. Spacing of supports shall be as per the drawings (refer to Division 15 specifications and drawings as well as structural drawings) and the FBC. Supports shall be fabricated as detailed on reviewed shop drawings.
- J. Refer to individual Division 15 sections for additional submittal requirements.

PART 2 – PRODUCTS

2.1 BASIS OF DESIGN

- A. It shall be understood that use of a piece of equipment other than that scheduled or identified as the Basis of Design may impact performance of an overall engineered system or may require other revisions, and thus any manufacturer's equipment other than that listed as Basis of Design shall require written approval via Addendum prior to bid except where the manufacturer's name is specifically listed on drawings or specifications as a pre-approved substitute or an accepted manufacturer. All substitutes, pre-approved substitutes, accepted manufacturers, and/or Basis of Design are subject to all requirements of quality, physical characteristics (i.e., dimension, sound, etc), and performance, etc., as set forth in these specifications and contract documents.

2.2 OPTIONS AND SUBSTITUTIONS

- A. Materials and equipment are specified herein by a single or by multiple Manufacturers establish the level of quality and performance required. The drawings are based upon equipment scheduled on drawings and specified.
- B. Request for approval of alternate manufacturers not listed as approved equals in the drawings or specifications shall be made in writing no less than ten (10) days prior to bid. Alternate manufacturers not listed as approved equals or basis of design shall not be considered approved to bid unless so stated via addendum. The approval of any substitutions or equals prior to bid shall not be construed as a shop drawing approval. The substitute or equal must be submitted as described in the specifications and meet all the requirements of the specifications and drawings.

- C. All requests for alternate manufacturers not listed shall be submitted for approval and specifically indicate any and all differences or omissions between the product specified as basis of design and the product proposed for substitution. Differences shall include, but shall not be limited to, data as follows for both the specified and substituted products.
- Principle of operation;
 - Materials of construction or finishes;
 - Weight and dimensions of item;
 - Deleted features or items;
 - Added features or items;
 - Changes in other Contractor's work caused by the substitution;
 - Physical dimensions;
 - Electrical requirements.
- D. Substitutions of other Manufacturer's will be considered and approved for use if, in the Engineer's opinion, the item requested for substitution is equal to that specified. The Contractor shall provide to the Engineer a typed comparative list of the basis of design and the proposed substitute. The comparative shall list capacities, pressure drops, electrical requirements, etc..., and shall outline any and all differences between the proposed equipment and basis of design.
- E. Where such approved substitution requires quantity and arrangement of ductwork, piping, wiring, conduit, and equipment from that specified or indicated on the drawings, the Contractor shall furnish and install any such ductwork, piping, structural supports, insulation, controllers, motors, starters, electrical wiring and conduit, and any other additional equipment required by the system, at no additional cost to the Owner. Where the Contractor proposes to use an item of equipment other than that specified or detailed on the drawing, which requires any redesign of the structure, partitions, foundations, piping, wiring, or any other part of the mechanical or electrical, all such redesign, and all new drawings and detailing required therefore, shall be prepared by the Subcontractor at its own expense and submitted to the Architect/Engineer for approval.
- F. All equipment and shop drawing submittals shall clearly outline differences or omissions (if any) between the products and materials specified as basis of design and the product proposed for construction. This shall also include the basis of design manufacturers that wish to substitute options or materials for equipment specified. Differences shall include, but shall not be limited to, data as follows for both the specified and submitted products.
- Principle of operation;
 - Materials of construction or finishes;
 - Weight and dimensions of item;
 - Deleted features or items;
 - Added features or items;

- Changes in other Contractor's work caused by the substitution;
- Physical dimensions;
- Electrical requirements.

PART 3 – INSTALLATION

3.1 COOPERATION WITH OTHER TRADES

- A. Give full cooperation to other trades and furnish in writing to the General Contractor, with copies to the Architect, any information necessary to permit the work of all trades to be installed satisfactorily and with the least possible interference or delay.
- B. When work installed under this Division will be in close proximity to, or will interfere with work of other trades, assist in working out space conditions to make a satisfactory adjustment. If so directed by the Engineer/Architect, prepare composite working drawings and sections at a suitable scale not less than 1/4" = 1'0", clearly showing how work is to be installed in relation to the work of other trades. If the work is installed before coordinating with other trades, or so as to cause any interference with work of other trades, make all the necessary changes in work to correct the condition without extra charge.
- C. Furnish to other trades, as required, all necessary templates, patterns, setting plans, and shop details for the proper installation of work and for the purpose of coordinating adjacent work.

3.2 PROTECTION

- A. Protect all work and material provided under this Division from damage. All damaged equipment work or material provided under this Division shall be replaced with new.
- B. Protect all work and equipment until inspected, tested, and accepted. Protect work against theft, injury, or damage; and carefully store material and equipment received on site which are not immediately installed. Close open ends of work with temporary covers or plugs during storage and construction to prevent entry of obstructing material.

3.3 SCAFFOLDING, RIGGING, AND HOISTING

- A. Provide all scaffolding, rigging, hoisting, and services necessary for erection and delivery into the premises of any equipment and apparatus furnished. Remove same from premises when no longer required.

3.4 REMOVAL OF RUBBISH

- A. This Contractor shall at all times keep premises free from accumulations of waste materials or rubbish caused by his employees or work. At completion of work he shall remove all his tools, scaffolding, materials, and rubbish from the building and site.

- B. All plaster, concrete, cement, etc. shall be removed from all pipe, hangers, and equipment prior to painting and/or concealment.

3.5 SAFETY

- A. This Contractor shall comply with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C.333), Title 29—Labor, Chapter XIII, Bureau of Standards, Department of Labor, Part 1518—Safety and Health Regulations for Construction. Housekeeping and equipment shall be maintained in such a manner that they comply with the Florida Industrial Commission Safety Code and Regulations of the Federal Williams—Steiger Occupational Safety and Health Act of 1970 (OSHA), wherein it states that the Contractor shall not require any laborer or mechanic employed in the performance of the contract to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his health and safety.

3.6 SUPERVISION

- A. This Contractor shall provide a competent, experienced, full time superintendent who is acceptable to the Architect/Engineer and Owner, and who is authorized to make decisions on behalf of the Contractor.

3.7 LUBRICATION

- A. Where necessary, provide means for lubricating all bearings and other machine parts. If a part requiring lubrication is concealed or inaccessible, extend a lubrication tube with suitable fitting to an accessible location and suitably identify it.
- B. After installation, properly lubricate all parts requiring lubrication and keep them adequately lubricated until final acceptance by the Owner.

3.8 VALVE CHARTS, TAGS, AND NAMEPLATES

- A. Provide at a location designated by the Engineer and the Owner, a valve chart enclosed in an aluminum frame with clear plastic shield. Chart shall show the designated number of each valve, its location and service. Valve numbers shall be same as those shown on the "As-Built" drawings.
- B. Each valve shown on the chart shall have a 1-1/2" diameter, 18 gauge brass tag with clearly visible stamped numbers, securely fastened to the valve stem or handle with a heavy brass hook or chain.
- C. Each panel mounted switch, thermometer, gauge, or controller for fans, pumps, or other electrically operated equipment shall be clearly designated by a black plastic nameplate of size approved by the Engineer securely fastened with metal pins or screws to the panel directly under the item designated.
- D. Refer to Section 15190 for additional information.

3.9 WIRING DIAGRAMS

- A. Furnish for use under Division 16 all wiring diagrams as may be required for the installation of the wiring to insure proper operation and control of the equipment provided under this Division. Provide the diagrams in time to avoid delays.

3.10 MATERIAL AND WORKMANSHIP

- A. All materials and apparatus required for the work, except as specifically specified otherwise, shall be new, of first-class quality, and shall be furnished, delivered, erected, connected and finished in every detail, and shall be so selected and arranged as to fit properly into the building spaces. Where no specific kind or quality of material is given, a first-class standard article as approved by the Engineer shall be furnished. Refer to substitutions in this Section.
- B. Unless otherwise specifically indicated on the plans or specifications, all equipment and materials shall be installed with the approval of the Architect and Engineer in accordance with the recommendations of the Manufacturer. This includes the performance of such tests as the Manufacturer recommends.

3.11 QUIET OPERATION AND VIBRATION

- A. All work shall operate under all conditions of load without any sound or vibration which is objectionable in the opinion of the Engineer and the Owner. In case of moving machinery, sound, or vibration noticeable outside of room in which it is installed, or annoyingly noticeable inside its own room, will be considered objectionable. Sound or vibration conditions considered objectionable by the Engineer and the Owner shall be corrected in an approved manner at no additional expense to the Owner. Vibration control shall be by means of approved vibration eliminators in a manner as specified in Section 15242.

3.12 ACCESSIBILITY

- A. This Contractor shall be responsible for the sufficiency of the size of shafts and chases, the adequate clearance in double partitions and hung ceilings for the proper installation of his work. He shall cooperate with all other Contractors whose work is in the same space, and shall advise them of his requirements. Such spaces and clearances shall, however, be kept to the minimum size required.
- B. This Contractor shall locate all equipment which must be serviced, operated, or maintained in fully accessible positions. Equipment shall include but not be limited to, valves, traps, clean-outs, motors, controllers, switchgear, and drain points. If required for better accessibility, furnish access doors for this purpose. Minor deviations from drawings may be made to allow for better accessibility.
- C. This Contractor shall provide the access panels for concealed mechanical equipment, valves, controls, dampers, or other device requiring service. (Refer to Paragraph 1.20 of this section.)

3.13 FOUNDATIONS, SUPPORTS, PIERS, AND ATTACHMENTS

- A. This Contractor shall furnish and install all necessary foundations, supports, pads, bases and piers required for all air conditioning equipment, piping, pumps, tanks,

compressors, and for all other equipment furnished under this Division, and shall submit drawings to the Architect and Engineer for approval before purchase, fabrication or construction of same.

- B. For pumps, compressors, and other rotating machinery, and for all equipment where foundations are indicated, provide concrete pads as shown. All pads shall be extended six inches (6") beyond machine base in all directions with top edge chamfered. Inset six inch (6") steel dowel rods into floors to anchor pads. All pads shall have a minimum of 6 x 6 W2.9/W2.9 WWF unless otherwise noted. Shop drawings of all foundations and pads shall be submitted to the Architect and Engineer for approval before same are constructed.
- C. Construction of foundations, supports, pads, bases, and piers where mounted on the floor, shall be the same materials and same quality of finish as the adjacent and surrounding flooring material.
- D. All equipment, unless shown otherwise, shall be securely attached to the building structure in an approved manner. Attachments shall be of a strong and durable nature and any attachments that are, in the opinion of the Architect and the Engineer, not strong enough shall be replaced as directed.

3.14 ACCESS DOORS FOR WALLS AND CEILINGS

- A. Provide flush panel access doors with a 16 gauge steel frame and a 14 gauge steel door panel.
- B. Finish is to be primed painted steel.
- C. Provide concealed hinges which allow the door to open 175 degrees and have a removable pin.
- D. Provide access doors with a locked flush mounted vandal proof spanner head operated steel cams.
- E. Provide 1-1/2 hour "B" label door for rated chase walls.
- F. Furnish masonry anchors for installation in masonry walls and metal lath wings with casing bead for plaster installation.
- G. Provide a minimum 2'-0" by 2'-0" access doors unless shown or noted otherwise on the drawings.
- H. Access doors for chase walls shall be mounted 16" off the finish floor.
- I. Access doors for mechanical equipment shall be a minimum of 12" larger than equipment all around.

3.15 VALVE BOXES

- A. All exterior underground valves shall be provided with exterior valve boxes equipped with removable covers appropriately labeled.

- B. Valve boxes shall be manufactured of reinforced fiberglass plastic or heavy duty PVC as approved by the Architect/Engineer, unless otherwise noted on the drawings.

3.16 WELDING

- A. Welded pipe joints shall be made by the oxyacetylene or electric process in accordance with the Code of Pressure Piping ASA B31.1.
- B. Welding shall be done with good quality modern welding equipment, by competent operators, and in thorough, first class manner, conforming to AWS Standards.
- C. The Contractor shall be required to furnish proof of the competency of each welding operator for both field and shop welds and shall at the request of the Architect/Engineer have all or any of such welding operators pass a standard qualification test such as ASME, AWS, or Hartford Insurance Company procedure and tests.
- D. Filler-metal for the welding process shall conform to ASTM A233 "Specification for Mild Steel Arc-Welding Electrodes". Classification of electrodes shall be one of the following: E6010, E6015, E7016, E7018.
- E. When welding is to be performed, precautionary measures must be taken to prevent fire. Remove flammable materials and debris from the area. Provide an appropriate extinguisher nearby.
- F. Pipes shall be cut short and cold sprung into place before welding or fabricating to compensate for expansion of lines when hot.
- G. Welds shall be of the single vee butt type. Pipe end shall be shop beveled to 45 degrees to within 1/16 inch of the inside wall surface.
- H. The abutting ends of the joints shall be separated before welding to permit complete fusion, tacked in two or more points to maintain alignment, and welded. Welding shall be continuous around the pipe.
- I. Welds shall be of sound weld metal, thoroughly fused into the ends of the pipe and to the bottom of the vee, and shall be built up in excess of the pipe wall to give a reinforcement of one-quarter (1/4) the pipe wall thickness and in such a manner that one weld metal will present a gradual increase in thickness from the surface of the pipe to the center of the weld. The minimum width of the weld shall be 2-1/2 times the pipe wall thickness.
- J. The fillet welds from the flanges of fittings shall be fused into the pipe and plate for minimum distance of 1-1/2 times the pipe wall thickness and shall be built up to present a minimum throat thickness of depth of weld of 1-1/4 times the pipe wall thickness.
- K. Branch connections shall be fabricated by welding. Openings cut into pipe for welded connections shall be accurately made to give carefully matched intersections and welding fittings shall be carefully welded into the pipe system.

- L. Welding ells shall be used at all turns in welded pipe lines; no mitered ells will be approved.

- M. Where branch piping is three times smaller than the main, branch connections shall be made up with the appropriate manufactured weld-on fitting. Welded tees shall be used for all other branch connections, unless otherwise approved by the Architect/Engineer for a specific case.
 - 1. Approved Manufacturers
 - a. Allied Piping Products.
 - b. Bonney Forge.
 - c. Branch Connections.
 - d. Branchlets.
 - e. Tube Turn.
 - f. Thread-O-Lets.

- N. Welds in piping shall be annealed after welding to remove the welding strains. The temperature need not exceed that causing a dull red, and shall be uniform around the pipe. Welds made in place shall be annealed, but the pipe shall be free to expand and shall be properly supported so as to avoid stresses. Annealing shall always be followed by slow cooling.

3.17 PERMITS, FEES AND INSPECTIONS

- A. The Contractor shall give all necessary notices, obtain all permits and pay all government fees, sales taxes and other costs, including utility connections or extensions, in connection with this work; file all necessary approvals of all governmental departments having jurisdiction.

- B. Obtain all required certificates of inspection for his work and deliver to the Owner/Engineer the same certificates before request for acceptance and final payment for the work.

3.18 PROJECT/SITE CONDITION

- A. Install Work in locations shown on Drawings, unless prevented by Project conditions. Bring to the attention of Architect/Engineer immediately any changes in the size or location of the material or equipment which may be necessary in order to meet field conditions, or in order to avoid conflict with the work of other Sections.

- B. Prepare drawings showing proposed rearrangement of work to meet project conditions, including changes to work specified in other sections. Obtain permission of Owner/Engineer before proceeding.

3.19 TRENCHING AND BACKFILLING

- A. For requirements for trenching and backfilling, refer to Division 2.

3.20 CLOSE-OUT DOCUMENTS

- A. Prior to final completion and prior to final punch list, six (6) bound copies of the following shall be submitted by transmittal letter to the Engineer for review and acceptance:
1. Equipment warranties for all equipment (1 year minimum, some equipment longer; refer to Drawings and other Specification Sections);
 2. Contractor's warranty (1 year minimum);
 3. Parts list and manuals for all equipment;
 4. Test and Balance readings;
 5. Operation and Maintenance instructions.
- B. This Contractor shall furnish Operating and Maintenance (O&M) manuals and As-built drawings before final payment will be issued.
1. O&M manuals shall be submitted in accordance with Division 1, General Requirements, and shall consist of the following (at a minimum):
 - a. All Contractor and Manufacturer warranties.
 - b. List of Contractors and Parts and Equipment Suppliers—complete with contact person, proper company name, address, and telephone numbers.
 - c. Parts list for supplied equipment—including a checklist of recommended components to be stocked on-site.
 - d. Maintenance and replacement parts manuals.
 - e. Start-up and shutdown operating instructions.
 - f. Manufacturer's literature describing the equipment, which shall include wiring diagrams and operating specifications.
 - g. Control system sequence of operation, system diagram, and backup disks of the system configuration.
 - h. Copies of final test and balance reports.
 2. As-built drawings shall consist of AutoCAD drawing hardcopies and copies of each AutoCAD file on Compact Disk.

3.21 EXISTING CONDITIONS—EQUIPMENT AND SYSTEMS

- A. For purposes of this Contract, the assumption during bidding is that any and all existing fire alarm, intercom, security, lighting, electrical systems, etc., are complete and operating properly.
- B. Before commencing any work which may impact fire alarm, security alarm, energy management, intercom, lighting, or electrical systems, the Specialty Contractor shall examine such systems thoroughly. If this Contractor finds any portion of any system not functioning fully and properly, he shall notify the Architect/Engineer (A/E) and the Authority Having Jurisdiction (AHJ) Inspector in writing exactly and precisely which item(s) are not working. Neither the diagnosis as to why the items are not functioning nor the repair of such items is required.
- C. Upon notification to the Owner, the A/E and AHJ Inspector shall verify whether such report is accurate. If the report is found accurate, the Owner may either:
 - 1. Correct such deficiencies with his own Maintenance forces or by employing another Specialty Contractor.
 - 2. Require of the Contractor for this construction project a proposal sum to thoroughly diagnose the cause of such deficiencies and the specifying of precise corrective action needed.
 - 3. Upon receipt of such proposal sum, the Owner may elect to employ the Contractor, by Change Order, to effect such corrections; or, with the Contractor's approval, employ the Contractor's appropriate Specialty Contractor directly by Purchase Order, to effect such corrections; or the Owner may achieve corrections to the system by other means.
- D. However, upon commencing any work under this Construction Contract, this Contractor has accepted the systems as complete and functioning properly. From the time of commencing work on such systems, they become the responsibility of this Contractor to maintain and keep functional through the Date of Final Substantial Completion. If, at the time of Final Substantial Completion, such a system or portion of such system is found not to be functioning properly, such item shall be listed on the "punchlist" and shall be corrected by this Contractor. Once corrected, inspected by the A/E and AHJ Inspector and found to be functioning properly, the item shall be removed from the "punchlist" as satisfied.
- E. The guarantees, warranties, and obligations of this Contractor for this work under this Contract shall not be extended to include the existing fire alarm, security alarm, other alarm systems, intercom, lighting, energy management and electrical systems beyond the date of final acceptance of the work under this Contract.

3.22 PAINTING

- A. Provide painting and touch-up painting of all exposed piping, ductwork, support structures, etc., and all unfinished equipment (concealed or exposed).
- B. Deliver materials to job site in new, original, and unopened containers bearing manufacturer's name, trade name, and label analysis. Store where indicated in accordance with manufacturer's instructions.

- C. Do not apply paint in snow, rain, fog or mist or when relative humidity exceeds 85%. Do not apply paint to damp or wet surfaces.
- D. Protect work of other trades. Correct any painting related damages by cleaning, repairing, or replacing, and refinishing, as directed by Engineer.
- E. Provide finish coats which are compatible with prime paints used. Provide barrier coats over incompatible primers where required. Notify Engineer in writing of anticipated problems using specified coatings with substrate primed by others.
- F. Perform preparation and cleaning procedures in strict accordance with coating manufacturer's instructions for each substrate condition.
- G. Remove hardware and accessories, machined surfaces, plates, lighting fixtures and similar items in place and not to be finish-painted or provide surface-applied protection. Re-install removed items and remove protective coverings at completion of work.
- H. Prepare cementitious surfaces of concrete, concrete block, and similar materials to be painted by removing efflorescence, chalk, dust, dirt, grease and oils, and by roughing to remove glaze. Determine alkalinity and moisture content of surfaces to be painted before beginning painting. Do not paint over surfaces where alkalinity or moisture content exceeds manufacturer's recommendations.
- I. Clean ferrous surfaces which are not galvanized or shop-coated. Remove oil, grease, dirt, loose mill scale and other foreign substances by solvent or mechanical cleaning. Touch-up shop-applied prime coats wherever damaged. Clean galvanized surfaces free of oil and surface contaminants with non-petroleum based solvent. Completely paint all welds prior to application of insulation or other protective covering. Non-insulated piping shall be painted entirely.
- J. Mix, prepare, and store painting and finishing materials in accordance with manufacturer's directions. Use applicators, and techniques best suited for materials and surfaces to which applied.
- K. Application
 - 1. Apply painting and finishing materials in accordance with manufacturer's directions. Use applicators, and techniques best suited for materials and surfaces to which applied.
 - 2. Apply additional coats when undercoats, stains or other conditions show through final paint coat, until paint film is of uniform finish, color, and appearance.
 - 3. Paint interior surfaces of ducts, where visible through registers or grilles, flat, non-specular black.
 - 4. Paint back sides of access panels, and removable or hinges covers to match exposed surfaces. Finish exterior doors on tops, bottoms, and edges same as exterior faces, unless otherwise indicated.

5. Sand lightly between succeeding enamel or varnish coats.
6. Apply prime coat to material which is required to be painted or finished, and which has not been prime coated by others.
7. Apply each material at not less than the manufacturer's recommended spreading rate, to provide a total dry film to thickness of not less than 4.0 mils for an entire coating system of prime and finish coats for 3-coat work.
8. Provide a total dry film thickness of not less than 2.5 mils for entire coating system of prime and finish coat for 2-coat work.
9. Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not in compliance with specified requirements.

END OF 15010

SECTION 15058 COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, other specification sections and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes general requirements for single-phase and polyphase, general-purpose, horizontal, squirrel-cage induction motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

1.3 COORDINATION

- A. Coordinate features of motors, installed units, and accessory devices to be compatible with motor controllers; torque, speed, and horsepower requirements of the load; ratings and characteristics of supply circuit and required control sequence; ambient and environmental conditions of installation location.

1.4 SUBMITTAL REQUIREMENTS

- A. Include assembly drawings, bearing data including replacement sizes, and lubrication instructions.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Provide manufacturers standard as supplied with respective equipment.

2.2 GENERAL REQUIREMENTS

- A. Electrical Service: Refer to drawings for required electrical characteristics.
- B. Motors: Design for continuous operation at ambient temperature of 40 degrees C, and for temperature rise in accordance with ANSI/NEMA MG 1 limits for insulation class, Service Factor, and motor enclosure type.
- C. Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, Service Factor, Power Factor, efficiency.
- D. Electrical Connection: Conduit connection boxes, threaded for conduit. For fractional horsepower motors where connection is made directly, provide conduit connection in end frame.

2.3 POLYPHASE SQUIRREL CAGE MOTORS

- A. Starting Torque: Between one and one and one-half times full load torque.
- B. Starting Current: Six times full load current.
- C. Power Output, Locked Rotor Torque, Breakdown or Pullout Torque: NEMA Design B characteristics.
- D. Design, Construction, Testing, and Performance: Conform to ANSI/NEMA MG 1 for Design B motors.
- E. Insulation System: NEMA Class B or better.
- F. Testing Procedure: In accordance with ANSI/IEEE 112, Test Method B. Load test motors to determine freedom from electrical or mechanical defects and compliance with performance data.
- G. Motor Frames: NEMA standard T-frames of steel, aluminum, or cast iron with end brackets of cast iron or aluminum with steel inserts. Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.
- H. Bearings: Grease lubricated anti-friction ball bearings with housings equipped with plugged provision for relubrication, rated for minimum AFBMA 9, L-10 life of 20,000 hours. Calculate bearing load with NEMA minimum V-belt pulley with belt center line at end of NEMA standard shaft extension. Stamp bearing sizes on nameplate.
- I. Sound Power Levels: To ANSI/NEMA MG 1.
- J. Efficiency: All motors shall meet the section 13-414 of the FBC for minimum efficiency requirements..
- K. All motors shall have class B temperature rise and Class F insulation.
- L. Nominal Power Factor: Meet or exceed values in Schedules at full load and rated voltage when tested in accordance with ANSI/IEEE 112.
- M. Motors installed inside AHU's or fans shall be ODP; motors installed outside shall be TEFC.

PART 3 – EXECUTION (NOT APPLICABLE)

END OF 15058

SECTION 15061 HANGERS AND SUPPORTS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, other specification sections and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

Section Includes:

- A. Pipe, Duct, and Equipment Hangers and Supports, and Associated Anchors.
- B. Equipment Bases and Supports.
- C. Sleeves and Seals.
- D. Flashing and Sealing Equipment and Pipe Stacks.

1.3 SUBMITTAL REQUIREMENTS

- A. Contractor shall submit shop drawings on products and methods of pipe supports.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. B-Line Systems.
- B. Grinnell.
- C. F and S.
- D. S-5!

2.2 PIPE HANGERS AND SUPPORTS

- A. Hangers for Pipe Sizes 1/2 to 2 Inch: Carbon steel, adjustable swivel, split ring (copper plated for copper pipe, hot dipped galvanized coating on non-copper pipe).
- B. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis (copper plated for copper pipe, hot dipped galvanized coating on non-copper pipe).
- C. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods; cast iron roll and stand.
- D. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.

- E. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp; adjustable steel yoke and cast iron roll for hot pipe sizes 6 inches and over. Refer to drawings for special support details.
- F. Vertical Support: Steel riser clamp (at each floor).
- G. Floor Support for All Pipe Sizes: Cast iron adjustable pipe saddle, locknut nipple, floor flange, and concrete pier or steel support.
- H. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- I. Shield for Insulated Piping 2 Inches and Smaller: 18 gage galvanized steel shield over insulation in 180 degree segments, minimum 12 inches long at pipe support.
- J. Shields for Insulated Piping 2-1/2 Inches and Larger: Hard block non-conducting saddles in 90 degree segments, 12 inch minimum length, block thickness same as insulation thickness.
- K. Shields for Vertical Copper Pipe Risers: Sheet lead.
- L. Offset Pipe Clamp: Carbon steel, hot dipped galvanized finish (copper plated for copper pipe) for supporting vertical pipe away from wall.
- M. Refer to drawings for additional supports.

2.3 HANGER RODS

- A. Hanger Rods: Threaded both ends, threaded one end, or continuous threaded. Hanger rods shall be zinc plated steel.

2.4 INSERTS

- A. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.5 FLASHING

- A. Metal Flashing: 22 gage galvanized steel.
- B. Lead Flashing: 5 lb/sq.ft. sheet lead for waterproofing; one lb/sq.ft. sheet lead for soundproofing.
- C. Flexible Flashing: 47 mil thick sheet butyl; compatible with roofing.

2.6 SLEEVES

- A. Sleeves for Pipes Through Non-fire Rated Floors: Form with 18 gage galvanized steel, unless otherwise directed on the drawings with a more stringent requirement.

- B. Sleeves for Pipes through Non-fire Walls or Footings. Form with steel pipe or 18 gage galvanized steel, unless otherwise directed on the drawings with a more stringent requirement.
- C. Sleeves through outside walls shall be made with 18 gauge galvanized steel and fitted with chrome escutcheon covers at all finished surfaces.
- D. Sleeves for Pipes Through Fire Rated and Fire Resistive Floors and Walls, and Fireproofing: Prefabricated fire rated sleeves including seals, UL Listed. Contractor shall submit manufacturer's UL approved methods for firesafing all types required for the project as coordinated with the methods of floor and wall construction. Refer to the plans for further requirements.
- E. Sleeves for Round Ductwork: Form with galvanized steel.
- F. Sleeves for Rectangular Ductwork: Form with galvanized steel.
- G. Caulk: Silicone sealant of top quality.

2.7 FABRICATION

- A. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- B. Design hangers without disengagement of supported pipe.
- C. Provide copper plated hangers and supports for copper piping.

2.8 MATERIAL/FINISH

- A. General Locations: Steel pipe hangers, miscellaneous steel supports, hardware, bolts, washers, nuts, screws, etc., not specified to be plated or coated shall be hot dipped galvanized with a minimum of 1.50 oz/ft. on all sides and all field cuts shall be zinc coated.
- B. Located In or Around Cooling Tower Yards: Pipe hangers, equipment supports, miscellaneous structure components, hardware, bolts, washers, nuts, screws, etc., shall be non-metallic polyester resin, vinyl ester resin, fiberglass, glass reinforced polyurethane or 316 stainless steel.

PART 3 - EXECUTION

3.1 INSERTS

- A. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
- B. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.

- C. Where concrete slabs form finished ceiling, provide inserts to be flush with slab surface.

3.2 PIPE SUPPORTS

- A. Support horizontal piping as follows:

<u>Pipe Size (Inches)</u>	<u>Maximum Support Spacing</u>	<u>Hanger Rod Diameter (if required)</u>
1/2 to 1-1/4	6'-6"	3/8"
1-1/2 to 2	9'-0"	3/8"
2-1/2 to 3	10'-0"	1/2"
4 to 6	10'-0"	3/4"
8 to 12	14'-0"	7/8"
14 to 18	20'-0"	1"
PVC Any Size	4'-0"	3/8"

- B. Install supports to provide minimum 1/2 inch space between finished covering and adjacent work.
- C. Place a support within 12 inches of each horizontal elbow.
- D. Use supports with 1-1/2 inch minimum vertical adjustment.
- E. Support horizontal cast iron pipe adjacent to each hub, with 5 feet maximum spacing between hangers.
- F. Support vertical piping at every floor and support from wall midway between ceiling and floor or at 12 feet maximum spacing, whichever is less. Support vertical cast iron pipe at each floor and at each hub.
- G. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- H. Support riser piping independently of connected horizontal piping.
- I. All auxiliary steel required for pipe supports shall be furnished and installed by this Contractor. Where building structure is not usable for pipe supports, provide steel members, channels, angles, or "UNISTRUT" components for piping support. All auxiliary steel exposed to weather shall be galvanized.

- J. Provide all steel required for support of pipes other than steel shown on structural Engineer's drawings.
- K. Interior Pipe Guides, Expansion Loops, and Anchors: Provide pipe guides, expansion loops, and anchors on hot water heating pipes installed above the ceiling. Expansion loops shall be installed every 50 feet and supported from building structure with pipe guides on 10 feet spacing. Piping shall be anchored to the structure as necessary for directional expansion control.

3.3 EQUIPMENT BASES AND SUPPORTS

- A. Provide equipment bases and supports of concrete type under all mechanical equipment and as shown on drawings.
- B. Provide templates, anchor bolts, and accessories for mounting and anchoring equipment.
- C. Construct support of steel members. Brace and fasten with flanges bolted to structure.
- D. Provide rigid anchors for pipes after vibration isolation components are installed.
- E. Refer to Section 15010, Paragraph 1.19, Foundations, Supports, Piers, Attachments, for additional requirements.

3.4 FLASHING

- A. Provide flexible flashing and metal counterflashing where piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.
- B. Flash vent and soil pipes projecting 3 inches minimum above finished roof surface with lead worked one inch minimum into hub, 8 inches minimum clear on sides with 24 x 24 inches sheet size. For pipes through outside walls, turn flanges back into wall and caulk, metal counterflash and seal.
- C. Provide acoustical lead flashing around ducts and pipes penetrating equipment rooms, installed in accordance with Manufacturer's instructions for sound control.

3.5 SLEEVES

- A. Set sleeves in position in formwork. Provide reinforcing around sleeves.
- B. Extend sleeves through floors one inch above finished floor level. Caulk sleeves full depth and provide floor plate.
- C. Where piping penetrates floor, ceiling, or wall, close off space between pipe or duct and adjacent work with fire stopping insulation and caulk seal. Provide close fitting metal collar or escutcheon covers at both sides of penetration.
- D. Install chrome plated steel escutcheons at finished surfaces.

- E. Sleeves installed in exterior walls with exposed ends shall be non-corrosive type sleeves (i.e., stainless steel).

END OF 15061

SECTION 15074 VIBRATION ISOLATION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, other specification sections and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes isolation pads and mounts, freestanding spring isolators, housed spring mounts, elastomeric hangers, spring hangers, flexible connectors.

1.3 QUALITY ASSURANCE

- A. Maintain ASHRAE criteria for average noise criteria curves for all equipment at full load condition.

1.4 SUBMITTALS

- A. Submit shop drawings and product data. Indicate vibration isolator locations, with static and dynamic load on each, on shop drawings and described on product data.
- B. Submit manufacturer's certificate under provisions of General Conditions, and Supplementary General Conditions that isolators are properly installed and properly adjusted to meet or exceed specified requirements.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Amber Booth.
- B. Mason Industries.
- C. Vibration Eliminator Co.
- D. Kevflex.

2.2 VIBRATION ISOLATORS

- A. Hanger—A combination spring and rubber hanger consisting of a rectangular steel box, coil spring, spring retainers, and elastomeric mounting designed for approximately 1/2" deflection.
- B. Flanged—A flanged spherical rubber expansion joint constructed of molded neoprene, nylon cord reinforced, with integral steel floating flanges, suitable for pressure up to 225# (4 to 1 safety factor) and temperatures up to 225°F. Connectors

shall have minimum movement capability of 1/2" compression, 3/8" extension 1/2" lateral and 15° angular. Where allowable movements will be exceeded or where operating pressures exceed the following, control rods shall be installed at each connector to limit elongation to 3/8".

through 4"	200 psi
5" to 10"	150 psi
12" to 14"	100 psi
16" to 24"	50 psi

Control units shall be of the spring isolated design through 8" and neoprene isolated for 10" and larger to limit noise and vibration transmission through the control rods.

- C. Pad—A pad-type mounting consisting of two layers of 3/8" thick ribbed or waffled Neoprene pads bonded to a 16 gage galvanized steel separator plate. Pads shall be sized for approximately 20 to 40 psi load and a deflection of 0.12" to 0.16".

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install vibration isolators and flexible connectors for the following motor driven equipment.
 - 1. Pumps—Flange—Flexible Connector (mount on supply and return piping).
 - 2. Chillers, Condensing Units, and Chilled Water Air Handling Units—Pad
 - 3. Split System Air Handling Unit and Power Ventilators—Hanger.
- B. Set steel bases for one inch clearance between equipment support and base. Adjust equipment level.
- C. Provide Spring Isolators on Piping Connected to Isolated Equipment as follows: Up to 4 inch diameter, first three points of support; 5 to 8 inch diameter, first four points of support; 10 inch diameter and over, first six points of support. Static deflection of first point shall be twice deflection of isolated equipment.

END OF 15074

SECTION 15077 MECHANICAL IDENTIFICATION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, other specification sections and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 RELATED WORK

- A. Section includes equipment labels, pipe labels, duct labels, valve tags.

1.3 COORDINATION

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- C. Submit manufacturer's installation instructions.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Color: Conform with ANSI/ASME A13.1.
- B. Metal Tags: 18 gauge brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.
- C. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings. Colors shall comply with ANSI A13.1. Size markers and letters as follows:

<u>OUTSIDE DIAMETER OF INSULATED PIPE</u>	<u>LENGTH OF COLOR FIELD</u>	<u>SIZE OF LETTERS</u>
¾" - 2"	1" x 8"	¾"
2½" - 6"	2¼" x 13"	1¾"
8" - 10"	4" x 24"	2½"
Over 10"	4" x 32"	3½"

Ductwork and Equipment	All	3½"
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- D. Plastic Flagging Tape: 1-3/16" wide, bright orange.
- E. Plastic Equipment Markers: 2" x 4", minimum 1/8" thick, corrosive and chemical resistant, black with white letters. Minimum size letter shall be 1/4". Air handler shall include quantity and sizes of filters required for a complete filter change. Fasten with stainless steel hardware.
- F. Equipment Locator Tacks: 7/8" diameter color coded with push tack and writable surface.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

3.2 INSTALLATION

- A. Metal Tags: Install with heavy brass hook or chain.
- B. Plastic Tape Pipe Markers: Install complete around pipe in accordance with manufacturer's instructions.
- C. Equipment: Identify air handling units, pumps, heat transfer equipment, tanks, and water treatment devices with plastic equipment markers. Small devices, such as in-line pumps, may be identified with metal tags.
- D. Controls: Identify control panels and major control components outside panels with plastic equipment tags.
- E. Valves: Identify valves in main and branch piping with tags.
- F. Piping: Identify piping, concealed or exposed, with plastic pipe markers. Tags may be used on small diameter piping. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and "T", at each side of penetration of structure or enclosure, and at each obstruction.
- G. Ductwork: Identify ductwork with plastic equipment markers. Identify as to air handling unit number and service (supply air, return air, exhaust, outside air, etc.). Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.
- H. Provide signage for gas vents to indicate the following: "WARNING: FLAMMABLE GAS VENT".
- I. Equipment Located Above Ceiling (i.e., VAV boxes, fans, air handlers, fire dampers, smoke dampers, etc.): Provide equipment locator tack, located on the

ceiling directly below the equipment, to be spot marked and so mark is easily visible from the floor. Use a permanent marker and label each tag with the name of the equipment. Color code equipment by type as follows:

<u>EQUIPMENT ABOVE CEILING</u>	<u>COLOR</u>
Air Handlers/Fan Coil Units	Light Blue
Exhaust Fans	Green
VAV Boxes	Yellow
Duct Heaters	Orange
Fire Dampers	Red
Smoke Dampers	Red

- J. Ductwork Volume Dampers Above the Ceiling: Tie an orange tape flag, minimum 18” long, from each volume damper. Let tape hang down vertically.

3.3 VALVE CHART AND SCHEDULE

- A. Provide valve chart and schedule in aluminum frame with clear plastic shield. Install at location as directed.

END OF 15077

SECTION 15081 DUCTWORK INSULATION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, other specification sections and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes ductwork insulation, shields and jackets.

1.3 QUALITY ASSURANCE

- A. Installer: Company specializing in ductwork insulation application with three (3) years minimum experience.
- B. Materials: Flame spread/smoke developed rating of 25/50 in accordance with ASTM E84. UL 723.

1.4 SUBMITTALS

- A. Product Data: Identify thermal conductivity, thickness and jacket for each type of product.
- B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting and certifying test results for compliance of insulation materials, sealers, attachments, cements and jackets with requirements indicated.
- C. Submit manufacturer's installation instructions.

1.5 ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesive and insulation

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Knauf Fiberglass.
- B. Owens Corning Fiberglass.
- C. Mansville.

2.2 MATERIALS

- A. Insulation: Flexible glass fiber; ANSI/ASTM C553; commercial grade; 6.0 installed 'R' value (minimum) at 75 degrees F, 0.002 foil scrim facing for air conditioning ducts (nominally 2" thick).
- B. Adhesives: Waterproof fire-retardant type and conform to adhesive and sealant council standards; ASC-A7001A-1971.
- C. Lagging Adhesive: Fire resistive to ASTM E84, NFPA 255, UL 723.
- D. Mechanical Fasteners: Galvanized steel, 12 gage, self- adhesive pad. Fasteners shall conform to mechanical fastener standard MF-1-1971 (available from SMACNA).
- E. Joint Tape: Glass fiber cloth, open mesh.
- F. Tie Wire: Annealed steel, 16 gage.

PART 3 – EXECUTION

3.1 PREPARATION

- A. Install materials after ductwork has been tested and approved.
- B. Clean surfaces for adhesives.
- C. Extend shafts for handles on equipment/devices which are insulated so that insulation is applied at the intended thickness (not compressed). Insulation shall be installed in a manner to eliminate sweating on handles and shafts. Handles shall remain accessible, visible, and operable.

3.2 INSTALLATION

- A. Insulation
 - 1. Apply insulation tightly and smoothly to duct.
 - 2. Secure insulation on the bottom of ducts and plenums and on the sides of plenums and other places where the insulation will sag.
 - 3. Install all materials in accordance with Manufacturer's installation instructions.
 - 4. Butt all insulation joints firmly.
 - 5. Install duct wrap to obtain specified 'R' value using a maximum of 25% compression.
 - 6. All penetrations and damage to the facing shall be repaired with tape and mastic prior to system start-up.

7. Provide 3" wide (minimum) pressure sensitive tape applied with moving pressure using an appropriate sealing tool at all seams and joints. Apply vapor seal mastic over all taped seams and joints.
8. Longitudinal seam of the vapor retarder shall be overlapped a minimum of 2 inches. A 2 inch tab shall be provided for the circumferential seam.
9. Closure systems shall have a 25/50 flame spread/smoke developed rating per UL 723.
10. For rectangular ducts over 18 inches wide, the duct wrap shall be secured to the bottom side of the duct with mechanical fasteners spaced on 18 inch centers to reduce sag. Fasteners shall be installed in a manner to avoid over compressing the insulation with the retaining washer.
11. Impale insulation on the bottom of ducts and plenums and on the sides of plenums and other places where the insulation will sag.
12. Cut off protruding pin after clips are secured and seal with aluminum backed pressure sensitive tape.
13. Apply insulation with joints tightly butted.
14. Seal all ductwork joints, punctures, and fittings with a mastic type sealant containing a vapor barrier.
15. Cover all breaks, joints, punctures, and voids with a vapor seal mastic and cover with a vapor barrier material identical to vapor barrier on the insulation.
16. Bevel insulation around nameplates, access plates, and doors.
17. Insulation shall be continuous through walls and floors except at fire dampers.

3.3 SCHEDULE

A.

SERVICE	INSULATION THICKNESS
Supply and Return Ductwork	2"
Flex Connections at AHU's and Other Transitions	2"
All Equipment and Duct Operating Below Ambient Dew Point	2"
Exhaust and Transfer Duct	1"
Tops of All Supply Diffusers	2"

END OF 15081

SECTION 15082 EQUIPMENT INSULATION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, other specification sections and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes equipment insulation, shields and jackets.

1.3 QUALITY ASSURANCE

- A. Installer: Company specializing in insulation application with three (3) years minimum experience.
- B. Materials: Flame spread/smoke developed rating of 25/50 in accordance with ASTM E84. UL 723.

1.4 SUBMITTALS

- A. Product Data: Identify thermal conductivity, thickness and jacket for each type of product.
- B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting and certifying test results for compliance of insulation materials, sealers, attachments, cements and jackets with requirements indicated.
- C. Submit manufacturer's installation instructions.

1.5 ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesive and insulation

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Pittsburg Corning (Type 1).
- B. Rubatex (Type 2).
- C. Armstrong Armaflex (Type 2).

2.2 INSULATION

- A. Type 1: Cellular glass; ANSI/ASTM C552; 'k' value of 0.29 at 75 degrees F; 8.5 lb/cu ft density. ASTM 84 flamespread: less than 25; smoke developed: less than 50.
- B. Type 2: Elastomeric foam insulation; 'k' value of 0.27 at 75 degrees F. ASTM 84 flamespread: less than 25; smoke developed: less than 50.

2.3 ACCESSORIES

- A. Bedding Compounds: Non-shrinking, permanently flexible, compatible with insulation.
- B. Vapor Barrier Coating: Non-flammable, fire resistant, polymeric resin, compatible with insulation.
- C. Insulating Cement: ANSI/ASTM C195, hydraulic setting mineral wool.
- D. Wire Mesh: Corrosive-resistant metal; hexagonal pattern.

PART 3 – EXECUTION

3.1 INSTALLATION

A. TYPE 1 INSULATION INSTALLATION

- i. Interior
 - 1. Butter joints of Foamglass insulation with Pittseal 444 or Childers CP-76. Apply insulation to pipe and fittings with all joints tightly fitted. Secure with stainless steel wire so that each length of insulation shall be secured with two wires. Insulation shall be applied with all joints fitted to eliminate voids. Voids shall be eliminated by refitting or replacing insulation.
 - 2. Finish with metalized polyester/scrim/bleached white Kraft or approved foil/scrim/bleached white Kraft, all service jacket (ASJ). Finish elbows and fittings with Pittcote 404 or Childers CP-30 Low Odor reinforced with white open weave membrane with maximum mesh opening of 10 x 10 per inch.
- ii. Exterior and Mechanical Equipment/Storage Rooms
 - 1. Apply insulation as noted above (paragraph 3.04 A.1) and apply vapor barrier with Pittcote 404 or Childers CP-30 Low Odor reinforced with white open weave membrane with maximum mesh opening of 10 x 10 per inch. Then apply a second coat of Pittcote 404 or Childers CP-30 Low Odor and finish with .016 inch thick aluminum jacket. Elbows and tees shall be finished with preformed 0.024 inch thick aluminum fitting covers.

B. TYPE 2 INSULATION INSTALLATION**i. Interior**

1. Type 2 insulation shall be slipped on prior to connection, and the butt joints shall be sealed. Where the slip-on techniques is not possible, the insulation shall be carefully slit and applied to the pipe.
2. All joints shall be sealed with the Manufacturer's recommended adhesives.
3. Do not apply Type 2 insulation in multiple layers.
4. Type 2 insulation shall not be used in plenums nor fire wall penetrations.
5. This Contractor shall paint Type 2 insulation exterior to the building with two (2) coats of a vinyl lacquer paint recommended by the Insulation Manufacturer.

ii. Exterior and Mechanical Equipment/Storage Rooms

1. Type 2 insulation shall be installed as described for interior except the pipe and fitting shall be covered with .016 inch thick aluminum jacket.
2. Elbows and tees shall be finished with preformed 0.024 inch thick aluminum fitting covers.

C. Install materials in accordance with manufacturer's instructions. Do not insulate factory insulated equipment.

D. Apply insulation as close as possible to equipment by grooving, scoring, and beveling insulation, if necessary. Secure insulation to equipment with stainless steel wires or bands.

E. Fill joints, cracks, seams, and depressions with bedding compound to form smooth surface. On cold equipment, use vapor barrier cement.

F. Cover insulation with metal mesh and finish with heavy coat of insulating cement.

G. Do not insulate over nameplate or ASME stamps. Bevel and seal insulation around such.

H. When equipment with insulation requires periodical opening for maintenance, repair, or cleaning, install insulation in such a manner that it can be easily removed and replaced without damage. Refer to detail on drawings for pump insulation requirements.

- I. Flat or irregular equipment insulation shall be cut to fit the shape and contour of the equipment. All voids between equipment surface and insulation shall be packed with light density fiberglass.

3.2 SCHEDULE

A.

SERVICE	INSULATION TYPE AND THICKNESS
Chiller Cold Surfaces	3/4" Type 2
Chilled Water Pump Surfaces	2" Type 1
Valves, Strainers, Fittings	2" Type 1
Any Equipment Operating Below Dew Point	2" Type 1
Handicap Accessible Lavatory and Sink Traps, Cold and Hot Water Supply Piping	3/4" Type 2

END OF 15082

SECTION 15083 PIPING INSULATION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, other specification sections and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes piping insulation, shields and jackets.

1.3 QUALITY ASSURANCE

- A. Installer: Company specializing in piping insulation application with three (3) years minimum experience.
- B. Materials: Flame spread/smoke developed rating of 25/50 in accordance with ASTM E84, UL 723, and NFPA 255.

1.4 SUBMITTALS

- A. Product Data: Identify thermal conductivity, thickness and jacket for each type of product.
- B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting and certifying test results for compliance of insulation materials, sealers, attachments, cements and jackets with requirements indicated.
- C. Submit manufacturer's installation instructions.

PART 2 – PRODUCTS

2.1 INSULATION

- A. Type 1:
 - 1. Impermeable, noncombustible, closed cellular glass insulation, conforming to ASTM C 552-79, "Specification for Cellular Glass Block and Pipe Thermal Insulation."
 - 2. Conductivity (k) equals approximately 0.29 (BTU-IN/HR, SF, degrees F) at 75 degrees F.
 - 3. Joint sealants and coatings shall be as approved by the insulation manufacturer for the intended application and service temperature range.

4. Jacketing shall be approximately 125 mils thick, consisting of a bituminous resin reinforced with a woven, glass fabric, an integral aluminum foil layer, and a protective plastic film coating.
 5. Approved Manufacturers and trade names:
 - a. Pittsburgh Corning Corp. "Foamglass Super K" with Pittseal, Pittcote, and Pittwrap.
 - b. Approved Equal.
- B. Type 2:
1. Closed cell, flexible foamed plastic conforming to ASTM C177 or ASTM C518, "Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form."
 2. Conductivity (k) equals approximately 0.27 (BTU-IN/HR, SF, Degree F) at 75 degrees F.
 3. Approved Manufacturers and trade names:
 - a. Armstrong "AP Armaflex"
 - b. Rubetex Corp. "Rubetex"
- C. Type 3:
1. Glass fiber, rigid molded sectional pipe covering conforming to ASTM C547, Class II, Mineral Fiber Preformed Pipe Insulation.
 2. Conductivity (k) equals approximately 0.23 (BTU-IN/HR, SF, Degree F) at 75 degrees F.
 3. Approved Manufacturers and Trade Names:
 - a. Manville Corp. "Micro-Lok 650-AP-T."
 - b. Owens-Corning Fiberglass Corp. "One Piece 25 ASJ/SSL-II"
 - c. Certain-Teed "500 Degree Snap-On."
 - d. Knauf Fiberglass "Knauf Pipe Insulation, 850°F."

2.2 JACKET

- A. Interior Applications:
1. Vapor Barrier (ASJ) Jackets: Kraft reinforced foil vapor barrier with double self-sealing adhesive joints.

2. Vapor Barrier (ASJ) Jackets: Metalized polyester film, reinforcing scrim, flame-retardant adhesive, and bleached paper with SSL. Butt strip tape coated with high performance, pressure sensitive, flame retardant adhesive.
- B. Exterior Applications: (Exterior and other exposed areas such as equipment/mechanical rooms)
1. Aluminum Jackets: ASTM B209; 0.016 inch thick; smooth finish with factory applied integral moisture barrier.
 2. Aluminum Fitting Covers: Childers 2 or 4 piece ELL-JACS elbow covers, Gore ELL-JACS elbow covers and 2-piece TEE-JACS tee covers; ASTM B209; 0.024 inch thick; smooth finish.

2.3 ACCESSORIES

- A. Insulation Bands: 3/8 inch wide; 0.020 inch thick aluminum.
- B. Metal Jacket Bands: 1/2 inch wide; 0.020 inch thick aluminum.
- C. Insulation Bonding Adhesive (to metal)
1. Benjamin Foster 85-15.
 2. Childers Chil-Stix CP-85.
- D. Insulating and Finishing Cement
1. Armco Corp.
 2. Rockwool Corp.
 3. Manville Corp.
- E. Vapor Barrier Lap Adhesive
1. Benjamin Foster 82-07.
 2. Childers Chil-Stix CP-85.
- F. Vapor Barrier Mastic
1. Benjamin Foster 30-35.
 2. Childers CP-30 Low Odor (for indoor use).
 3. Childers Chil-Pruf CP-22/23/24 (for outdoor use).
- G. Lagging Adhesive
1. Benjamin Foster 30-36.
 2. Childers Chil-Rene CP-96.
- H. Glass Cloth Jacket
1. Benjamin Foster.

2. Childers Chil-Glas #10.

PART 3 – EXECUTION

3.1 PREPARATION

- A. Install materials after piping has been tested, cleaned, and approved.
- B. All surfaces to be insulated shall be dry and free of loose scale, rust, dirt, oil or water.

3.2 APPLICATION

- A. Insulation shall be installed in a smooth, clean, workmanlike manner. Joints shall be tight and finished smooth.
- B. Insulation shall fit tightly against the surface to which it is applied to prevent air circulation between the insulation and the pipe or equipment to which it is applied.
- C. Insulation applied to cold piping or equipment shall be completely vapor sealed, free of pin holes or other openings.
- D. Do not use wet insulation materials.
- E. All longitudinal joints on vertical pipe runs shall be staggered.
- F. Apply insulation so as to permit expansion or contraction of pipe lines without causing damage to insulation or surface finish.
- G. Do not apply mastic or adhesive until all previous application of mastic and adhesives have thoroughly dried.
- H. The adhesive used in connection with all covering work shall contain an approved vermin and rodent-proof ingredient.

3.3 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.

3.4 TYPE 1 INSULATION INSTALLATION

- A. Interior
 - 1. Butter joints of Foamglass insulation with Pittseal 444 or Childers CP-76. Apply insulation to pipe and fittings with all joints tightly fitted. Secure with stainless steel wire so that each length of insulation shall be secured with two wires. Insulation shall be applied with all joints fitted to eliminate voids. Voids shall be eliminated by refitting or replacing insulation. Do not fill voids with joint sealer.

2. Finish with metalized polyester/scrim/bleached white Kraft or approved foil/scrim/bleached white Kraft, all service jacket (ASJ). Finish elbows and fittings with Pittcote 404 or Childers CP-30 Low Odor reinforced with white open weave membrane with maximum mesh opening of 10 x 10 per inch.

B. Exterior and Mechanical Equipment/Storage Rooms

1. Apply insulation as noted above and apply vapor barrier with Pittcote 404 or Childers CP-30 Low Odor reinforced with white open weave membrane with maximum mesh opening of 10 x 10 per inch. Then apply a second coat of Pittcote 404 or Childers CP-30 Low Odor and finish with .016 inch thick aluminum jacket. Elbows and tees shall be finished with preformed 0.024 inch thick aluminum fitting covers.

3.5 TYPE 2 INSULATION INSTALLATION

A. Interior

1. Type 2 insulation shall be slipped on the pipe prior to connection, and the butt joints shall be sealed. Where the slip-on techniques is not possible, the insulation shall be carefully slit and applied to the pipe.
2. All joints shall be sealed with the Manufacturer's recommended adhesives.
3. Do not apply Type 2 insulation in multiple layers.
4. Type 2 insulation shall not be used in plenums nor fire wall penetrations.
5. This Contractor shall paint Type 2 insulation exterior to the building with two (2) coats of a vinyl lacquer paint recommended by the Insulation Manufacturer.

B. Exterior and Mechanical Equipment/Storage Rooms

1. Type 2 insulation shall be installed as described for interior except the pipe and fitting shall be covered with .016 inch thick aluminum jacket.
2. Elbows and tees shall be finished with preformed 0.024 inch thick aluminum fitting covers.

3.6 TYPE 3 INSULATION INSTALLATION

A. Interior

1. Tightly butt together sections of insulation on pipe runs sealing longitudinal seams of jacket with vapor barrier adhesive. Seal end joints with four inch (4") wide straps of vapor barrier tape. Seal off ends of insulation with vapor seal mastic at valves, fittings, and flanges. No further finish required.

B. Exterior and Mechanical Equipment/Storage Rooms

- 1. PVC fitting jackets shall be used when they are available for the particular application.

3.7 HANGERS

- A. Continue insulation through pipe hangers. Provide either rigid insulation inserts or sheet metal inserts at all outside pipe hangers. Provide rigid insulation inserts for piping operating below 60 degrees F and sheet metal inserts for piping above 60 degrees F.

- B. Rigid insulation or wood inserts between the pipe and pipe hanger shall be of a thickness equal to the adjoining insulation and shall be provided with vapor barrier where required. Insulation insert shall not be less than the following lengths:

1/2" to 2-1/2" pipe size	10" Long
3" to 6" pipe size	12" Long
8" to 10 pipe size	16" Long
12" and Over	22" Long

- C. Inserts for cold piping shall have a vapor barrier facing of the same material as the adjacent pipe insulation. Seal inserts into insulation with vapor seal mastic.

- D. Where insulation is a load bearing material of sufficient strength to support the weight of the piping, pipe shields one-third the circumference of the insulation and of a length not less than three times the diameter of the insulation (maximum length 24") shall be provided. An all service jacket shall be applied between shields and insulation. Follow insulation manufacturer's recommendations for use of pipe insulation in conjunction with outside installed hangers.

- E. Where insulation is not of sufficient strength to support the weight of the piping, a saddle, or section of calcium silicate insulation such as "Kaylo" shall be provided. Vapor barrier and finish shall be applied as required to match adjoining insulation. In addition, shields shall be furnished as specified above.

3.8 PIPE SLEEVES

- A. Pipe insulation and vapor barrier shall be continuous through sleeves in walls and floors.

- B. Type B insulation shall not be used in sleeves through fire walls or fire rated (2 hour) floor systems. Use Type A or Type C through the sleeve instead and vapor seal the joint between the two (2) insulations.

- C. Provide 26 gauge galvanized steel or 0.020 inch aluminum jacket over insulation on pipe passing through sleeves where sealant is required.

- D. Where penetrating interior walls, extend the metal jacket 2 inches out either side of the wall and secure each end with a metal band compressing the insulation slightly.

- E. Where penetrating floors, extend the metal jacket 2 inches below the floor and 5 inches above the floor. Secure with metal bands.

3.9 INSULATION SCHEDULE

A.

SERVICE	PIPE SIZE	INSULATION TYPE AND THICKNESS
Exterior Chilled Water (including unconditioned spaces and mechanical equipment rooms)	All	2-1/2" Type 1
Interior Chilled Water	2" or Smaller	1-1/2" Type 1
Interior Chilled Water	2-1/2" or Greater	2" Type 1
Refrigerant Suction Pipes and Coil Condensate Lines (except in plenums or fire wall penetrations)	All	3/4" Type 2
Refrigerant Suction Pipes and Coil Condensate Lines (in plenums or fire wall or floor penetrations)	All	1-1/2" Type 1

END OF SECTION

SECTION 15181 HYDRONIC PIPING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, other specification sections and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes piping systems.

1.3 REGULATORY REQUIREMENTS

- A. Conform to ANSI/ASME B31.9, latest revision.

1.4 QUALITY ASSURANCE

- A. Valves: Manufacturer's name and pressure rating marked on valve body.

1.5 SUBMITTALS

- A. Submit product data. Include data on pipe materials, pipe fittings, valves, and accessories.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 15010, General Conditions, and Supplementary General Conditions.
- B. Store and protect products under provisions of Section 15010, General Conditions, and Supplementary General Conditions.
- C. Deliver and store valves in shipping containers with labeling in place.

PART 2 – PRODUCTS

2.01 MATERIALS—PIPE ABOVE GRADE

- A. Chilled water, condenser water, heating hot water, make-up water, drains, and vents:

	SIZES (INCHES)	MATERIALS
Pipe	2-1/2" and Larger	Carbon steel, butt weld, Schedule 40
Pipe	2" and Smaller	Type L, Hard Temper Copper Tubing
Fittings	Lines 2-1/2" and Larger	Carbon steel, butt weld, Schedule 40

Fittings	2" and Smaller	Wrought copper sweat
Unions	2" and Smaller	Brass
Flanges	2-1/2" and Larger	Carbon steel, slip on, raised face, 150 lbs. and 250 lbs.
Gaskets		"Graphoil", full face, 1/16", Union Carbide, or approved equal
Air Conditioning Condensate Drain		Type L, Hard Temper Copper Tubing

2.2 ACCEPTABLE MANUFACTURERS—VALVES

- A. Stockham, Grinnell, Nibco, Milwaukee, and Mueller (unless noted otherwise).
- B. Substitutions: Under provisions of Section 15010, General Conditions, and Supplementary General Conditions.

2.3 BALL VALVES

- A. Up to 2 Inches: Bronze two piece body, stainless steel ball, Teflon seats and stuffing box ring, lever handle, and balancing stops, solder ends. Provide extended handle shaft as necessary for installed thickness of insulation so that handle operates freely outside the insulation and jacket.

2.4 BUTTERFLY VALVES LOCATED ABOVE GROUND

- A. 2-1/2" through 4": 150 psi SWP iron body; butterfly valve; EPDM seat with phenolic resin hard backing; to have range of 300°F; bronze disc; lug type; 416 stainless steel stem; luberized bronze reinforced Teflon bushing; infinite throttling handle with memory stop; suitable for dead-end service.
- B. 5" through 10": 150 psi SWP iron body; butterfly valve; EPDM seat with phenolic resin hard backing; to have range of 300°F; bronze disc; lug type; 304 stainless steel stem; luberized bronze reinforced Teflon bushing; series DG worm screw operator with handwheel suitable for deadend service.
- C. Valves installed over 7'-0" above finished floor shall be provided with a chain wheel.
- D. Gear operators exposed to weather shall have weatherproof cover.
- E. Provide extended handle shaft as necessary for installed thickness of insulation so that handle operates freely outside the insulation and jacket.

2.5 CHECK VALVES

- A. Up to 2 Inches: Bronze 45 degree swing disc, solder ends. 2-1/2" and Larger: Iron body, flanged ends (horizontal piping).

- B. 2-1/2" and Larger: iron body, bronze disc, stainless steel stem, stainless steel springs, Buna-N seat with 250°F range, lug type valves.

2.6 BUTTERFLY VALVES LOCATED BELOW GROUND AND/OR SUBMERGED

- A. 3" through 24": 150 psi tight-closing, rubber seated type conforming to the design standards of ANSI/AWWA C504. Valves shall be bubble tight at the rated pressure in either direction and shall be suitable for throttling service and/or operation after long periods of inactivity in buried soil and/or submerged up to 10 feet below water.
- B. Manufacturer shall have manufactured this product and have proof of satisfactory installed history for a minimum of five (5) years and show proof of compliance with ANSI/AWWA C504. All valves shall be hydrostatic and leak tested in accordance with ANSI/AWWA C504.
- C. Valve body shall be constructed of cast iron ASTM A126, Class B, with ANSI B16.1 drilled flange. Disc shall be concentric design with aluminum bronze ASTM B148 UNS C95400, Grade C up to 8" and ductile iron ASTM A536, Grade 65-45-12 with 316 stainless edge above 8". Shaft shall be one piece through shaft of 18-8 stainless steel, corresponding to the requirements of AWWA C504, latest revision, and shall be fastened by a threaded disc pin and provide a positive leak proof connection of the shaft to the disc. Shaft bearings shall be of the self-lubricating, corrosion-resistant, sleeve type and be designed for horizontal and/or vertical shaft load. Packing shall be self adjusting and suitable for vacuum or pressure service.
- D. Valve seats shall be located in the body only and shall be of a synthetic rubber compound suitable for the service and shall be designed so that no adjustments or maintenance is required.
- E. Valves shall be coated per AWWA C550 and in full compliance with NSF-61.
- F. Provide gear operators furnished with AWWA 2 inch nut and sealed housing designed for buried and submerged service for depths up to 10 feet below water for valves over 6 inches. Provide buried extension shaft with AWWA nut, removable cover, and buried shaft cover and 1 inch extension shafts as necessary for the buried/submerged depth (up to 10 feet) of the valve operator. Contractor to cut shaft and provide buried shaft cover as necessary. Provide two (2) t-handle valve wrenches for the project. Refer also to valve box detail on the drawings for further requirements.

PART 3 – EXECUTION

3.1 PREPARATION

- A. Ream pipe and tube ends. Remove burrs.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

- D. After completion, fill, clean, and treat systems.

3.2 INSTALLATION

- A. Ream pipe and tube ends. Remove burrs.
- B. Route piping in orderly manner, plumb and parallel to building structure, and maintain gradient.
- C. Install piping to conserve building space, and not interfere with use of space and other work.
- D. Group piping whenever practical at common elevations.
- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- F. Provide clearance for installation of insulation, and access to valves and fittings.
- G. Install valves where they are easily accessible.
- H. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.
- I. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- J. Prepare pipe, fittings, supports, and accessories for finish painting.
- K. Install valves with stems upright or horizontal, not inverted.
- L. Use dielectric unions of flanges between ferrous and non-ferrous metals to prevent corrosion reaction. Use insulated bolts on flanges.
- M. Establish elevations of buried piping outside the building to ensure not less than 3 feet of cover and as coordinated with all other buried services, either existing or being installed.
- N. Excavate and backfill in accordance with sections on excavation and backfilling and as further described herein.
- O. All welds shall be properly prepared and painted to prevent oxidation prior to applying insulation or other protective covering. All exposed uninsulated piping shall be painted completely. Refer to Section 15010.

3.3 APPLICATION

- A. Install flanges/unions downstream of valves and at equipment or apparatus connections.

- B. Install brass male adapters each side of valves in copper piped system. Sweat solder adapters to pipe.
- C. Install gate or ball or butterfly valves for shut-off and to isolate equipment, part of systems, or vertical risers. (Above grade)
- D. Provide manual air vents at the high point of piping and where indicated on drawings.
- E. Provide 3/4 inch gate or ball drain valves at main shut-off valves, low points of piping, bases of vertical risers, and at equipment.
- F. Cleaning of piping systems.
 - 1. Conform to applicable codes for addition of non-potable chemicals to building mechanical systems, and for delivery to public sewage systems.
 - 2. System Cleaner
 - a. Liquid alkaline compound with emulsifying agents and detergents to remove grease and petroleum products.
 - b. Algaecide; chlorine release agents such as sodium hypochlorite or calcium hypochlorite, or microbiocides such as quarternary ammonia compounds, tributyl tin oxide, methylene bis, or isothiazolones.
 - 3. Preparation
 - a. Systems shall be operational, filled, started, and vented prior to cleaning.
 - b. Place terminal control valves in open position during cleaning.
 - 4. Cleaning Sequence
 - a. Add cleaner to closed systems at concentration as recommended by manufacturer of water contained in the system; of one pound per 100 gallons of water for hot systems and one pound per 50 gallons of water for cold systems.
 - b. Hydronic Water Systems: Contractor shall rent a pump with strainer and pipe to new system. Contractor shall circulate for 48 hours, then drain systems as quickly as possible. Refill with clean water, circulate for 24 hours, then drain. Refill with clean water and repeat until system cleaner is removed. After cleaning and flushing, the Contractor shall connect new piping to existing system as shown on drawings.
 - c. Use neutralizer agents on recommendation of system cleaner supplier and approval of Architect/Engineer.
 - d. Flush open systems with clean water for one hour minimum. Drain completely and refill. Remove, clean, and replace strainer screens.

- e. Inspect, remove sludge, and flush low points with clean water after cleaning process is completed. Include disassembly of components as required.

END OF 15181

SECTION 15182 HYDRONIC SPECIALTIES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, other specification sections and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes air vents, strainers, valves, thermometers, pressure gauges, air elimination, etc...

1.3 QUALITY ASSURANCE

- A. Manufacturer: For each product specified, provide components by same manufacturer throughout.

1.4 SUBMITTALS

- A. Submit shop drawings and product data.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of General Conditions and Supplementary General Conditions.
- B. Store and protect products under provisions of Section 15010, General Conditions, and Supplementary General Conditions.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS—AIR VENTS

- A. Amtrol.
- B. Armstrong.
- C. TACO.

2.2 AIR VENTS

- A. Manual Type: Short vertical sections of pipe to form air chamber, with 1/8 inch brass needle valve at top of chamber. Vertical Section of pipe shall be same diameter as pipe served up to 1-1/2", larger pipes shall have a minimum of 2" in diameter.

- B. Automatic Type: Air vent shall have a pilot operated elimination mechanism, 1/4" orifice and have a self cleaning mechanism. Air vent shall be Model No. 720, as manufactured by Amtrol.

2.3 ACCEPTABLE MANUFACTURERS—STRAINERS

- A. Spirax/Sarco.
- B. Mueller.
- C. Watts Regulator.
- D. Titan.

2.4 STRAINERS

- A. Strainers for pipe sizes 2" and smaller, shall be Sarco, Type BT, screwed and sizes 2-1/2" and larger shall be Type AF-125 flanged. Type BT strainers shall have screens having 0.033" openings, and Type AF-125 strainers shall be furnished with monel screens. Provide strainers to protect all automatic controls, valves, and pumps not equipped with integral strainers. Provide a disposable fine mesh start-up screen which shall be removed after thirty (30) days of operation.
- B. Strainer shall be sized for a maximum of 2 psi pressure drop.

2.5 RELIEF VALVES

- A. Bronze body, Teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labeled.

2.6 CALIBRATED BALANCING VALVES

- A. CBV-T (1/2" through 2" NPT threaded type):
 1. Furnish and install, as shown on plans and with manufacturer's recommendations, Model CBV-T threaded type circuit balancing valves.
 2. Each valve shall have metering ports incorporating Nordel check valves on both sides of the seat.
 3. All valves shall be "Y" pattern, equal percentage, globe style, designed either for presetting with a balance schedule or for proportional balancing. All metal parts are bronze copper alloy. Each valve shall provide four functions:
 - a. precise flow measurement;
 - b. precision flow balancing;
 - c. positive shutoff with a no-drip soft seat; and
 - d. diagnostic point for system analysis.
 4. A 1/4" NPT tapped drain port shall be provided on each side of valve seat. Valves

5. A ¼" NPT tapped drain port shall be provided on each side of valve seat. Valves
 6. shall have four (4) full 360 degree adjustment turns of the handwheel (1,440 degrees) with a micrometer-type indicator and hidden memory feature to program the valve for a precise, tamper-proof, balanced setting. When installed, the handwheel and metering ports shall not be located on the bottom of the valve to prevent sediment deposits. Handwheel scale must be able to be positioned so that it may be clearly read without the use of mirrors or any special tools. Metering ports shall be interchangeable with drain ports to allow for read-out flexibility when installed in tight piping locations.
 7. Each threaded CBV-T to be shipped with a pre-formed insulation to meet or exceed ASTM D1784/Class 14253-C, MEA #7-87, ASTM E84, and ASTM E136 with a flame spread rating of 25 or less and a smoke development rating of 50 or less.
- B. CBV-G 2½" through 12" Grooved/Flanged:
1. Furnish and install, as shown on plans and with manufacturer's recommendations, Circuit Balancing Valves.
 2. The valve body shall be ductile iron with grooved ends or with Armgrip(tm) non-rotating ductile iron flange adapters. Valves shall be suitable for the working pressures and temperatures as shown on drawings.
 3. Each valve shall have metering ports incorporating Nordel check valves, on both sides of the seat.
 4. All valves shall be "Y" pattern, modified equal percentage, globe style, designed either for presetting with a balance schedule or for proportional balancing. Each valve shall perform four functions:
 - a. precise flow measurement
 - b. precision flow balancing
 - c. positive shutoff with a no-drip soft seat; and
 - d. diagnostic point for system analysis.
 5. Valves shall have five, (2½" and 3") six, (4" through 6") twelve, (8") ten, (10") or fourteen (12") full 360 degree adjustment turns of the handwheel with a micrometer-type indicator and hidden memory feature to program the valve for a precise, tamper-proof balanced setting. When installed, the handwheel and metering ports shall not be located on the bottom of the valve to prevent sediment deposits. Handwheel scale must be able to be positioned so that it may clearly read without the use of mirrors or any special tools.
 6. Circuit balancing valves shall be installed at least five pipe diameters downstream from any fitting and at least ten pipe diameters downstream from any pump. Two pipe diameters downstream of the CBV shall be free of any fitting.

7. The valve shall be furnished with pre-formed insulation to meet or exceed ASTM D1784/Class 14253-C, MEA #7-87, ASTM E84, and ASTM E136 with a flame spread rating of 25 or less and a smoke development rating of 50 or less.
- C. Acceptable manufacturers shall be Armstrong, Tour & Andersson, or Mepco.
 - D. Provide an Armstrong, Model CBVM-135/60 or equal, meter kit. Kit shall have two (2) meter, 5 foot hose each, and shall have a range of 0'-60'.

2.7 THERMOMETERS

- A. Provide thermometers where indicated, specified, and required. They shall be installed so that they can be clearly read from the floor.
- B. Industrial stem thermometers shall have a scale not less than 9" long and shall be red-reading mercury type with white background and black etched graduations and numerals. Casing materials shall be aluminum on all products installed outdoors.
- C. Thermometers shall be suitable for the service intended and the range shall be selected to span from approximately 10 degrees below through 10 degrees above the operating range of the fluid.
- D. Thermometers shall have a guaranteed accuracy of within 1% of the range scale and shall be provided with 1 degree graduations. Thermometers shall be provided with brass separable socket wells.
- E. Provide thermometer wells and necessary fittings where specified or indicated. Wells installed in insulated piping shall be provided with lagging extensions of appropriate length to accommodate insulation.
- F. Thermometers shall be as manufactured by Marsh Instrument Co., Weksler Instrumentation, Terice, Miljoco, or approved equal.

2.8 PRESSURE GAUGES

- A. Pressure and compound pressure gauges shall be installed so that they can be clearly read from the floor and shall be Bronze Bourdon tube type with minimum 6" dials and snubbers. Dials shall be white with black numerals, graduations, and pointers, and shall be set in either iron, steel, or aluminum cases having a baked enamel finish. Cases shall have safety blowout plugs.
- B. Pressure gauges shall have a range of approximately twice the operating pressure and all gauges shall have an accuracy of 1/2 of 1% of full scale reading. Gauges shall be provided with brass shutoff cocks.
- C. Provide compound pressure gauges in pump suction pipe (30" Hg VAC. to 100 psi).
- D. Provide gauges where indicated, specified, or required.
- E. Gauges shall be manufactured by Marshalltown Instrument, Weksler Instrumentation, Terice, Miljoco, or approved equal.

2.9 P/T PLUGS

- A. Provide, in locations shown on drawings, a 1/2 inch MPT fitting for pipe line and 1/4 inch for valve body locations to receive either a temperature or pressure probe 1/8 inch OD. Fitting shall be solid brass with two valve cores of Neoprene capable of withstanding a maximum temperature of 200 deg. F at 500 psi, fitted with a color coded and marked cap with gasket, and shall be rated at 1000 psig at 140 deg. F.
- B. Provide Owner with pressure gauge adapters with 1/8" O.D. probe and 5 inch testing thermometers for chilled water with a 25 - 125 F range.
- C. Supply and present to the Owner upon completion of testing, two (2) pressure and temperature test kits. Each shall consist of one dual scale (0-100 psi, 0-230 feet of water) pressure gauge with a No. 500 gauge adapter attached, one 25-125 F pocket testing thermometer, one 0-220 F pocket testing thermometer, one 500 gauge adapter, and one protective carrying case.
- D. Acceptable manufacturers shall be Peterson, Sisco, or approved equal.

2.10 SUCTION DIFFUSER

- A. Provide a suction diffuser at inlet of each base mounted pump. Unit shall consist of angle type body with inlet vanes and combination Diffuser-Strainer-Orifice cylinder with 3/16" diameter openings for pump protection. Unit shall be equipped with disposable fine mesh start-up strainer which shall be removed after thirty (30) days of operation. Strainer free area shall be no less than five (5) times the section area of the pump connection. Unit shall be provided with adjustable support foot to carry weight of suction piping.
- B. Suction diffusers shall be as manufactured by Bell and Gossett, TACO, Armstrong, Titan FCI, or Mueller.

2.11 EXPANSION TANK

- A. Tank shall be pressurized diaphragm type. (Refer to drawings for model number.)
- B. Tank shall be constructed of welded steel, furnished with automatic fill valve, and ASME rated for 175 psig.
- C. Tank shall be as manufactured by Armstrong, TACO, Amtrol, Inc., or Bell & Gossett.

2.12 AIR PURGER

- A. Units shall be in-line type constructed of cast iron or steel and shall contain a low velocity chamber for air elimination. Unit shall be suitable for 125 psi working pressure and shall contain air vent connection and drain connection.
- B. Air purger shall be manufactured by Armstrong, Amtrol, or Bell & Gossett.

PART 3 – EXECUTION

3.1 INSTALLATION AND APPLICATION

- A. Install specialties in accordance with manufacturer's instructions to permit intended performance.
- B. Where large air quantities can accumulate, provide enlarged air collection standpipes.
- C. Provide manual air vents at system high points and as indicated.
- D. Provide valved drain and hose connection on strainer blow down connection.
- E. Flow switches, temperature sensors, sensor sockets, wells gage taps, etc. shall be furnished under controls section of these specifications and installed under this Section. Locations of all sensor sockets, flow switches, and taps shall be coordinated with and supervised by the Controls Contractor.
- F. Motorized control valves shall be furnished by the Controls Contractor, installed by the Mechanical Contractor.

END OF 15182

SECTION 15183 TESTING OF PIPING SYSTEMS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, other specification sections and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes testing of piping systems.

1.3 SUBMITTALS

- A. Tabulated test results of all piping tests shall be submitted to Architect/Engineer prior to substantial completion.

PART 2 – PRODUCTS (NOT APPLICABLE)

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Furnish all labor, materials, and equipment required for testing procedures.
- B. Piping Systems: Hydrostatically test all pipe lines installed with a water pressure test of 1-1/2 times its operating pressure, but not less than 100 psi for a period of 4 hours, during which time the pressure shall remain constant without pumping. If leaks or defects develop, new tests shall be made and repeated until all defects are remedied. Pipes or joints which leak shall be taken apart and remade. Caulking will not be permitted.
- C. Lines containing check valves shall have the test pressure source located upstream of the valves, or the valve discs shall be removed until after the testing. Control valves shall be set in the open position.
- D. Pipe testing shall be performed after flushing, except for buried lines.
- E. Any equipment that has a pressure rating lower than the testing pressure shall be valved off during the test.
- G. Potable hot and cold water lines shall be hydrostatically tested at 125 psig for a period of twenty-four (24) hours.
- H. Insulation shall not be applied until pressure testing has been completed. Joints of any type shall not be painted or varnished prior to testing.

END OF 15183

SECTION 15184 PLUMBING PIPING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, other specification sections and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes plumbing piping systems.

1.3 QUALITY ASSURANCE

- A. Valves: Manufacturer's name and pressure rating marked on valve body.

1.4 SUBMITTALS

- A. Submit product data under provisions of General Conditions and Supplementary General Conditions.
- B. Include data on pipe materials, pipe fittings, valves and accessories.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store and protect at products site under provisions of General Conditions and supplementary General Conditions.
- B. Deliver and store valves in shipping containers with labeling in place.

PART 2 – PRODUCTS

2.1 COLD WATER PIPING, ABOVE GRADE

- A. Copper Tubing: ASTM B88, Type L hard drawn. Fittings: ANSI/ASME B16.23, cast brass, or ANSI/ASME B16.29, wrought copper. Joints: ANSI/ASTM B32, solder, Grade 95TA.

2.2 VALVES—GENERAL

- A. Materials for all valves shall be bronze.

2.3 ACCEPTABLE MANUFACTURERS—VALVES

- A. Crane.
- B. Grinnell.

- C. Nibco.
- D. Milwaukee.

2.4 GATE VALVES

- A. Up to 2 Inches: Bronze body, non-rising stem and handwheel, inside screw, single wedge or disc, solder or threaded ends. Valves 2-1/2" through 4" shall be iron body bronze mounted with ends to suit pipe and shall be of non-rising stem type. Valves larger than 4" shall be iron body bronze mounted flanged ends with outside screw and yoke with rising stem. Working pressure for bronze valves shall be 150 pounds and for iron valves shall be 125 pounds per square inch.

2.5 GLOBE VALVES

- A. Up to 2 Inches: Bronze body, rising stem and handwheel, inside screw, renewable composition disc, solder ends, with backseating capacity. Valves 2-1/2" and larger shall be iron body bronze mounted with ends to suit pipe, yoke bonnet, and disc guide. Working pressure for bronze valves shall be 150 psi and iron valves 125 psi.

2.6 BALL VALVES

- A. Up to 2 Inches: Bronze body, stainless steel ball, teflon seats and stuffing box ring, lever handle, solder or threaded ends.

2.7 SWING CHECK VALVES

- A. Up to 2 Inches: Bronze 45 degree swing disc, solder ends. Valves 2-1/2" and larger shall be iron body brass mounted and with ends to suit pipe. Working pressure for check valves shall be 125 pounds.

2.8 WATER PRESSURE REDUCING VALVES

- A. Up to 2 Inches: Bronze body, stainless steel and thermoplastic internal parts, fabric reinforced diaphragm, strainer, and single union.

PART 3 – EXECUTION

3.1 PREPARATION

- A. Ream pipe and tube ends. Remove burrs.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.2 INSTALLATION

- A. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

- B. Route piping in orderly manner and maintain gradient.
- C. Install piping to conserve building space and not interfere with use of space.
- D. Group piping whenever practical at common elevations.
- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- F. Provide clearance for installation of insulation and access to valves and fittings.
- G. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors with General Contractor.
- H. Slope water piping and arrange to drain at low points.
- I. Establish elevations of buried piping outside the building to ensure not less than 3 ft of cover, or as existing piping connections require.
- J. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- K. Prepare pipe, fittings, supports, and accessories not prefinished, ready for finish painting. Refer to Section 09900.
- L. Copper piping installed below grade shall be wrapped with ¾" Armaflex pipe insulation. Seal all edges and seams to prevent moisture intrusion.
- M. Establish invert elevations, slopes for drainage to 1/8 inch per foot minimum. Maintain gradients.
- N. Excavate in accordance with sections on Excavation and Backfill.
- O. Install bell and spigot pipe with bell end upstream.
- P. Install valves with stems upright or horizontal, not inverted.
- Q. Install silicon iron waste and vent pipe in accordance with manufacturer's recommendations.
- R. Pipe cold water to both hand mixing valves of sinks and lavatories when only cold water is designated for connection unless otherwise noted on the drawings.

3.3 APPLICATION

- A. Use grooved mechanical couplings and fasteners only in accessible locations.
- B. Install unions downstream of valves and at equipment or apparatus connections.
- C. Install brass male adapters each side of valves in copper piped system. Sweat solder adapters to pipe.

- D. Install gate or ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- E. Install globe valves for throttling, bypass, or manual flow control services.

3.4 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Prior to starting work, verify system is complete, flushed and clean.
- B. Ensure pH of water to be treated is between 7.4 and 7.6 by adding alkali or acid.
- C. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.
- D. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
- E. Maintain disinfectant in system for 24 hours.
- F. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- G. Flush disinfectant from system until residual equal to that of incoming water.
- H. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C601.

END OF 15184

SECTION 15185 HVAC PUMPS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, other specification sections and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes air vents, strainers, valves, thermometers, pressure gauges, air elimination, etc...

1.3 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacture, assembly, and field performance of pumps with minimum three years experience.
- B. Alignment: Base mounted pumps shall be aligned and first time energized by the pump manufacturer's trained representative at the job site. The Contractor shall submit to the Engineer a statement from the Manufacturer's Representative certifying that such services were completed and the installation is per the Manufacturer's requirements.
- C. Qualifications: The Manufacturer shall have a local, trained representative with a full field service support office within 50 miles of the job site. The service support office shall have stock inventory items and service personnel specifically trained to install, check- out, align, and service pumps produced by the manufacturer.

1.4 SUBMITTALS

- A. Submit shop drawings and product data.
- B. Submit certified pump curves showing performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.
- C. Submit manufacturer's installation instructions.

1.5 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data.
- B. Include installation instructions, assembly views, lubrication instructions, and replacement parts list.

1.6 SPARE PARTS

- A. Provide one extra set of mechanical seals and a complete set of gaskets for each pump installed on this project.

1.09 WARRANTY

- A. Provide one (1) year manufacturer's warranty.
- B. In addition to the manufacturer's basic one year warranty, provide all parts , next day parts shipping costs, additional alignment services, motor replacement and labor, as necessary for repairs of a failed pump during the warranty period, at no additional cost to the Owner.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A.
 - 1. TACO.
 - 2. Weinman.
 - 3. ITT-Bell & Gossett

2.2 GENERAL CONSTRUCTION REQUIREMENTS

- A. Balance: Rotating parts, statically and dynamically.
- B. Construction: To permit servicing without breaking piping or motor connections.
- C. Pump Motors: Operate at 1750 rpm unless specified otherwise on drawings.
- D. Pump Connections: Flanged-Provide flat faced matching flanges as required.
- E. All pump motors shall be totally-enclosed fan cooled (TEFC).
- F. All HVAC pump motors shall be IEEE rated energy efficient, high efficiency motors and shall comply with Specification Section 15170, Paragraph 2.06(M.).
- G. All HVAC pump motors designated for variable frequency drive (VFD) duty shall be VFD compatible motors and be inverter duty rated.
- H. Provide a pump selection (i.e. model #) which will allow for the installation of a larger impeller than that required to meet the GPM and static head characteristics listed on the pump schedule. Pump selection shall allow for an increased size impeller (minimum ¼" larger diameter) to be installed within the same pump casing.

2.3 VERTICAL IN-LINE PUMPS

- A. Type: Vertical, single stage, close coupled, back pull-out centrifugal pump for in-line mounting, for 125 psig maximum working pressure.

- B. Casing: Cast iron, with suction and discharge gage ports, renewable bronze casing wearing rings, seal flush connection, drain plug, flanged suction and discharge.
- C. Impeller: Bronze, fully enclosed, keyed to motor shaft, dynamically balanced.
- D. Bearings: Permanently lubricated roller or ball bearings.
- E. Shaft: Carbon steel with bronze shaft sleeve.
- F. Seal: Stainless steel mechanical seal with Buna-N elastomers, Ni-Resist seat and carbon washers.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install pumps in accordance with manufacturer's instructions.
- B. Provide access space around pumps for service. Provide no less than minimum as recommended by manufacturer.
- C. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.
- D. Decrease from line size with long radius reducing elbows or eccentric reducers. Support piping adjacent to pump such that no weight is carried on pump casings.
- E. Provide drains for bases and seals, piped to and discharging into floor drains.
- F. Lubricate pumps before start-up.
- G. This Contractor shall provide, as a part of the Base Bid, impeller shaving on all pumps 7½ HP and larger (all other pumps shall be installed with impellers sized per the pump schedule). Impeller shaving shall occur upon approval of the T&B agents recommendations. This Contractor shall coordinate this effort with the Owner/Engineer and the machine shop so as to minimize the downtime of the pump(s) and disruption to the building occupants.
- H. Contractor shall provide start-up service from the Manufacturer's Representative, which shall include the alignment of the pump coupling for all pumps. Laser alignment shall be completed for pumps 20 HP and larger.
- I. Start-up Certificate: Submit the start-up certificate to the Architect/Engineer within seven (7) days from the day of start-up. A copy of the start-up certificate shall be available on-site, the day the start-up is complete, and remain available at the site for the duration of the project.

END OF 15185

SECTION 15189 WATER TREATMENT

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, other specification sections and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes chemical water treatment for chilled water loops.

1.3 SUBMITTALS

- A. Submit shop drawings indicating system schematics, equipment locations, and controls schematics.
- B. Submit product data indicating chemical treatment materials, chemicals, and equipment.
- C. Submit manufacturer's installation instructions and field reports indicating start-up of treatment systems is completed and operating properly.
- D. Submit reports indicating analysis of system water after cleaning and after treatment.

1.4 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data.
- B. Include data on chemical feed pumps, agitators, and other equipment including spare parts lists, procedures, and treatment programs.
- C. Include step by step instructions on test procedures including target concentrations.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum three years experience. Company shall have local representatives with water analysis laboratories and full time service personnel.

1.6 REGULATORY REQUIREMENTS

- A. Conform to applicable code for addition of non-potable chemicals to building mechanical systems, and for delivery to public sewage systems.

1.7 MAINTENANCE SERVICE

- A. Furnish service and maintenance of treatment systems for one year from Date of Substantial Completion.
- B. Provide monthly technical service visits to perform field inspections and make water analysis on site. Detail findings in writing on proper practices, chemical treating requirements, and corrective actions needed. Submit two copies of field service report after each visit.
- C. Provide laboratory and technical assistance services for warranty period.
- D. Include training course at startup of systems for operating personnel, instructing them on installation, care, maintenance, testing, and operation of water treatment systems.

1.8 MAINTENANCE MATERIALS

- A. Submit maintenance materials.
- B. Provide sufficient chemicals for treatment and testing during warranty period.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. System Cleaner
 - 1. Liquid alkaline compound with emulsifying agents and detergents to remove grease and petroleum products.
 - 2. Algaecide.
- B. Closed System Treatment (Water)
 - 1. Sequestering agent to reduce deposits and adjust pH.
 - 2. Corrosion inhibitors.
 - 3. Conductivity enhancers.

2.2 EQUIPMENT

- A. Closed System
 - 1. For each closed system, provide and install one (1) each five (5) gallon one-shot pot feeder, with quick opening screw cap for working pressure of 175 psi, and a bleed off valve. Locate pot feeder where it does not deliberately or inadvertently feed inadequately diluted chemicals directly to the pumps [i.e., a minimum of five (5) feet].
 - 2. A valved sample point with tap or faucet device shall be provided and installed remote from the pot feeder, in each closed system.

3. Provide corrosion coupon rack, in each closed system, complete with isolation valves.
4. Provide side stream bag or cartridge filter sized to handle two percent (2%) of system flow for each closed system.

PART 3 – EXECUTION

3.1 PREPARATION

- A. System shall be operational, filled, started, and vented prior to cleaning. Use water meter to record capacity in each system.
- B. Place terminal control valves in open position during cleaning.

3.2 CLEANING SEQUENCE

- A. Remove strainers, automatic air vents, and flow regulators from all HVAC piping systems and ensure all control and shut-off valves are fully open. Flush each HVAC system for two hours.
- B. Each HVAC piping system shall be thoroughly cleaned by filling with a solution of commercial cleaning chemicals designed to remove deposits such as pipe dope, oils, loose mill scale, rust and other extraneous materials. The recommended dosages and characteristics of the cleaner shall be such that the water need only be at ambient temperature. After the recommended dosages are added the water shall be circulated for 36-72 hours. Systems shall then be drained, filled and flushed with clean water until no foreign matter is observed and total alkalinity of rinse water is equal to that of the make up water.
- C. Replace strainers, air vents, and flow regulators and fill system with clean water. In closed systems ensure expansion tank is approximately 2/3 water at system working pressure.
- D. Each system shall be properly treated to prevent scaling and corrosion.
- E. The water treatment service company currently under contract to the School Board to supply water treatment services for HVAC systems shall supervise the flushing and cleaning. That company shall certify in writing that the flushing and cleaning has been properly done.
- F. All cost associated with this service and certification shall be paid by the Contractor.

3.3 INSTALLATION

- A. Install closed and open systems in accordance with manufacturer's instructions.

3.04 CLOSED SYSTEM TREATMENT

- A. Provide one bypass feeder. Install isolating and drain valves and necessary piping. Install around globe valve downstream of circulating pumps unless indicated otherwise.
- B. Introduce closed system treatment through bypass feeder when required or indicated by test.
- C. Provide 3/4 inch water coupon rack around circulating pumps with space for 4 test specimens.
- D. Chemical for changing and maintaining the water treatment shall be supplied by the water treatment service company.

END OF 15189

SECTION 15200 HVAC CONTROLS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions of this specification, and Division 1 Specifications sections apply to work of this section.

1.2 GENERAL REQUIREMENTS

- A. Examine other Sections of the Specifications for requirements that affect work of this Division whether or not such work is specifically mentioned in this Division.
- B. Coordinate work with that of other trades affecting, or affected by work of this Division. Cooperate with those trades to assure steady progress of work under contract. It is this controls contractor's responsibility to neatly "line item" work and responsibilities in their bid, of other subcontractors described in this section that are required for a complete HVAC controls system.

1.3 DESCRIPTION OF WORK

- A. Provide a complete system of direct digital temperature controls as hereby specified and shown on the drawings.
- B. Controls applicable to this section include, but are not limited to temperature and humidity sensors, automatic water valves with electric actuators, automatic dampers, pressure gauges and sensors, control relays, flow meters and related devices. Work of this contractor includes installation in conduit, wiring, wells, and enclosures necessary to provide a complete and operable system of controls.
- C. The programmable controllers shall be programmed by the controls contractor to be compatible with the Owner's existing building automation systems software. Systems shall operate on the District's Wide Area Ethernet Network and communicate via IP/IXP protocol.
- D. Extent of the direct digital control and energy management systems work required by this section is indicated on drawings and schedules, and by requirements of this section.
- E. Control sequences and control point list are specified on the drawings
- F. Refer to other Division 15 sections for installation of instrument wells, valves, and dampers in mechanical systems; coordinate and communicate with the general/mechanical contractor that this is not work of this section.
- G. Refer to Division 16 sections for power supply wiring from power source to power connection of controls and/or unit control panels. Includes starters, disconnects, and required electrical devices, except where specified as furnished, or factory-installed by manufacturer.

1.4 BASIS OF DESIGN AND CONTRACTOR QUALIFICATIONS

- A. Basis of design for HVAC Controls System is Automated Logic Controls. There are no approved equals.**
- B. The controls contractor is to be in the exclusive business of installing and representing the above manufacturer. The controls contractor shall have a minimum of three (3) years experience in the programming, installation and service of commercial DDC control systems.**
- C. Responsibilities regarding field equipment start-up and checkout
1. Provide support to the contractor to insure all control devices are properly interfaced with HVAC equipment.
 2. Perform a point-to-point operational check of each analog and digital point.
 3. Power up the panels and verify correct power operation.
 4. Verify communications line integrity.
 5. Write all software programs and database.
 6. Install all software and database in the system.
 7. Verify operation of all operating software.
 8. Calibrate/adjust/setup field devices as necessary in the order to provide a complete and proper operating system.
 9. Notify Architect/Engineer of any problems related to the design within two (2) working days of find.
 10. Work with the Architect/Engineer to validate operation and final completion of the project.
 11. Work with the test and balance agency in balancing and adjusting the HVAC system.
- D. Acceptance of the installation
1. Once the job is installed and the controls contractor has thoroughly checked it, then it will be necessary to demonstrate to the Architect/Engineer that the project design intent and specifications have been met. The controls contractor shall prepare technical demonstrations to the Architect/Engineer requiring a random test of not less than 20% of the system points. The demonstration shall occur concurrent with the substantial completion inspection for the project.

1.5 DESCRIPTION OF RESPONSIBILITIES PROVIDED BY CONTROLS CONTRACTOR

- A. Provided and installed by the controls contractor, unless noted to be installed by mechanical contractor.
1. Room temperature sensors
 2. Duct temperature sensors
 3. Insertion temperature sensors
 4. Outside air temperature sensor
 5. Pressure sensors (air and water)
 6. Differential pressure switches (air and water)

7. Control dampers (installed by mechanical contractor)
8. Control valves (installed by mechanical contractor)
9. Damper actuators
10. Damper linkages
11. Valve actuators
12. Outboard gear panels (auxiliary panels)
13. Name plates (engraved type)
14. Control relays
15. Varistors
16. Flow meters (installed by the mechanical contractor)
17. Terminal strips
18. Control fuse blocks
19. Power supplies
20. Humidity sensors
21. Transducers
22. Pressure switches
23. End switches
24. Submittal literature on all control devices provided
25. 120/24VAC transformers
26. Warranty
27. Personal computer for Energy Management System (EMCS)
28. Installation of DDC controllers
29. Installation of all electric temperature control devices not in-line
30. Power wiring from junction box at each control panel to power supplies
31. Power supplies
32. Control system grounding

- B. The programmable controllers shall be programmed by controls contractor to be compatible with existing software and point naming conventions in the Owner's Energy Management Department.

1.6 RESPONSIBILITIES OF THE MECHANICAL CONTRACTOR

- A. Install air flow monitors.
- B. Install all in-line control devices (such as valves, dampers, flow meters, water temperature sensors, air flow control devices, wells, flow switches, differential pressure switches across pumps).
- C. Provide operation and maintenance manuals of HVAC equipment purchased.
- D. Start-up and check-out of all HVAC equipment.
- E. Install copper line connections to in-line devices.

1.7 QUALITY ASSURANCE

- A. All control conduit and wiring shall meet the requirements of Division 16 for materials and installation. All electrical system components shall comply with NEMA and UL standards.

- B. Electrical Standards: Provide electrical components of systems which comply with NEMA and UL standards.
- C. NEMA Compliance: Comply with NEMA standards pertaining to components and devices for control systems.
- D. NFPA Compliance: Comply with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems" where applicable to controls and control sequences.

1.8 SUBMITTALS

- A. Submit product data.
- B. Submit complete control diagrams and sequence of operation.
- C. Submit the following product data:
 - 1. Manufacturer's detailed information for each piece of equipment used, identifying each item used.
 - 2. Catalog sheets for each item specified in the control diagrams. Identify specific model and accessories being used in the control diagram, when two or more devices or models are shown.
- D. Provide the following information for each item and device: Proper system label, indication of coordination with submitted catalog information, proper settings and adjustments of instruments, physical dimensions of devices and accessories, and the normal condition of device, such as normally open or closed dampers, valves, and relays.
- E. Submit automatic control damper information including amount of leakage, airflow characteristics, and construction of all components. Submit a damper and control valve schedule that shall include sizes, locations and pertinent information required for approval and coordination with the mechanical contractor and sheet metal subcontractor.

1.9 NETWORK AND APPLICATION SPECIFIC CONTROL PANEL SPECIFICATIONS

- A. The control system shall be capable of integrating multiple building functions including equipment supervision and control alarm management energy management and historical data collection and archiving.
- B. The control system shall consist of the following:
 - 1. Stand-alone DDC panels
 - 2. Stand-alone application specific controllers (ASCs)
 - 3. Integration via Open protocol to 3rd Party equipment to include chillers
 - 4. Network Handheld Terminals
- C. System architectural design shall eliminate dependence upon any signal device for alarm reporting and control execution. Each DDC panel shall operate independently by performing its own specified control alarm management operator I/O and historical data collection. The failure of any single component or network

connection shall not interrupt the execution of control strategies at other operational devices.

- D. Stand-alone DDC panels shall be able to access any data from or send control commands and alarm report directly to any other DDC panel or combination of panels on the network without dependence upon a central processing device. Stand-alone DDC panels shall also be able to sent alarm reports to multiple operator workstations without dependence upon a central processing device.

1.10 NETWORKING / COMMUNICATIONS

- A. The control system shall network the operator workstations and the stand-alone DDC panels. Inherent in the system's' design shall be the ability to expand or modify the network either via the local area network or autodial telephone line modem connections or via a combination of the two networking schemes.

1.11 LOCAL AREA NETWORK

- A. Workstation / DDC Panel Support: Operator workstation and DDC panels shall directly reside on a local area network such that communications may be executed directly between controllers, directly between workstations, and between controllers and workstations on a peer-to-peer basis.
- B. Dynamic Data Access: All operator devices and network resident panels shall have the ability to access all point status and application report data or execute control functions for any and all other devices via the local area network. Access to data shall be based upon logical identification of building equipment.
- C. Access to system data shall not be restricted by the hardware configuration of the facility management system. The hardware configuration of the FMS network shall be totally transparent to the user when accessing data or developing control programs.
- D. General Network Design: Network design shall include the following provisions:
 - 1. High speed data transfer rates for alarm reporting quick report generator from multiple controllers and upload/download efficiency between network devices. The minimum baud rate shall be 1 Megabaud.
 - 2. Support of any combination of controllers and operator workstations directly connected to the local area network. A minimum of 50 devices shall be supported.
 - 3. Detection and accommodation of single or multiple failures of either workstations, DDC panels or the network media. The network shall include provisions for automatically reconfiguring itself to allow all operation equipment to perform their designated functions as effectively as possible in the event of single or multiple failures.
 - a. Message and alarm buffering to prevent information from being lost.
 - b. Error detection, correction, and retransmission to guarantee data integrity.

- c. Default device definition to prevent loss of alarms or data, and ensure alarms are reported as quickly as possible in the event an operator device does not respond.
- d. Commonly available, multiple sourced, networking components and protocols shall be used to allow the BAS to coexist with other networking applications such as office automation. Ethernet is the acceptable technology.
- e. Use of an industry standard IEEE 802.x protocol. Communications must be of a deterministic nature to assure calculable performance under worst-case network loading.
- f. Synchronization of the real-time clocks in all DDC panels shall be provided.

1.12 MASTER DDC CONTROL PANEL

- A. General: Stand-alone DDC panels shall be microprocessor based, multi-tasking, multiuser, real-time digital control processors. Each stand-alone DDC panel shall consist of modular hardware with plug-in enclosed processors, communication controllers, power supplies, and input/output modules. A sufficient number of controllers shall be supplied to fully meet the requirements of this specification and the point list.
- B. Memory: Each DDC panel shall have sufficient memory to support its own operating system and databases including:
 - 1. Control processes
 - 2. Energy Management applications
 - 3. Alarm Management
 - 4. Historical / Trend Data for all points
 - 5. Maintenance Support applications
 - 6. Custom processes
 - 7. Operator I/O
 - 8. Manual Override monitoring
- C. Point Types: Each DDC panel shall support the following types of point inputs and outputs:
 - 1. Digital inputs for status/alarm contacts
 - 2. Digital outputs for on/off equipment control
 - 3. Analog inputs for temperature, pressure, humidity, flow, and position measurements
 - 4. Analog outputs for valve and damper position control, and capacity control of primary equipment
 - 5. Pulse inputs for pulsed contact monitoring
- D. Expandability: The system shall be modular in nature, and shall permit easy expansion through the addition of software applications, workstation hardware, field controllers, sensors, and actuators.
- E. Serial Communication Ports: Stand-alone DDC panels shall provide at least two RS-232C serial data communication ports for simultaneous operation of multiple operator I/O devices such as industry standard printers, laptop workstations, PC workstations, and panel-mounted or portable DDC panel operator's terminals. Stand-

alone DDC panels shall allow temporary use of portable devices without interrupting the normal operation of permanently connected modems, printers, or network terminals.

- F. Hardware Override Switches: As indicated in the point schedule, the operator shall have the ability to manually override automatic or centrally executed commands at the DDC panel via local, point discrete, onboard hand/off/auto operator override switches for binary control points and gradual switches for analog control type points. These override switches shall be operable whether the panel is powered or not.
- G. Hardware Override Monitoring: DDC panels shall monitor the status or position of all overrides, and include this information in logs and summaries to inform the operator that automatic control has been inhibited. DDC panels shall also collect override activity information for daily and monthly reports.
- H. Integrated On-Line Diagnostics: Each DDC panel shall continuously perform selfdiagnostics, communication diagnosis and diagnosis of all subsidiary equipment. The DDC panel shall provide both local and remote annunciation of any detected component failures, or repeated failure to establish communication. Indication of the diagnostic results shall be provided at each DDC panel, and shall not require the connection of an operator I/O device.
- I. Surge and Transient Protection: Isolation shall be provided at all network terminations, as well as all field point terminations to suppress induced voltage transients consistent with IEEE Standard 587-1980. Isolation levels shall be sufficiently high as to allow all signal wiring to be run in the same conduit as high voltage wiring where acceptable by electrical code.
- J. Powerfail Restart: In the event of the loss of normal power, there shall be an orderly shutdown of all stand-alone DDC panels to prevent the loss of database or operating system software. Non-volatile memory shall be incorporated for all critical controller configuration data. Battery back-up of the controller configuration shall not be permitted. Regardless of your approval as a manufacturer, in the event that the standalone controllers maintain their programs via batteries, this shall not be acceptable. This removes the need for emergency power to the controllers and reduces the generator requirements. Programs shall be maintained in non-volatile EEPROMS.
- K. Upon restoration of normal power, the DDC panel shall automatically resume full operation without manual intervention.

1.13 SYSTEM SOFTWARE FEATURES:

- A. General: All necessary software to form a complete operating system as described in this specification shall be provided. The person machine interface software shall operate on a true Windows based operating system. OS/2, UNIX or any other operating systems shall not be acceptable.

- B. The software programs specified in this section shall be provided as an integral part of the DDC panel and shall not be dependent upon any higher level computer for execution.

1.14 CONTROL SOFTWARE DESCRIPTION

- A. Pre-tested Control Algorithms: The DDC panels shall have the ability to perform the following pre-tested control algorithms:
 - 1. Two position control
 - 2. Proportional control
 - 3. Proportional plus integral control
 - 4. Proportional, integral, plus derivative control
 - 5. Automatic control loop tuning
- B. Equipment Cycling Protection: Control software shall include a provision for limiting the number of times each piece of equipment may be cycled within any one-hour period.
- C. Heavy Equipment Delays: The system shall provide protection against excessive demand situations during start-up periods by automatically introducing time delays between successive start commands to heavy electrical loads.
- D. Powerfail Motor Restart: Upon the resumption of normal power, the DDC panel shall analyze the status of all controlled equipment, compare it with normal occupancy scheduling, and turn equipment on or off as necessary to resume normal operation.
- E. Energy Management Applications: DDC panels shall have the ability to perform any or all of the following energy management routines:
 - 1. Time of day scheduling
 - 2. Calendar based scheduling
 - 3. Holiday scheduling
 - 4. Temporary schedule overrides
 - 5. Optimal start
 - 6. Optimal stop
 - 7. Night setback control
 - 8. Enthalpy switchover (economizer)
 - 9. Peak demand limiting
 - 10. Temperature compensated load rolling
 - 11. Fans speed / cfm control
 - 12. Heating / Cooling interlock
 - 13. Cold deck reset
 - 14. Hot deck reset
 - 15. Hot water reset
 - 16. Chilled water reset
 - 17. Condenser water reset
 - 18. Chiller sequencing
 - 19. All programs shall be executed automatically without the need for operator intervention, and shall be flexible enough to allow user customization. Programs shall be applied to building equipment as described in the Execution portion of this specification.

- F. Custom Process Programming Capability: DDC panels shall be able to execute custom, job-specific processes defined by the user, to automatically perform calculations and special control routines.
- G. Process Inputs and Variables: It shall be possible to use any of the following in a custom process:
1. Any system-measured point data or status
 2. Any calculated data
 3. Any results from other processes
 4. User-defined constants
 5. Arithmetic functions (+,-,*,/,square root, exp, etc.)
 6. Boolean logic operators (and, or, exclusive or, etc.)
 7. On-delay / Off-day / One-shot timers
- H. Process Triggers: Custom processes may be triggered based on any combination of the following:
1. Time interval
 2. Time of day
 3. Date
 4. Other processes
 5. Time programming
 6. Events (e.g., point alarms)
- I. Dynamic Data Access: A single process shall be able to incorporate measured or calculated data from any and all other DDC panels on the local area network. In addition, a single process shall be able to issue commands to points in any and all other DDC panels on the local are network.
- J. Advisory / Message Generator: Processes shall be able to generate operator messages and advisories to operator I/O devices. A process shall be able to directly send a message to a specified device, buffer the information in a follow-up file, or cause the execution of a dial-up connection to a remote device such as a printer or pager.
- K. Custom Process Documentation: The custom control programming feature shall be self-documenting. All interrelationships defined by this feature shall be documented via graphical flowcharts and English language descriptors.
- L. Alarm Management: Alarm management shall be provided to monitor, buffer, and direct alarm reports to operator devices and memory files. Each DDC panel shall perform distributed, independent alarm analysis and filtering to minimize operator interruptions due to non-critical alarms, minimize network traffic, and prevent alarms form being lost. At no time shall the DDC panel's ability to report alarms be affected by either operator activity at a PC workstation or local I/O device, or communications with other panels on the network.
- M. Point Change Report Description: All alarm or point change reports shall include the point's English language description, and the time and date of occurrence.

- N. **Prioritization:** The user shall be able to define the specific system reaction for each point. Alarms shall be prioritized to minimize nuisance reporting and to speed operator response to critical alarms. A minimum of three priority levels shall be provided. Each DDC panel shall automatically inhibit the reporting of selected alarms during system shutdown and start-up. Users shall have the ability to manually inhibit alarm reporting for each point.
- O. The user shall also be able to define under which conditions point changes need to be acknowledged by an operator, and/or sent to follow-up files for retrieval and analysis at a later date.
- P. **Report Routing:** Alarm reports, messages, and files will be directed to a user-defined list of operator devices, or PC's used for archiving alarm information. Alarms shall also be automatically directed to a default device in the event a primary device is found to be off-line.
- Q. **Alarm Messages:** In addition to the point's descriptor and the time and date, the user shall be able to print, display or store a 65-character alarm message to more fully describe the alarm condition or direct operator response. These alarm messages shall be utilized to perform the beeper interface alarm messaging.
- R. Each stand-alone DDC panel shall be capable of storing a library of at least 250 alarm messages. Each message may be assignable to any number of points in the panel.
- S. **Auto-Dial Alarm Management:** In Dial-up applications, only critical alarms shall initiate a call to a remote beeper. In all other cases, call activity shall be minimized by timestamping and saving reports until an operator scheduled time, a manual request, or until the buffer space is full. The alarm buffer must store a minimum of 50 alarms.
- T. **Historical Data and Trend Analysis:** A variety of historical data collection utilities shall be provided to automatically sample, store, and display system data in all of the following ways.
 - 1. **Continuous Point Histories:** Stand-alone DDC panels shall store point history files for all analog and binary inputs and outputs.
 - 2. The point history routine shall continuously and automatically sample the value of all analog inputs at half-hour intervals. Samples for all point shall be stored for the past 24 hours to allow the user to immediately analyze equipment performance and all problem-related events for the past day. Point history files for binary input or output points and analog output points shall include a continuous record of the last ten status changes or commands for each point. Continuous histories shall be provided on all points.
 - 3. **Control Loop Performance Trends:** Stand-alone DDC panels shall also provide high resolution sampling capability with an operator-adjustable resolution of 10-300 seconds in one-second increments for verification of control loop performance.
 - 4. **Extended Sample Period Trends:** Measured and calculated analog and binary data shall also be assignable to user-definable trends for the purpose of

collecting operator-specified performance data over extended periods of time. Sample intervals of 1 minute to 2 hours, in one-minute intervals, shall be provided. Each stand-alone DDC panel shall have a dedicated buffer for trend data, and shall be capable of storing a minimum of 5000 data samples.

- U. Data Storage and Archiving: Trend data shall be stored at the stand-alone DDC panels, and uploaded to hard disk storage when archival is desired. Uploads shall occur based upon either user-defined interval, manual command, or when the trend buffers become full. All trend data shall be available in disk file form for use in 3rd party personal computer applications.
- V. Runtime Totalization: Stand-alone DDC panels shall automatically accumulate and store runtime hours for binary input and output points as specified in the Execution portion of this specification
 - 1. The Totalization routine shall have a sampling resolution of one minute or less.
 - 2. The user shall have the ability to define a warning limit for Runtime Totalization. Unique, user-specified messages shall be generated when the limit is reached.
- W. Analog / Pulse Totalization: Stand-alone DDC panels shall automatically sample, calculate and store consumption totals on a daily, weekly, or monthly basis for userselected analog and binary pulse input-type points.
 - 1. Totalization shall provide calculation and storage of accumulations of up to 99,999.9 units (e.g. kWh, gallons, KBTU, tons, etc.).
 - 2. The Totalization routine shall have a sampling resolution of one minute or less.
 - 3. The user shall have the ability to define a warning limit. Unique, user-specified messages shall be generated when the limit is reached.
- X. Event Totalization: Stand-alone DDC panels shall have the ability to count events such as the number of times a pump or fan system is cycled on and off. Event Totalization shall be performed on a daily, weekly, or monthly basis.
 - 1. The Event Totalization feature shall be able to store the records associated with a minimum of 9,999,999 events before reset.
 - 2. The user shall have the ability to define a warning limit. Unique, user-specified messages shall be generated when the limit is reached.

1.15 APPLICATION SPECIFIC CONTROLLERS - HVAC APPLICATIONS

- A. Each stand-alone DDC controller shall be able to extend its performance and capacity through the use of remote Application Specific Controllers (ASCs).
- B. Each ASC shall operate as a stand-alone controller capable of performing its specified control responsibilities independently of other controllers in the network. Each ASC shall be a microprocessor-based, multi-tasking, real-time digital control processor.
- C. Each ASC shall have sufficient memory to support its own operating system and data bases, including:
 - 1. Control Processes

2. Energy Management Applications
 3. Operator I/O (Portable Service Terminal)
- D. The operator interface to any ASC point data or programs shall be through any network resident PC workstation, or any PC or portable operator's terminal connected to any DDC panel in the network. Provide a portable operator terminal connection to the network at every air handling unit mechanical room. This connection shall allow the operator the capability to access the system information as well as the entire facility. Refer to the specifications on the network terminal below. The network terminal shall operate off of the same passwords as on the workstation.
- E. Application specific controllers shall directly support the temporary use of a portable service terminal. The capabilities of the portable service terminal shall include, but not be limited to, the following:
1. Display temperatures
 2. Display status
 3. Display setpoints
 4. Display control parameters
 5. Override binary output control
 6. Override analog setpoints
 7. Modification of gain and offset constants
 8. Entire Network Information
- F. Powerfail Protection: All system setpoints, proportional bands, control algorithms, and any other programmable parameters shall be store such that a power failure of any duration does not necessitate reprogramming the controller.

1.16 DELIVERY, STORAGE AND HANDLING

- A. Provide factory shipping cartons for each piece of equipment and control device. Maintain cartons while shipping, storage and handling as required to prevent equipment damage, and to eliminate dirt and moisture from equipment. Store equipment and materials inside and protect from weather.

1.17 RECORD DOCUMENTS

- A. Provide operation and maintenance manuals.
- B. Provide and install plastic encased charts and flow diagrams in each equipment room.
- C. One copy of the control system record drawings, submitted as part of the project closeout package. Submission shall be in AutoCAD format on disk (no paper copies), to include the following information:
1. Point-to-point wiring diagrams and sequences of operation
 2. Location on the drawings of critical control devices such as control panels, auxiliary control panels, static pressure sensors, room temperature sensors, water temperature sensors/wells.
 3. Location of all 120/1/60 power sources for the control devices.
 4. Control valve sizing (valve CV and pressure drops). Valve schedules.
 5. Complete bill of material.
 6. Room schedule.
 7. Phone line or internet location for remote system access.

8. Homerun connections between panels.
9. Communication trunk line layout.
10. Lightning protection devices (quantity and location).
11. Surge protection devices (quantity and location).

1.18 TRAINING

- A. Provide 20 hours of training for owner's personnel which shall include the following:
 1. Layman's description of the HVAC/control system.
 2. Location of all key control devices (such as panels, override switches, etc.).
 3. Operational training.
- B. The initial training shall be given when the system is operational and has been verified completed by the engineer. Follow-up sessions will be scheduled as needed by the Maintenance personnel during the 1-year warranty period.
- C. Training hours are to be recorded on a log sheet to be prepared by the trainer and given to the Owner at the initial training session. Each subsequent training event is to be entered onto the log and initialed by both the trainer and trainee with a brief description of the instruction given.

1.19 WARRANTY

- A. Provide full parts and labor warranty on all control devices installed during this project for one (1) year from the date of substantial acceptance of the project. Warranty is to include:

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS:

- A. Low Temperature Detector: Provide manually reset freezestats on outside air AH's with a minimum of 20 foot vapor tension element. Interlock to AH starter to shut unit off in either hand or auto position.
- B. Static Pressure Transmitters: Provide electronic supply duct static pressure transmitter as required. Transmitter shall sense the differential between the supply duct and the space pressure. Sensing point shall be located 2/3 downstream in the longest ductwork run. Output shall be 4-20 mA proportional to pressure increase. Accuracy to be $\pm 2\%$ of full range.
- C. Water Differential Pressure Transmitter: Provide industrial grade differential pressure transmitter to monitor and control the differential pressure across the supply and return piping chilled water. The transmitter shall have a 4-20 mA signal proportional to the pressure increase. Output variations shall not exceed .1% of full scale with a 10:1 turndown ration. Transmitter shall have integral accessible zero/span adjustment, RFI/EMI protection, 316ss diaphragm and pipe mounting bracket. Operating range 32 to 100°F with 10 to 90% RH non-condensing.
- D. Air Differential Pressure Switches: Provide differential pressure switches for fan status to the DC system which are diaphragm operated to actuate a single pole double throw snap switch. Motion of the diaphragm shall be restrained by a

calibrated spring that can be adjusted to see the exact pressure differential at which the electrical switch can be actuated.

- E. Water Differential Pressure Switch: Provide differential pressure switch for pump flow status to the DDC system. Switch to be in a NEMA 4 enclosure. Pressure range from 3-150 psig.
- F. Electronic Air Flow Measurement: Linear temperature compensated analog electronic velocity signal. Microprocessor based electronic control signal capable of low flow sensitivity. True average velocity measurement across entire width of ductwork. 4-20 mA or 0-10 VDC output signals.
- G. Water Flow Measurement: The sensor shall be a 4-20 mA output type, with the repeatability of $\pm 1\%$ of value. Shall incorporate back-lit display and keypad on the meter. Flowmeter shall utilize Vortex shedding technology with a turndown of 20:1. Temperature limits: -40.0° to 80.0° C. Material is dependent upon that of the size and type of pipe material.
- H. Air Quality Transmitter (CO₂ Sensors): The sensor shall be a 4-20 mA / 1-5 VDC output type and designed to monitor IAQ/CO₂ levels in accordance with ASHRAE standard 62-2004.
- I. Control Valves Normally Open Two-Way Control Valves: Provide fully proportioning two-way control valves with equal percentage modulating plugs for normally open applications. Valves shall be sized for 3 to 5 psi pressure flow at maximum flow rate. Valves shall have stainless steel stems and spring-loaded Teflon packing. Leakage shall not exceed 0.05 percent of valve CV. Utilize existing pneumatic valves where possible otherwise.
 - 1. Up to 2 Inch: Valves shall be cast brass, screwed ends, ANSI Class 125.
 - 2. 2½ to 6 Inch: Valves to be cast iron, flanged ends, ANSI Class 125.
- J. Butterfly Valves: Provide two-way butterfly valves rated per ANSI 150 with fully tapped and threaded lugs and carbon steel body. Valves shall have field replaceable elastomeric resilient seats. Disc shall be fabricated from aluminum or manganese bronze and shaft shall be 416, 316 or 17-4PH stainless steel.
- K. Control Dampers: Provide automatic control dampers. Installation by Division 15 contractor per specification section "Ductwork Specialties". Provide damper for low leakage, parallel blade type. Blades to be a minimum 16 gauge galvanized steel of single unit design or 22 gauge galvanized sheet steel of double unit construction. Damper blades shall be 6 inches wide and a maximum length of 60 inches with square block pins of zinc-plated steel. Frames shall be 13 gauge galvanized sheet metal with non-ferrous sleeve type bearings. Dampers shall have solid stops with edge seals so that the blade edges shall interlock with neoprene seals. Leakage shall not exceed 6.3 cfm per square foot with the damper closed against 4 inches w.g. static pressure.
- L. Network Terminal: Provide access of the entire network. Access will include access and control of the features similar to the operator workstation. Adjustments,

overrides, scheduling, trends, histories must all be available for every system no matter the location of the network terminal.

- M. Temperature Sensors: Temperature sensors shall be either thermister type (+/- 0.7 F accuracy) or nickel wire temperature elements (RTD) with a precision of $\pm 1\%$ of full scale, not to exceed 2°F. Room sensors to include manual slide setpoint adjustment, with range of adjustability to be software definable.
- O. Duct-Mounted Insertion Elements: Use averaging elements of 17' length.
- P. Pipe Insertion Elements: Use separable brass thermowell with minimum insertion length of 2½ inches.
- Q. Humidity Sensors: Provide a monolithic IC humidity sensor with $\pm 3\%$ accuracy, washable sensor, one point calibration, 4-20 mA linear output.

2.2 CONTROL CONDUCTORS AND CONDUIT

- A. Provide control conductors that meet the BAS manufacturer's requirements and by control diagrams, not less than number 18 AWG stranded copper for all digital signal /control and not less than 18 AWG stranded and shielded copper conductors between controllers. Provide MTW controls conductors within enclosures and number 12 AWG stranded copper (minimum) THHN or THWN power conductors.
- B. In unburied indoor concealed locations, provide EMT conduit with compression type fittings in normally cooled / conditioned spaces. Provide galvanized steel IMC with cast type galvanized screwed fittings in non-cooled / conditioned spaces, including mechanical rooms. Plenum rated cable may be used in plenums only.
- C. In unburied outdoor locations, provide weather-tight galvanized steel IMC with cast type galvanized screwed fittings. Provide liquid-tight flexible metallic conduit (18 inches minimum length, 6 feet maximum) for connections to all vibrating equipment. Provide insulated grounding bushings at conduit connections to all boxes and panels. Seal water-tight all conduit penetrations.
- D. Conduit buried outdoors and below slabs shall be PVC, in accordance with Division 16 of the specifications.
- E. Provide UL approved components and located for accessibility to NEC requirements. Plenum cable on separate supports mounted on vertical walls of the plenum shall be acceptable, provided it is tagged and bundled. Plenum cables where exposed or in walls shall be in Flex, EMT, or Wiremold per NEC. Plenum cable bundles shall not be supported from ductwork or pipes.
- F. All control wiring, whether in conduit or bare, shall be home runs without splices.
- G. Conduit Markings: In the mechanical rooms and any other location where the conduit is exposed, mark junction boxes to identify controls conduit.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine areas and conditions under which control systems are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to the engineer.

3.2 INSTALLATION OF CONTROL SYSTEMS

- A. General: Install systems and materials in accordance with manufacturer's instructions, roughing-in drawings and details shown on drawings.
- B. The control equipment and connecting wiring shall be installed in a neat and workmanlike manner by trained mechanics on staff and under direct supervision of the controls contractor, conforming to all applicable state and local codes.
- C. Provide all communications accessories for an operable energy management/direct digital control system.
- D. Provide all components, accessories, installation adjustment and testing necessary for an operational system.
- E. Provide temperature and humidity sensors, automatic water valves with actuators, control wiring, panels, and other auxiliaries and appurtenances necessary to obtain satisfactory control of mechanical systems and as specified in the control diagrams. Coordinate with Air Distribution System installer for control air requirements. Provide electronic system components necessary to accomplish the automatic control requirements of the mechanical work.
- F. Provide conductors and conduit for control systems. Installation shall meet requirements of Division 16.
- G. Coordinate and work with Test and Balance Agency to insure proper system adjustments of all control components and control devices such as dampers, valves, etc. Provide the necessary assistance labor to the Test and Balance agency during start-up and check-out periods.
- H. All panels shall be installed in accessible locations, free of obstructions from pipes, conduits, ductwork, etc. Unless otherwise shown on contract documents all panels shall be reached from the floor without the use of ladders.

3.3 LIGHTNING & ELECTROMAGNETIC SUPPRESSION:

- A. All exterior communications shall be over 62/125 X EE-6 meter wavelength fiber installed by Division 16. Fiber optic transceivers shall be provided by the Controls Contractor. Fiber patch panel at hub locations to be provided by Division 16.

3.4 CONTROL WIRING:

- A. Install control wiring, without splices between terminal points, color coded. Install in neat workmanlike manner, securely fastened. Install in accordance with National Electrical Code.

- B. All wiring and piping shall be run straight, parallel to building lines and structure. All wires shall be bundled and independently supported when not in conduit. Flexible wireways shall be limited to six feet long. Reroute wires as directed by Architect when not in compliance with this paragraph.
- C. All control points shall be homeruns with no splices and as shown on the control diagrams.
- D. All control point wiring shall land at the controller end on a terminal strip, either a separate strip or the I/O strip.
- E. Splices shall not be permitted in wireways or AUX cabinets.
- F. Wiring shall conform to the manufacturers recommend installation practices including transient suppression on I/O circuit.
- G. Wiring shall be labeled to match the control shop drawings.
- H. Electrical contractor will provide a 120 VAC junction box at each DDC panel. Controls Contractor shall provide all other necessary power and control wiring to all control devices including valves, dampers, variable air volume terminals, and wiring to damper operators, valves, etc.
- I. Provide communications accessories for an operable energy management/direct digital control system.
- J. Coordinate input and output requirements between controller and remote devices/sensors.
- K. Coordinate and work with the general contractor and Test and Balance Agency to insure proper system adjustments of all control components and control devices, such as dampers, valves, etc.
- L. Secure controls conduit to building structure. Do not substitute attachments to work of other trades (such as pipes, ducts, other conduits). Provide accessory steel supports, as required. Refer to Division 16 specifications and details for methods of neat and secure support of cables and conduit.
- M. Locate control instruments or accessories on insulated/covered casings/pipes/ducts on the finished surfaces of the covering. Seal penetrations to assure no leaks are present around stems that penetrate into the air or water systems.
- N. Provide thermowells for all pipe mounted sensors.
- O. Identification: Provide engraved laminated plates and valve disks for identification of each: control valve, controls damper, controls panel, flow sensor, display gauge, and sensor (not internal panel gauges). Label all nonpanel devices (as well as instruments mounted in face of panels) to indicate system function.

- P. Provide a room temperature sensor for each occupied space and as indicated on the drawings.
- Q. Provide CT's on all chiller power supplies and provide monitoring of current (power) use.

END OF 15200

SECTION 15300 TESTING, ADJUSTING, AND BALANCING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions, of this specification division, Division 1 specification sections apply to work of this Section.

1.2 TESTING and BALANCING OF HVAC SYSTEMS

- A. Selection: The Prime Contractor, herein referred to as Contractor, shall procure the services of, and have a contract with, an independent Test and Balance contractor (Balancer), which specializes in the testing and balancing of heating, ventilating, and air conditioning systems. The Balancer shall test, balance and adjust all water circulating and air moving equipment, air distribution, and exhaust systems, and temperature control equipment and systems as herein specified and shown on the drawings.
- B. The Contractor shall award the test and balance contract to the Balancer as soon as possible to allow them to schedule the work in cooperation with other trades and to meet the completion date. The Contractor shall prepare a critical path schedule, coordinated with all subcontractors, so as to accomplish all tasks required of the Balancer as scheduled herein.
- C. Contractor shall cooperate with the Balancer as required during execution of the work under this section.
- D. The Balancer shall inspect all work under the above sections as it relates to work under this section and report in writing to the Contractor and Architect/Engineer any deviations from plans and specifications that will affect the performance of the systems. All correspondence (written, fax, electronic mail, and the like) is to be copied to the Architect/Engineer

1.3 BALANCER QUALIFICATIONS

- A. The Balancer shall be a member in good standing with The Associated Air Balance Council (AABC) or National Environmental Balancing Bureau (NEBB) and shall provide AABC National Project Certification Performance Guaranty or equivalent, to the owner upon request. The Balancer must be totally independent, having no affiliation with any contractor, design engineer, or equipment manufacturer/supplier of HVAC related equipment.
- B. The Balancer shall have a fully staffed office and have been regularly engaged in the testing and balancing of heating, ventilating, and air conditioning systems.
- C. The Balancer shall provide proof that personnel performing work have successfully completed at least three (3) projects of similar size and scope. A complete list of reference projects, including name and phone number of contacts, shall be submitted with the bid.

- D. All instruments used shall be accurately calibrated within six months of balancing and maintained in good working order. If requested, the test shall be conducted in the presence of the Architect/Engineer and/or his representative.

1.4 BALANCER SUBMITTALS

- A. Provide a testing and balancing plan for review within thirty days upon receipt of contract. The plan review should include comments and recommendations on any discrepancies that may hinder balancing. This plan review shall be transmitted directly to the Contractor.
- B. Submit to Contractor, equipment pre-start and start-up forms. After receipt from the contractor of the submittal data, forms will be transmitted by the Balancer to the Mechanical Contractor for use in equipment start-up. The completed forms will be turned over to the Balancer prior to the beginning of the test and balance phase.
- C. Submit agenda of test procedures for each system, describing balancing standards for the testing and balancing of the air conditioning, heating, and ventilating systems for the approval of the Architect/Engineer. This agenda shall include all forms for each system and component, with specified data from the project plans and specifications included on the forms.
- D. The Final Testing and Balance Report must be received prior to substantial completion inspection.

1.5 BALANCER MEETINGS, INSPECTIONS AND TESTS

- A. Make inspections of the systems during construction for proper installation of balancing devices and general construction as related to HVAC testing and balancing work.
- B. Perform Final Test and Balance work associated with the HVAC system as described herein.
- C. A minimum of one after-occupancy inspection shall be made within 90 days of the final test and balance. At this time, any minor adjustments shall be made for occupant comfort. Major problems, which will require major readjustments, shall be addressed to the Architect / Engineer prior to any readjustments. Any alterations to the final test and balance report shall be transmitted as a revised report to the Construction Manager for transmittal to the Architect/Engineer.

1.6 BALANCER WARRANTY AND REPORTS

- A. Provide National Project Certification Performance Guarantee. This Performance Guarantee is to be either by NEBB or AABC. Depending on which organization is chosen, the report is not to mention, or include reference to the other organization.
- B. Provide five copies of tabulated report in neatly organized typed form with AABC approved minimum data, within fifteen working days after completion of test.

Report will include start-up reports, equipment test data and drawings to coincide with the test report. In addition, all reports shall incorporate a summary page(s) which shall include:

1. General description of project (building type, system type, equipment description, etc.)
 2. A descriptive list of all equipment and test results (sorted building by building) which do NOT meet plans and specifications. All equipment and test data NOT listed on the above mentioned summary page(s) will be considered to perform within 10% of design requirements.
 3. Copies of reduced plan drawings that uniquely identify and cross reference air devices, VAV boxes, dampers, equipment, etc.
 4. Duct pressure test/leakage and Hydrostatic leakage test reports.
 5. Building Pressure tables, design and actual.
 6. Start-up reports.
 7. Inspection reports.
- D. The Owner reserves the right to provide verification of the test and balance reports and such verification shall be by a second independent agency. Reports found to be inaccurate will be disallowed and the test and balance agency will be required to repeat operations under the supervision of the second independent agency until accurate reports are completed and agreed upon. The cost of initial checking will be borne by the Owner, unless the initial report is found to be inaccurate. In such case, the costs of the verification test and balance and all subsequent costs of supervision in order to secure acceptable reports will be borne by the test and balance agency.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 – EXECUTION

3.1 CONTRACTOR'S RESPONSIBILITIES

- A. Final testing and balancing of the HVAC systems shall be performed as specified above. It is the responsibility of the Contractor to be completely familiar with all the provisions and responsibilities of the Balancer, and to provide such certification, cooperation, and support required.
- B. The Contractor shall repair all deficiencies noted by the Balancer in a timely manner. The Balancer will notify the contractor in writing, on a daily basis, of any deficiencies discovered and Contractor will notify the Balancer immediately, in writing, upon completion of the repairs. The cost for extra re-testing by the Balancer due to un-repaired items that were certified as repaired, will be the responsibility of the Contractor. **The final testing and balancing report will contain no punch list items. All deficiencies will have been corrected prior to submission of the final report. Preliminary reports are not to be submitted to the Owner or Architect/Engineer.**
- C. The Contractor shall:
 1. Allow adequate time in the construction schedule to perform the Testing and Balancing work.

2. Notify the Balancer upon commencement of work related to the HVAC system.
3. Provide required shop drawings and equipment data.
4. Provide test openings as required for testing and balancing HVAC systems.
5. Provide updated job schedule and timely notice prior to scheduled events.
6. Provide test openings and temporary end caps or otherwise seal off ends of ductwork to permit leakage testing prior to installation of diffusers, grilles, and similar devices.
7. Make preliminary tests to establish adequacy, quality, safety, completed status, and satisfactory operation of HVAC systems and components.
8. Perform duct leakage tests, in the presence of the Balancer, on all supply, return, outside air make-up, and exhaust air systems.
9. Within the intent of the contract documents, provide, at the request of the Balancer, all equipment, material, supplies, workmen, and supervisions necessary to provide a satisfactory, operating system.
10. During the test and balance period, operate all HVAC equipment as necessary to permit systems to be tested and balanced as fully operating, functional systems.
11. Work harmoniously with the Balancer, providing all courtesies normally extended to professional consultants.
12. Perform all work necessary to make ceiling plenums air-tight and functional.
13. Remove and replace ceilings as necessary to permit test and balance operations.
14. Remove and replace equipment, lights, or other items which obstruct testing and balancing operations. Where equipment, lights, or other items will interfere with future adjustments of the HVAC system, such equipment, lights, or other items shall be relocated by the Contractor, as directed by the Architect.
15. Provide completed start-up forms on each piece of equipment.
16. Replace belts and drives as required for proper balancing. Drives shall be adjusted and aligned by the Contractor to prevent abnormal belt wear and vibration.
17. Adjust fan speed as required not to exceed RFLA of motor.
18. Open all manually adjustable dampers and test dampers for smooth, vibration-free operation.
19. Verify that all controls are installed and operating in accordance with the sequence of operations.
20. Before requesting final testing and balancing, submit signed statement that HVAC systems are installed, adjusted, fully lubricated, operating satisfactorily, and are ready for use.

3.2 BALANCER'S RESPONSIBILITIES

- A. Air Balance: The Balancer shall perform the following tests, and balance system in accordance with the following requirements:
 1. Record minimum data required by AABC and NEBB forms.
 2. Test and adjust fan rpm to design requirements.
 3. Test and record motor full load amperage/voltage and operating amperage/voltage.

4. Make pitot tube traverse of main supply, return, OA and exhaust ducts and obtain design cfm at fans. The air flow in rectangular duct shall be traversed and measured using the log-Tchebycheff method and round duct shall be measured with the log- Linear method (a.k.a. log-Tchebycheff), no exceptions. Refer to the AABC's 1989 National Standards Manual Chapter 8; NEBB's latest Procedural Standards, Section 10; and ASHRAE's 1997 Fundamentals Handbook Chapter 14.
 5. Test and adjust system for design cfm recirculated air.
 6. Test and adjust system for design cfm outside air.
 7. Test and record system static pressure profile.
 8. Adjust all main supply and return air ducts to proper design cfm.
 9. Adjust all zones to proper design cfm, supply, return, and exhaust.
 10. Adjust all VV terminals to design minimum, maximum and/or heat cfm and record controller setpoint.
 11. Provide suggestion/corrective measures pertaining to performance related issues.
 12. Test and adjust each diffuser, grille, and register to within 10% of design requirements.
 13. Each grille, diffuser, and register shall be identified as to the location, areas and system.
 14. Test and adjust fan to within 100%-110% of design.
 15. Traverse ducts as required. Seal test holes through the duct access panel with flat head bolts inserted from inside of duct.
- B. Size, AK catalog factors of diffusers, grilles, registers, and all tested equipment shall be identified and listed.
- C. Readings and test of diffusers, grilles, and registers shall include required fpm velocity and test resultant velocity, required cfm, and and test resultant cfm after adjustments. When direct cfm measuring instruments are used, velocities are not required.
- D. In cooperation with the controls contractor, set adjustments of automatically operated dampers to operate as specified, indicated, and / or noted.
- E. Check all controls for proper calibrations, and list all controls requiring adjustment by controls installers.
- F. All diffusers, grilles, and registers shall be adjusted to minimize drafts in all areas.
- G. Advise Contractor in writing of all ductwork that should be repaired to reduce air leakage.
- H. Water Balance: The Balancer shall prepare the water systems for balancing in the following manner:
1. Open all valves to full open position. Close all bypass valves. Set modulating valve to full coil flow.
 2. Check all strainers where gauge taps are provided, and if required, direct Contractor to clean same.

3. Examine water in system and determine if the water has been treated and cleaned. If water has mud or other entrained matter, test and balance work shall stop and Contractor shall clean system as specified in other sections of Division 15.
 4. Check pump rotation.
 5. Check expansion tanks to determine that they are not air-bout and that the system is completely full of water.
 6. Check all air vents at high points of water systems and determine all are installed and operating freely.
 7. Check coils for counterflow or parallel flow as called for by design.
 8. Set all temperature controls so all coils are calling for full cooling or heating. This should close all automatic bypass valves at coils.
 9. Check operation of automatic bypass valves.
 10. Check and have control contractor set operating temperatures of chillers / boilers to design requirements.
 11. Complete air balance must have been accomplished before actual water balance is complete.
- I. Chilled Water/Hot Water:
1. Set pumps to 100%-110% of design flow.
 2. Adjust flow of water through chillers / boilers.
 3. Check leaving water temperatures and return water temperature through chillers / boilers. Reset to correct design temperatures.
 4. Check water temperature at inlet side of coils.
 5. Proceed to balance each water coil. Upon completion of flow readings and adjustments at coils, mark all settings and record data.
 6. After adjustments to coils are made, recheck settings at the pumps and chillers / boilers, and readjust if required.
 7. All flow devices to be balanced to within +10% of design.
 8. Record and check the following items at each cooling / heating element:
 - a. Test and record entering air temperature (DB heating and cooling).
 - b. Test and record entering air temperatures (WB cooling).
 - c. Test and record leaving air temperatures (DB heating and cooling).
 - d. Test and record leaving air temperatures (WB cooling).
 - e. Entering and leaving water temperature.
 - f. Pressure drop of each coil or vessel.
 - g. Calculate gpm.
 - h. Calculate total cooling and heating coil capacities.
 - i. If test conditions are not within design tolerance, then convert the test conditions to design conditions, or re-test when conditions are closer to design (i.e. opposite season test).
- J. Chiller Performance Test: Test chiller in accordance with ARI Standard 83-550.
- K. Cooling Tower Performance Test: test cooling towers in accordance with CTI Code ATC- 105.
- L. Record The Dry Bulb Temperature in each space and in addition, record a wet bulb temperature at each thermostat or sensor.

- M. Deficiencies: All deficiencies shall be noted by the Balancer in a field report and submitted to Contractor and the Architect on a daily basis. All deficiencies will be uniquely numbered and tracked.
- N. Upon correction of deficiencies, the Contractor shall notify the Balancer in writing that the problem is resolved. If any deficiencies are not corrected, the Contractor will be responsible for the cost of additional re-testing.
- O. Equipment: All information required as shown, but not limited to, shall be compiled in a neat, orderly, itemized format on 8½" x 11" test forms. The following data shall be submitted to the Contractor, for distribution to the Architect/Engineer and Owner. This data is the minimum required data except where specified standard (i.e. AABC) requires additional data. In addition, any HVAC equipment specified for the project, but not indicated below, is required per AABC form.
- P. Air Handlers, Fan Coils, And Duct-mounted Coils:
1. Mark number
 2. Unit manufacturers and model number
 3. Total supply air cfm and rpm - specified and actual
 4. Return air cfm - specified and actual
 5. Outside air cfm - specified and actual
 6. Unit static pressure profile, including total fan static
 7. Specified total and external static pressure
 8. Water gpm flow, coil pressure drop, and entering and leaving temps - specified and actual
 9. Coil - entering and leaving air DB/_F and WB/_F - specified and actual
 10. Outside air DBF and WBF at time of test
 11. Voltage, phase, and cycle specified load conditions
 12. Hand calculations of the BTU_h at test conditions of Total cooling, Latent cooling and Sensible cooling.
 13. Btu per hour when converted to specified load conditions gpm by means of heat transfer test
- Q. Pumps:
1. Mark number
 2. Manufacturer and model number
 3. gpm flow - specified and actual
 4. Shut-off head
 5. Pump heat and full load amperage - specified and actual
 6. Motor hp - specified and actual
 7. Voltage, phase, and cycles - specified and actual
- R. Fans:
1. Mark number
 2. Manufacturer and model number
 3. Total cfm supply and rpm - specified and actual
 4. Static pressure (discharge static - suction static)
 5. Full load amperage - specified and actual
 6. Voltage, phase, and cycles - specified and actual

- S. Air Devices (grilles, Registers, Diffusers, and Louvers):
 - 1. Mark number
 - 2. Room number
 - 3. cfm - specified and actual
 - 4. Size
 - 5. Effective area
 - 6. Velocity FPM - specified and actual

- T. Chiller:
 - 1. Mark number
 - 2. Unit manufacturer and model number
 - 3. Total chilled water and condenser water gpm - specified and actual
 - 4. Chilled water entering and leaving temperature - specified and actual - one hour log
 - 5. Cooler and condenser pressure drop - specified and actual
 - 6. Compressors full load amperage - specified and actual
 - 7. Voltage, phase, and cycle - specified and actual
 - 8. Ambient temperature, DB/WB, time of day, and weather conditions at time of test
 - 9. Cooler tons, condenser tons, and operating kW compared to specified conditions

- U. Air Monitor:
 - 1. Mark number
 - 2. Unit manufacturer and model number
 - 3. Duct size/monitor size factor
 - 4. cfm - specified and actual.
 - 5. velocity or velocity pressure

- V. Water Flow Stations:
 - 1. Mark number.
 - 2. Unit manufacturer and model number.
 - 3. Size.
 - 4. GPM specified and actual.
 - 5. Pressure drop and setting.

END OF 15300

SECTION 15701 AIR COOLED CHILLER

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, other specification sections and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Provide Microprocessor controlled, multiple-scroll compressor, air-cooled, liquid chillers of the scheduled capacities as shown and indicated on the Drawings, including but not limited to:
 - 1. Chiller package with ZERO Ozone Depletion Potential Refrigerant R-410A
 - 2. Electrical power and control connections
 - 3. Chilled water connections
 - 4. Factory start-up
 - 5. Charge of refrigerant and oil.

1.3 SUBMITTALS

- A. Submit shop drawings indicating components, assembly, dimensions, weights and loadings, required clearances, and location and size of field connections. Indicate valves, strainers, and thermostatic valves required for complete system.
- B. Submit product data indicating rated capacities, weights, specialties and accessories, electrical requirements, wiring diagrams, and part load curves.
- C. Submit written certification that components of package not furnished by manufacturer have been selected in accordance with manufacturers requirements.
- D. Submit manufacturer's installation instructions. The Manufacturer shall review the contract drawings for space requirements, and state any modifications required for clearances, piping, electrical, and controls.

1.4 OPERATION AND MAINTENANCE DATA

- A. Submit operations data, include start-up instructions, maintenance data, parts lists, controls, and accessories. Include troubleshooting guide.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Units shall be delivered to job site fully assembled and charged with refrigerant and oil

by the Manufacturer.

- B. Units shall be stored and handled per Manufacturer's instructions.
- C. Protect the chiller and its accessories from the weather and dirt exposure during shipment.
- D. During shipment, provide protective covering over vulnerable components. Fit nozzles and open ends with plastic enclosures.

1.6 WARRANTY

- A. Provide five (5) year warranty on the motor compressor assembly along with a one (1) year warranty on parts and labor for the entire machine.
- B. The Manufacturer shall be responsible for the chiller installation to conform to recommended requirements for operating accessibility and maintenance. The Manufacturer shall also provide an authorized factory representative for initial start-up of the machine.

1.7 MAINTENANCE SERVICE

- A. The Manufacturer shall provide two (2) operating inspections the first year.

1.8 QUALITY ASSURANCE

- A. Products shall be Designed, Tested, Rated and Certified in accordance with, and installed in compliance with applicable sections of the following Standards and Codes:
 - 1. ANSI/ASHRAE Standard 15 – Safety Code for Mechanical Refrigeration
 - 2. ASHRAE 90.1 – Energy Efficiency compliance.
 - 3. ANSI/NFPA Standard 70 – *National Electrical Code (NEC)*.
 - 4. ASME Boiler and Pressure Vessel Code, Section VIII, Division 1.
 - 5. ARI Standard 550/590 – Positive Displacement Compressors and Air Cooled Rotary Screw Water-Chilling Packages.
 - 6. Conform to Intertek Testing Services, formerly ETL, for construction of chillers and provide ETL/cETL Listing label.
 - 7. Manufactured in facility registered to ISO 9002.
 - 8. OSHA – Occupational Safety and Health Act
- B. Factory Test: Chiller shall be pressure-tested, evacuated and fully charged with refrigerant and oil, and shall be factory operational run tested with water flowing through the vessel.

- C. Chiller manufacturer shall have a factory trained and supported service organization that is within a 50 mile radius of the site.

PART 2 — PRODUCTS

2.1 CHILLER MATERIALS AND COMPONENTS

- A. General: Install and commission, as shown on the schedules and plans, factory assembled, charged, and tested air cooled scroll compressor chiller(s) as specified herein. Chiller shall be designed, selected, and constructed using a refrigerant with Flammability rating of “1”, as defined by ANSI/ASHRAE STANDARD - 34 Number Designation and Safety Classification of Refrigerants. Chiller shall include, but is not limited to: a complete system with a single refrigerant circuit 35 tons (123kW) and below, and not less than two refrigerant circuits above 35 tons (123kW), scroll compressors, direct expansion type evaporator, air-cooled condenser, refrigerant, lubrication system, interconnecting wiring, safety and operating controls including capacity controller, control center, motor starting components, and special features as specified herein or required for safe, automatic operation.
- B. Cabinet: External structural members shall be constructed of heavy gage, galvanized steel coated with baked on powder paint which, when subjected to ASTM B117, 1000 hour 5% salt spray test, yields minimum ASTM 1654 rating of “6”.
- C. Service Isolation valves: Service discharge (ball type) isolation valves are added to unit per system. This option also includes a system high-pressure relief valve in compliance with ASHRAE15. (Factory-mounted.)
- D. Pressure Transducers and Readout Capability
 - 1. Discharge Pressure Transducers: Permits unit to sense and display discharge pressure.
 - 2. Suction Pressure Transducers: Permits unit to sense and display suction pressure.

2.2 COMPRESSORS

Compressors: Shall be hermetic, scroll-type, including:

- 1. Compliant design for axial and radial sealing
- 2. Refrigerant flow through the compressor with 100% suction cooled motor.
- 3. Large suction side free volume and oil sump to provide liquid handling capability.
- 4. Compressor crankcase heaters to provide extra liquid migration protection.
- 5. Annular discharge check valve and reverse vent assembly to provide low

pressure drop, silent shutdown and reverse rotation protection.

6. Initial Oil charge.
7. Oil Level sightglass.
8. Vibration isolator mounts for compressors.
9. Brazed-type connections for fully hermetic refrigerant circuits.
10. Compressor Motor overloads capable of monitoring compressor motor current. Provides extra protection against compressor reverse rotation, phase-loss and phase imbalance

2.3 REFRIGERANT CIRCUIT COMPONENTS

Each refrigerant circuit shall include: liquid line shutoff valve with charging port, low side pressure relief device, filter-drier, solenoid valve, sight glass with moisture indicator, thermostatic expansion valves, and flexible, closed-cell foam insulated suction line and suction pressure transducer.

2.4 HEAT EXCHANGERS

A. Evaporator:

1. Direct expansion type with refrigerant inside high efficiency copper tubes, chilled liquid forced over the tubes by galvanized steel baffles.
2. Constructed, tested, and stamped in accordance with applicable sections of ASME pressure vessel code for minimum 450 psig (3103 kPa)refrigerant side design working pressure and150 PSIG (1034 kPa) water side design working pressure.
3. Shell covered with ¾" (19mm), flexible, closed cell insulation, thermal conductivity of 0.26k ([BTU/HR-Ft²-°F]/in.) maximum. Water nozzles with grooves for mechanical couplings, and insulated by Contactor after pipe installation.

B. Air Cooled Condenser

1. Coils. Condenser coils are made of a single material to avoid galvanic corrosion due to dissimilar metals. Coils and headers are brazed as one piece. Integral sub cooling is included. The design working pressure of the coil is 650 PSIG(45 bar).
2. Low Sound Fans Shall be dynamically and statically balanced, direct drive, corrosion resistant glass fiber reinforced composite blades molded into a low noise, full-airfoil cross section, providing vertical air discharge and low sound. Each fan in its own compartment to prevent cross flow during fan cycling. Guards of heavy gage, PVC (polyvinylchloride) coated or galvanized steel.

3. Fan Motors: High efficiency, direct drive, 6 pole, 3 phase, insulation class "F", current protected, Totally enclosed Air-Over (TEAO), rigid mounted, with double sealed, permanently lubricated, ball bearings.

2.5 CONTROLS

- A. General: Automatic start, stop, operating, and protection sequences across the range of scheduled conditions and transients.
- B. Microprocessor Enclosure: Rain and dust tight NEMA 3R/12 (IP55) powder painted steel cabinet with hinged, latched, and gasket sealed door.
- C. Microprocessor Control Center:
 1. Automatic control of compressor start/stop, anti-coincidence and anti-recycle timers, automatic pumpdown shutdown, condenser fans, evaporator pump, evaporator heater, unit alarm contacts, and chiller operation from 0°F to 125°F (-18°C to 52°C) ambient. Automatic reset to normal chiller operation after power failure.
 2. Software stored in non-volatile memory, with programmed setpoints retained in lithium battery backed real time clock (RTC) memory for minimum 5 years.
 3. Forty character liquid crystal display, descriptions in English (or Spanish, French, Italian, or German), numeric data in English (or Metric) units. Sealed keypad with sections for Setpoints, Display/Print, Entry, Unit Options & clock, and On/Off Switch.
 4. Programmable Setpoints (within Manufacturer limits): display language; chilled liquid temperature setpoint and range, remote reset temperature range, set daily schedule/holiday for start/stop, manual override for servicing, low and high ambient cutouts, number of compressors, low liquid temperature cutout, low suction pressure cutout, high discharge pressure cutout, anti-recycle timer (compressor start cycle time), and anti-coincident timer (delay compressor starts).
 5. Display Data: Return and leaving liquid temperatures, low leaving liquid temperature cutout setting, low ambient temperature cutout setting, outdoor air temperature, English or metric data, suction pressure cutout setting, each system suction pressure, discharge pressure (optional), liquid temperature reset via a YORK ISN DDC or Building Automation System (by others) via a 4-20milliamp or 0-10 VDC input with optional BAS interface, anti-recycle timer status for each compressor, anti-coincident system start timer condition, compressor run status, no cooling load condition, day, date and time, daily start/stop times, holiday status, automatic or manual system lead/lag control, lead system definition, compressor starts/operating hours (each), status of hot gas valves, evaporator heater and fan operation, run permissive status, number of compressors running, liquid solenoid valve status, load & unload timer status, water pump status.
 6. System Safeties: Shall cause individual compressor systems to perform auto

shut down; manual reset required after the third trip in 90 minutes. Includes: high discharge pressure, low suction pressure, high pressure switch, and motor protector. Compressor motor protector shall protect against damage due to high input current or thermal overload of windings.

7. Unit Safeties: Shall be automatic reset and cause compressors to shut down if low ambient, low leaving chilled liquid temperature, under voltage, and flow switch operation. Contractor shall provide flow switch and wiring per chiller manufacturer requirements.
8. Alarm Contacts: Low ambient, low leaving chilled liquid temperature, low voltage, low battery, and (per compressor circuit): high discharge pressure, and low suction pressure.

- D. Manufacturer shall provide any controls not listed above, necessary for automatic chiller operation. Mechanical Contractor shall provide field control wiring necessary to interface sensors to the chiller control system.

2.6 POWER CONNECTION AND DISTRIBUTION

A. Power Panels:

1. NEMA 3R/12 (IP55) rain/dust tight, powder painted steel cabinets with hinged, latched, and gasket sealed outer doors. Provide main power connection(s), control power connections, compressor and fan motor start contactors, current overloads, and factory wiring.
2. Power supply shall enter unit at a single location, be 3 phase of scheduled voltage, and connect to individual terminal blocks per compressor. Separate disconnecting means and/or external branch circuit protection (by Contractor) required per applicable local or national codes.

- B. Compressor, control and fan motor power wiring shall be located in and enclosed panel or routed through liquid tight conduit.

2.7 ACCESSORIES and OPTIONS

- A. Microprocessor controlled, Factory installed Across the-Line type compressor motor starters as standard.

B. Outdoor Ambient Temperature Control

High Ambient Control (Factory Mounted): Permits unit operation above 115°F ambient.

C. Power Supply Connections:

Single point terminal Block with Circuit Breaker and lockable external handle (in compliance with Article 44014 of N.E.C.) can be supplied to isolate power voltage for servicing. Incoming power wiring must comply with the National Electric Code and/or local codes.

- D. Control Power Transformer:

Converts unit power voltage to 120-1-60 (500 VA capacity). Factory-mounting includes primary and secondary wiring between the transformer and the control panel.
- E. Condenser Coil Environmental Protection:

Post-Coated Dipped: Dipped-cured coating on condenser coils for seashore and other corrosive applications (with the exception of strong alkalis, oxidizers, and wet bromine, chlorine and fluorine in concentrations greater than 100ppm).
- F. Flow Switch (Field-mounted): Vapor proof SPDT, NEMA 4X switch (150 PSIG), -20°F to 250°F.
- G. Service Isolation valves: Service suction and discharge (ball type) isolation valves are added to unit per system. This option also includes a system high pressure relief valve in compliance with ASHRAE15. (Factory-mounted.)
- H. Hot Gas By-Pass: Permits continuous, stable operation at capacities below the minimum step of unloading to as low as 5% capacity (depending on both the unit & operating conditions) by introducing an artificial load on the cooler. Hot gas by-pass is installed on only one refrigerant circuit.
- I. Building Automation System (EMS) Reset Interface: Chiller to accept 4 to 20mA, 0 to 10 VDC, input to reset the leaving chilled liquid temperature.
- J. Vibration Isolation (Field-mounted): 1 Inch Deflection Spring Isolators: Level adjustable, spring and cage type isolators for mounting under the unit base rails.
- K. Sound Reduction (Factory-mounted):
 - 1. Provide the following options as required to meet scheduled sound levels at all points of operation:
 - a. Compressor Sound Blankets (Factory-mounted).
 - b. Low Sound fans, Low speed, reduced noise (Factory-mounted).

SOUND POWER LEVELS (In Accordance with ARI 370) – Octave Band Center Frequency, Hz										
YLAA0175HE46 (Equipped with Low Sound Fans and Acoustic Sound Blanket kit)										
Load %	Ambient (°F)	63	125	250	500	1K	2K	4K	8K	LWA
100.0	95.0	101.0	96.0	93.0	92.0	88.0	85.0	81.0	77.0	94.0
83.3	88.2	100.0	96.0	93.0	92.0	88.0	85.0	81.0	77.0	94.0
66.7	80.7	100.0	95.0	93.0	92.0	87.0	84.0	80.0	77.0	93.0
50.0	70.8	99.0	95.0	92.0	92.0	87.0	84.0	80.0	77.0	93.0
33.3	58.9	96.0	92.0	89.0	88.0	84.0	81.0	77.0	73.0	90.0
16.7	55.0	93.0	89.0	86.0	85.0	81.0	78.0	74.0	70.0	87.0

SOUND PRESSURE LEVELS in dB at 30.0 (ft.) **										
YLAA0175HE46 (Equipped with Low Sound Fans and Acoustic Sound Blanket kit)										
Load %	Ambient (°F)	63	125	250	500	1K	2K	4K	8K	dBA
100.0	95.0	74.0	69.0	66.0	65.0	61.0	58.0	54.0	50.0	67.0
83.3	88.2	73.0	69.0	66.0	65.0	61.0	58.0	54.0	50.0	67.0
66.7	80.7	73.0	68.0	66.0	65.0	60.0	57.0	53.0	50.0	66.0
50.0	70.8	72.0	68.0	65.0	65.0	60.0	57.0	53.0	50.0	66.0
33.3	58.9	69.0	65.0	62.0	61.0	57.0	54.0	50.0	50.0	63.0
16.7	55.0	66.0	62.0	59.0	58.0	54.0	51.0	47.0	47.0	60.0

** Chiller is assumed to be a point source on a reflecting (hemispherical radiation)

PART 3 – EXECUTION

3.1 INSTALLATION (RECEIVING, UNLOADING, AND INSTALLING READY FOR OPERATION AND TESTING)

- A. Install in accordance with manufacturer's instructions.
- B. Align chiller package on concrete pad.
- C. Install units on vibration isolators.
- D. Connect to electrical service.
- E. Connect to chilled water piping.
- F. Arrange piping for easy dismantling to permit tube cleaning.

3.2 MANUFACTURER'S FIELD SERVICES

- A. Assemble components shipped separately, charge oil, and refrigerant.
- B. Prepare, test, and start systems under provisions of Division 1 and Supplementary General Conditions.
- C. Supply service of factory trained representative to perform testing, dehydration and charging of machine, start-up, and instruction on operation and maintenance to Owner.
- D. Supply initial charge of refrigerant and oil, and perform application with factory trained Technicians.

3.3 DEMONSTRATION

- A. Demonstrate system operation and verify specified performance.

END OF 15701

SECTION 15726 ROOFTOP AIR HANDLING UNITS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, other specification sections and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes rooftop air handling units.

1.3 QUALITY ASSURANCE

- A. Fan Performance Ratings: Conform to AMCA 210 and bear the AMCA Certified Rating Seal.
- B. Sound Ratings: AMCA 301; tested to AMCA 300 and bear AMCA Certified Sound Rating Seal.
- C. Fabrication: Conform to AMCA 99 and ARI 430.
- D. Filter Media: ANSI/UL 900 listed, Class I, approved by local authorities.
- E. Air Coils: Certify capacities, pressure drops, and selection procedures in accordance with ARI 410.

1.4 SUBMITTALS

- A. Shop drawings shall indicate assembly, unit dimensions, weight loading, required clearances, construction details, and field connection details.
- B. Product data shall indicate dimensions, weights, capacities, ratings, fan performance, motor electrical characteristics, and gages and finishes of materials.
- C. Provide fan curves with specified operating point clearly plotted. Fan performance curve shall not be submitted in table form.
- D. Submit sound power levels for both fan outlet and casing radiation at rated capacity.
- E. Submit product data of filter media, filter performance data, filter assembly, and filter frames.
- F. Submit electrical requirements for power supply wiring including wiring diagrams for interlock and control wiring, clearly indicating factory-installed and field-installed wiring.
- G. Submit manufacturer's installation instructions.

1.5 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data.
- B. Include instructions for lubrication, filter replacement, motor and drive replacement, spare parts lists, and wiring diagrams.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in factory-fabricated protective containers, with factory-installed shipping skids and lifting lugs.
- B. Store and protect product.
- C. All indoor double wall air handlers should be stored inside. When outdoor storage is necessary, it is recommended that these guidelines be followed:

1. Select a well drained area, preferably a concrete pad or blacktop surface.
2. Place the units on a dry surface or raised off the ground to assure adequate air circulation beneath unit and to assure that no portion of the unit contacts standing water at any time.
3. Allow proper clearance around the unit to perform periodic inspection and maintenance of the equipment while in storage.
4. Keep the equipment in the original shipping container for protection and care of handling.
5. Cover the unit securely with a canvas tarp.

NOTE: Use canvas only! Do not use clear or colored plastic or plastic tarps to cover the modular climate changer. Plastic will cause condensation to form in and on the equipment. This moisture can result in corrosion damage or wet storage stains.

6. Ensure that the canvas tarp is secure.
7. Do not stack units.
8. Do not pile other material on the units.
9. Loosen belt tension on dry belts.
10. Every two weeks, rotate the fan and motor shaft thirty revolutions by hand. Check for free rotation
11. Every six months, check fan shaft bearings and grease lines. Add grease using a manual grease gun following lubrication recommendations in the periodic maintenance section.
12. Check the motor lubrications; remove and clean grease plugs, and check for the presence of moisture in the grease. If moisture is present, remove the motor and send it to an authorized repair shop for bearing inspection/replacement. If no

moisture is present, refer to the motor manufacturer's lubrication recommendation for proper lubrication.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters are in place, bearings lubricated, and fan has been test run under observation.
- B. Do not allow chilled water to flow through the unit when the unit is not operating.

1.8 SPARE MATERIALS

- A. Provide a minimum of two (2) extra sets of each type of filter specified in Paragraph 2.04, Filters. The first complete set (prefilter and final filter) shall be used throughout the duration of construction from the time of initial start-up until Final Completion. At the time of Substantial Completion, the second set of filters shall be installed. At the time of the Final Completion Walk-through, provide a clean set of filters so that the project is turned over with clean filters.

PART 2 – PRODUCTS

2.1 GENERAL

- A. The Contractor shall furnish and install the modular air handling unit(s) as shown and scheduled on the plans. The units shall be installed in strict accordance with the specifications. Unit shall be complete with fan section, heating and cooling coil section, access section, filter with pre-filter section/mixing box, and all accessories specified (refer to drawings).

2.2 UNIT CASING

- A. Unit shall be specifically designed for outdoor applications.
- B. Casing leakage shall not exceed 1% of design CFM at $\pm 8''$ static pressure differential across casing.
- C. Panel deflection shall not exceed $L/240$ at $\pm 8''$ static pressure differential across casing.
- D. Unit casing shall consist of a structural frame with insulated roof, wall, and floor panels.
- E. Removal of wall panels shall not affect structural integrity of units.
- F. Unit shall have double wall, 2'' insulated panels for walls, roof, and floor. Exterior skin will be galvanized and painted sheet steel, color as selected by Architect. Individual segments shall have galvanized sheet steel, stainless sheet steel, or perforated galvanized interior liner, as described in performance specifications.

1. Provide panels with optional perforated liner in the fan section and other sections as shown on the drawings. Interior liner will be perforated galvanized. Minimum perforated panel thermal resistance (R-Value) will be $R11 \text{ hr-ft}^2\text{-}^\circ\text{F}/\text{BTU}$.
 - G. Unit roof shall be double-sloped with a longitudinal peak and a minimum pitch of 1/4" per foot.
 1. Roof load capacity shall be at least $50 \text{ lb}/\text{ft}^2$.
 2. Roof shall overhang unit perimeter by a minimum of 1-1/2".
 - H. Floor panels shall be double wall construction, designed to provide at most L/240 deflection when subjected to a 300 lb. load at mid-span.
 - I. Unit casing shall be insulated with spray injected foam to achieve thermal resistance of $R13 \text{ hr-ft}^2\text{-}^\circ\text{F}/\text{BTU}$.
 1. Insulation application shall meet the requirements of NFPA 90A.
 2. Drain pan shall be stainless steel double wall with an insulation R-value of 6.25 $\text{hr-ft}^2\text{-}^\circ\text{F}/(\text{BTU-in})$.
 - J. Double wall access doors shall be provided on sections for access.
 1. Provide stainless steel hinges to permit a 180° door swing.
 2. Access door shall be of the same material type as exterior/interior casing.
 3. Access door latches shall use a roller cam latching mechanism.
 - K. Drain pans shall comply with the guidelines of ASHRAE 62.
 1. Drain pans shall be double sloped at least 1/8" per foot, and have no horizontal surfaces.
 2. Drain connection material shall be the same as drain pan.
 3. Drain pans shall drain to one point.
 4. Drain connections shall be welded to drain pans
 5. Drain pans shall have at least 1" clearance between pan and coil supports.
- 2.3 FANS
- A. Fans will be Class I, II, or III, as required to meet selected RPM and horsepower shown in performance specifications.
 - B. Fans shall be SWSI (plenum).
 - C. Fans shall bear the AMCA Seal.
 - D. Fans shafts shall be polished steel and sized such that the first critical speed will be at least 125% of the maximum operating speed for the fan pressure class. Shaft shall be coated with an anti-corrosion coating.
 - E. Fan and motor assembly shall be internally mounted on a common base. Fan and motor base shall be spring isolated on a full width isolator support channel.
 1. Fan motor shall be on an adjustable base.
 2. Access doors shall be provided.

2.4 BEARINGS AND DRIVES

- A. Fan bearings shall have average life (L50) of at least 200,000 hours. Bearing fatigue life ratings shall comply with ANSI/AFBMA 9.
- B. Fan drives will be selected for a 1.5 service factor and will be furnished with anti-static belts.
 - 1. Drives shall be fixed pitch.
 - 2. Sheaves will be machined from close grain cast iron and statically balanced.
 - 3. Drive belts will be V type, precision molded, raw edge construction, anti-static, oil and heat resistant.

2.5 ELECTRICAL MOTORS

- A. Fan motors will be built in accordance with the latest NEMA and IEEE standards.
- B. Fan motors comply with ASHRAE Standard 90.1.
- C. Fan motors will be furnished in sizes, electrical power and starting characteristics as shown in performance specifications.
 - 1. Fan motors will be rated for continuous, full load duty at 104°F (40°C) ambient temperature and 1.15 service factor.
 - a. Exception: 1.5 hp and 3 hp, dual voltage (230/460V), 900 RPM, TEFC motors will have a 1.0 service factor.
 - 2. Fan motors will be NEMA design ball bearing type.
 - a. Direct drive plenum fans will be coupled with motors that closely match required fan RPM.
 - 3. Fan motors will meet, at a minimum, NEMA high efficiency standards.
 - 4. Motors will be suitable for use with variable frequency drives, per NEMA MG-1 Part 30.

2.6 FAN VARIABLE FREQUENCY DRIVES

- A. Variable frequency drives shall be provided (factory mounted and wired to motor) with units.
- B. VFD's shall be UL or ETL listed and comply with applicable provisions of the National Electric Code. Refer to VFD Schedule on Drawings for additional requirements.
- C. VFD's shall be housed in a dedicated, weather resistant compartment exterior to the unit.

2.7 COOLING COILS

- A. Cooling coil segments shall have a full-width IAQ drain pan that extends at least 6" downstream of the last coil in the section.
- B. Coils shall be removable from the side of unit, via removing no more than one AHU panel.

- C. Coils shall have frames constructed of galvanized steel.
- D. Cooling coils with finned height greater than 48" shall have an intermediate drain pan with downspout to drain condensate to main drain pan. Intermediate drain pan material shall be stainless steel.
- E. Coil bulkheads and blank-offs shall prevent air from bypassing coils.
- F. Coil connections shall be extended through unit casing.
- G. Coils shall have a 1/4" FPT plugged vent or drain tap on each connection that is accessible from outside the unit.
- H. Spool shaped coil grommets shall be provided to insulate and seal coil penetrations.
- I. Coils shall be designed to operate at 250 psig and up to 300° F and shall be factory tested with 325 psig compressed air under water.
- J. Coil tubes shall be mandrel expanded to form fin bond and burnished, work-hardened interior surface.
- K. Coil fins shall be die-formed, continuous, and have fully drawn collars to accurately space fins, and form a protective sheath for tubes.

2.8 FILTERS

- A. Filter tracks/frames shall be an integral part of the unit.
- B. Filter types, nominal sizes, efficiencies, and performance characteristics shall be as scheduled.
- C. Filter access shall be provided via access doors on filter segments or adjacent segments as required by filter loading scheme.

2.9 DAMPERS

- A. Dampers shall be factory installed.
- B. Dampers shall have airfoil blades with extruded vinyl edge seals and flexible metal compressible jamb seals.
- C. Dampers will have a maximum leakage rate of 4 CFM/square foot at 1" w.g. and comply with ASHRAE 90.1.
- D. Maximum damper torque requirement shall be 7 in. lbs./ft².
- E. Damper blades will be parallel acting unless submitted otherwise.
- F. Dampers shall be capable of stable control of outside air from 30% to 130% of scheduled OA values.

2.10 AIR FLOW MONITORING STATIONS

- A. Airflow monitoring stations shall be provided on outside air inlets.
- B. Airflow monitoring stations shall bear the AMCA Certified Ratings Seal for Airflow Measurement Performance.
- C. Airflow monitoring station dampers shall comply with leakage rates per ASHRAE 90.1.
- D. Airflow monitoring stations will be accurate within 5% of actual airflow between 350 FPM and 2000 FPM free area velocity. Manufacturer shall select airflow monitoring stations at 1200 FPM for the scheduled OA values, unless the Manufacturer's experience and expertise directs it otherwise. Monitors shall be capable of measuring outdoor air from 30% to 130% of scheduled OA values.
- E. Outdoor air intake openings with air flow monitoring stations shall have rain louver.
 - 1. Louver shall be a wind-driven rain penetration class A louver.
 - 2. Louver effectiveness ratio will be 100% at the following conditions:
 - a. Wind velocity, 29 mph into louver.
 - b. Rain fall rate, 3 in./hr.
 - c. Free area air velocity, 1500 FPM.

2.11 ROOF CURBS

- A. Roof curbs shall be furnished with rooftop units.
- B. Roof curbs shall be insulated, galvanized steel and support the perimeter of units, including pipe chases and shall allow for transition of existing ductwork to new rooftop units. Manufacturer's representative shall field verify existing duct dimensions.
- C. Roof curbs shall have a wood nailing strip.

2.12 APPURTENANCES

- A. Safety grates capable of supporting a 300 lb. load shall be provided over bottom openings.
- B. Base rails suitable for rigging and lifting will be provided
- C. Lifting lugs shall be provided where required for proper lifting.

2.13 FINISHES

- A. External unit surfaces will be factory cleaned prior to finishing or shipping.
- B. Unit shall be painted to match existing roof color, coordinate color with Architect.
 - 1. Painted units shall be prime-coated prior to painting.
 - 2. Painted unit shall exceed 500-hour salt spray test, with (5%) solution, without any sign of red rust when tested in accordance with ASTM B-117.

2.14 TESTS AND INSPECTIONS

- A. Fan skid will be run-balanced at specified speed to insure smooth, operation.
 - 1. Constant volume fan assemblies will be balanced at design RPM.
 - 2. Variable volume fan assemblies will be balanced from 10% to 100% of design RPM.
 - 3. Filter-in measurements will be taken in horizontal and vertical axes on drive and opposite-drive sides of fan shafts.
 - 4. Constant speed fan vibration limits: filter-in measurements will not exceed 4 mils.
 - 5. Variable speed fan vibration limits: filter -in measurements will not exceed 7 mils.

- B. Unit wiring with voltage greater than 30Vac will be hipot tested prior to shipping.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions and in conformance with ARI 430.

- B. The manufacturer shall make provisions for the air handlers to be field assembled, if required. The cost of assembly shall be included as a basic part of this project.

- C. The Contractor shall make condensate drain connections at all drain pan pipe fittings furnished with the unit and manifold them to a single condensate trap, then slope/pipe to room floor drain. The condensate drain shall be configured and dimensioned to remove all condensate from the drain pan in accordance with the manufacturer's recommended dimensional formula. The dimensional data shown on the drawing details should be used as a guide only. The installed trap shall have a minimum 4 inch height differential between the unit drain connection and trap discharge.

- D. Provide coil piping insulation flush and tight against side of unit. Provide a bead of caulk to insure the integrity of vapor seal.

- E. Seal any penetration in unit caused by cutting casing or mounting devices to unit.

END OF 15726

SECTION 15727 BLOWER COIL AIR HANDLING UNITS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, other specification sections and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes indoor blower coil air handling units.

1.3 QUALITY ASSURANCE

- A. Fan Performance Ratings: Conform to AMCA 210 and bear the AMCA Certified Rating Seal.
- B. Sound Ratings: AMCA 301; tested to AMCA 300 and bear AMCA Certified Sound Rating Seal.
- C. Fabrication: Conform to AMCA 99 and ARI 430.
- D. Filter Media: ANSI/UL 900 listed, Class I, approved by local authorities.
- E. Air Coils: Certify capacities, pressure drops, and selection procedures in accordance with ARI 410.
- F. Air Handling Units: Product of manufacturer regularly engaged in production of components who issues complete catalog data on total product.

1.4 SUBMITTALS

- B. Shop drawings shall indicate assembly, unit dimensions, weight loading, required clearances, construction details, and field connection details.
- C. Product data shall indicate dimensions, weights, capacities, ratings, fan performance, motor electrical characteristics, and gages and finishes of materials.
- D. Provide fan curves with specified operating point clearly plotted. Fan performance curve shall not be submitted in table form.
- E. Submit sound power levels for both fan outlet and casing radiation at rated capacity.
- F. Submit product data of filter media, filter performance data, filter assembly, and filter frames.

- G. Submit electrical requirements for power supply wiring including wiring diagrams for interlock and control wiring, clearly indicating factory-installed and field-installed wiring.
- H. Submit manufacturer's installation instructions.

1.5 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data under provisions of Division 1.
- B. Include instructions for lubrication, filter replacement, motor and drive replacement, spare parts lists, and wiring diagrams.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Division 1 in factory-fabricated protective containers, with factory-installed shipping skids and lifting lugs.
- B. Store and protect products under provisions of Division 1.
- C. Store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters are in place, bearings lubricated, and fan has been test run under observation.

1.8 SPARE MATERIALS

- A. Provide one extra set of each type of filter.

PART 2 – PRODUCTS

2.1 CASING

- A. Casings (structural components) shall be constructed of 18 gauge galvanized steel, insulated with one-inch, foil faced, 1½ pound density, fire resistant and odorless glass fiber material to provide thermal and acoustical insulation. Fan housing sides are directly attached to the air handler top and bottom panels, strengthening the entire unit assembly. Internal coils are directly attached to the rear mounting lugs. Coil access panels are located on both sides of the air handler and allow easy removal of the internal coil and drain pan. Main access panels provide generous access to the fan, motor, and drive from both sides of air handler.

2.2 FILTERS

- A. Provide two-inch, pleated, standard efficiency (30%) filters on all units. Units shall have a standard flat filter rack that is sized for less than 500 fpm at nominal airflow. All units and filter racks shall use standard filter sizes.

2.3 FANS

- A. Fans shall be forward curved, centrifugal blower type equipped with heavy-duty, adjustable speed, V-belt drive. The fan shaft shall be supported by heavy-duty, permanently sealed ball bearings. All fans shall be dynamically balanced. All air handlers have a single fan.

2.4 MOTORS AND DRIVES

- A. All standard motors shall be open drip-proof with permanently sealed ball bearings, internal current and thermal overload protection, a minimum 1.15 service factor, and 56 frame resilient bases. Motors shall be factory installed and wired to the air handler junction box and voltage scheduled.
- B. Drives shall be variable pitch, suitable for adjustment within five percent of specified rpm. Drives shall be selected at 1.2 service factor.

2.5 COILS

- A. Main coils shall be designed for chilled water. Coils shall use high efficiency aluminum fins which are mechanically bonded to ½ inch OD seamless copper tubes. All coils shall be specifically designed and circuited for water use. All coils shall be factory tested with 450 psi air under water. Sweat type connections shall be standard.

2.6 DRAIN PAN

- A. The drain pan shall be plastic and fully drainable. The drain pan shall be removable for cleaning.

2.7 ELECTRIC HEATER

- A. Factory provided and mounted, UL recognized, resistance open-wire heater with a disc-type automatic thermal primary safety device. Provide single point power connection to the unit. Provide mercury contactors, line fuses, and a door interlocking disconnect switch.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions and in conformance with ARI 435.
- B. Install unit on vibration isolators.

END OF 15727

SECTION 15740 ELECTRIC DUCT HEATERS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, other specification sections and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes electric duct heaters.

1.3 QUALITY ASSURANCE

- A. Fabrication: Conform to applicable standards.
- B. Air Coils: Certify capacities, pressure drops, and selection procedures in accordance with ARI 410.

1.4 SUBMITTALS

- B. Shop drawings to indicate assembly, unit dimensions, weight loading, required clearances, construction details, and field connection details.
- C. Product data shall indicate dimensions, weights, capacities, ratings, and gages and finishes of materials.
- D. Submit manufacturer's installation instructions.

1.5 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Do not operate units for any purpose, temporary or permanent, until ductwork is clean and controls have been tested.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Indeeco.
- B. Markel.
- C. Warren.

2.2 GENERAL

- A. The Contractor shall furnish and install the duct mounted electric heaters as shown and scheduled on the plans. The electric duct heaters shall be installed in strict accordance with the specifications. Unit shall be complete with controls, wiring, fuses, safety devices, control panels, thermostats, etc., as required for a complete and operating system.

2.3 ELECTRIC DUCT HEATERS

- A. Heaters and panelboards shall meet the requirements of the National Electrical Code and shall be listed by Underwriter's Laboratories for zero clearance to combustible surfaces and for use with heat pumps and air conditioning equipment.
- B. Heating elements shall be open coil, 80% nickel, 20% chromium, type A resistance wire. Type C alloys containing iron or other alloys are not acceptable. Coils shall be machine crimped into stainless steel terminals extending at least 1" into the airstream and all terminal hardware shall be stainless steel. Coils shall be supported by ceramic bushings staked into aluminized steel supporting brackets.
- C. Heater frames and terminal boxes shall be aluminized steel. Unless otherwise indicated, the terminal box shall be NEMA 1 construction and shall be provided with a hinged, latching cover and multiple concentric knockouts for field wiring.
- D. All heaters shall be furnished with a disc type, automatic reset thermal cutout for primary overtemperature protection. All heaters shall also be furnished with disc type, load carrying manual reset thermal cutouts, factory wired in series with heaters stages for secondary protection. Heat limiters or other fusible overtemperature devices are not acceptable.
- E. Heaters shall be rated for the voltage, phase and number of heating stages indicated in the schedule. All three phase heaters shall have equal, balanced, three phase stages. All internal wiring shall be stranded copper with 105°C insulation and shall be terminated in crimped connectors or box lugs.
- F. Terminal blocks shall be provided for all field wiring and shall be sized for installation of 75°C copper wire rated in accordance with NEC requirements.
- G. Heaters shall be furnished with the Control Option specified below which is most suitable for the control methods of the controller and as coordinated with the Controls Contractor.
- H. Provide thermal cutouts, airflow switch, contactors, fuses, control circuit transformer and built-in, snap-acting, door interlock disconnect switch.

- I. Provide thermal cutouts, airflow switch, SOLITECH SCRs, fuses, control circuit transformer and built-in, snap-acting, door interlocked disconnect switch.
- J. Provide heaters with insulated dust tight terminal box.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions and in conformance with ARI and the SMACNA Ducted Electric Heat Guide for Air Handling Systems.
- B. Provide for connection to electrical service.
- C. Provide all clearances for maintenance and service as required by NEC and the manufacturer's installation instructions.
- D. Contractor shall remote mount the control panel as required by the field conditions. Coordination of control panel locations shall be completed prior to shop drawing/ submittal phase with all other trades to account for panel type prior to ordering equipment.
- E. Support coil sections independent of piping on steel channel or double angle frames and secure to casings. Provide frames for maximum three coil sections. Arrange supports to avoid piercing drain pans. Provide airtight seal between coil and duct or casing.
- F. Protect coils to prevent damage to fins and flanges. Comb out bent fins.
- G. Wire electric duct coils in accordance with ANSI/NFPA 70.

END OF 15740

SECTION 15838 POWER ROOF VENTILATORS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, other specification sections and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes exhaust and kitchen make-up air rooftop fans.

1.3 QUALITY ASSURANCE

- A. Performance Ratings: Conform to AMCA 210.
- B. Sound Ratings: AMCA 301, tested to AMCA 300.
- C. Fabrication: Conform to AMCA 99.

1.4 SUBMITTALS

- A. Submit shop drawings and product data.
- B. Submit sound power levels for both fan inlet and outlet at rated capacity.

PART 2 – PRODUCTS

2.1 CENTRIFUGAL ROOF EXHAUST FAN

- A. Centrifugal Fan Unit: Belt driven with spun aluminum housing; resilient mounted motor; 1/2 inch mesh, 16 gage aluminum bird screen; square base to suit roof curb with continuous curb gaskets; secured with stainless steel bolts and screws.
- B. Drive frame assemblies shall be constructed of heavy gauge steel and mounted on vibration isolators.
- C. Precision ground and polished fan shafts shall be mounted in permanently sealed, lubricated pillow block ball bearings. Bearings shall be selected for a minimum (L50) life in excess of 200,000 hours at maximum cataloged operating speed. Drives shall be sized for a minimum of 150% of driven horsepower. Pulleys shall be of the fully machined cast iron type, keyed and securely attached to the wheel and motor shafts. Motor pulleys shall be adjustable for final system balancing.
- D. A disconnect switch shall be factory installed and wired from the fan motor to a junction box installed within the motor compartment. A fan conduit chase shall be provided through the curb cap to the motor compartment for ease of installation.

- E. All fans shall bear the AMCA Certified Ratings Seal for sound and air performance.
- F. Each fan shall bear a permanently affixed manufacturer's nameplate containing the model number and individual serial number for future identification.

2.2 KITCHEN MAKE-UP AIR UNIT

A. Supply

1. Filtered make-up air units shall have belt driven double width/double inlet, forward curved centrifugal type supply fans.
2. The entire fan and motor assembly shall be mounted on vibration isolators to prevent noise transmission. Motors shall be permanently lubricated, heavy duty, ball bearing type, carefully matched to the fan load and furnished at the specified voltage, phase and enclosure. The fan shaft shall be ground and polished steel mounted in heavy duty, sealed ball bearings. Bearings shall be selected for a minimum average (L50) life in excess of 200,000 hours at maximum cataloged operating speeds. Pulleys shall be of the fully machined, cast iron type, keyed and securely attached to the wheel and motor shafts. Motor sheaves shall be adjustable for final system balancing. Drives shall be sized for a minimum of 150% of driven horsepower.
3. Fan wheels shall be of the forward curved type, constructed of heavy gauge steel and statically and dynamically balanced to ensure smooth, vibration free operation.
4. Housing construction shall be heavy gauge galvanized steel with removable panels for access to fan and tempering unit components, filters, and controls.
5. Filters shall be one inch aluminum mesh and shall be UL classified.
6. The prewired control center shall include, but not be limited to, an integral master disconnect switch with fuse blocks for main power connection, magnetic motor starters with thermal overloads and manual reset, fused 115 volt control transformer, and distribution terminal control strip for control wiring connection. All electrical components shall be UL Listed, Approved or Classified where applicable and wired in compliance with the National Electrical Code. Wiring shall be complete, requiring only one-point field connection for power service and one-point field connection for low voltage.

2.3 ROOF CURB

- A. Prefabricated roof curb shall be of box section design, minimum 18 gauge galvanized steel construction, continuous mitered and welded corner seams, integral base plate, factory installed pressure treated wood nailer, and shall be insulated with 1½" thick, rigid fiberglass board insulation. To install properly, weld, bolt, or screw all curbing to the roof deck or substructure. Panel frames shall be rounded to reduce air flow interference. All curbs shall be minimum 16" high.

2.4 BASE FLASHING CAP SHEET

- A. Provide SBS fiberglass reinforced, 98 mils (minimum) thickness membrane faced with embossed aluminum foil, weight 90 lbs. per 100 sq.ft. (minimum). Product shall be by one of the following:
 - 1. Siplast - "Veral" aluminum surfaced cap sheet.
 - 2. Soprema - "Sopralast 50 TV ALU" aluminum surfaced cap sheet.

2.5 BASE FLASHING BASE PLY

- A. Provide either glass reinforced asphalt sheet or SBS modified bitumen sheet, weight 89 lbs. per 100 sq.ft. (minimum). Product shall be one of the following:
 - 1. Siplast - "Irex 40."
 - 2. Soprema - "Elastophene Flam."

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Secure roof exhausters with stainless steel screws to roof curb and secure roof curb to roof.

3.2 INSTALLATION OF BASE FLASHING FOR CURBS

- A. Install aluminum foil faced modified bitumen base flashing cap sheet and base ply by torching in strict accordance with manufacturer's directions. Follow manufacturer's torching precautions carefully.

END OF 15838

1	EXISTING FIELD MEMBRANE - REINSTALLED / REPLACED AS REQUIRED.
2	MEMBRANE 2" MIN. HOT AIR WELD LAP SEAM.
3	NEW STANCHION VERTICAL CYLINDER MEMBER (WELDED TO BASE PLATE) (11).
4	APPROVED MASTIC SEALANT.
5	300 SERIES STAINLESS STEEL WORM-GEAR CLAMP
6	FABRICATED NON-REINFORCED FIBERTITE MEMBRANE FLASHING. INSTALLED MINIMUM 8"+ ON VERTICAL.
7	INSULATION REINSTALLED / REPLACED AS REQUIRED.
8	EXISTING (METAL) DECK/SUBSTRATE.
9	APPROVED INSULATION FASTENER & STRESS PLATE.
10	APPROVED FIELD MEMBRANE FASTENER & STRESS PLATE
11	STANCHION BASE PLATE MECHANICALLY ATTACHED TO ROOF DECK
12	TYPICAL BASE PLATE FASTENER.

SECTION DETAIL - FIELD FABRICATED STANCHION FLASHING
SCALE: 1-1/2" = 1'-0"

NOTE: BIDDERS & CONTRACTORS ARE RESPONSIBLE FOR CONFIRMING ALL DIMENSIONS, AREAS, FEATURES & COMPONENTS.

D.H. GRACEY & ASSOCIATES, INC. 5608 4TH AVENUE, N.W. • BRADENTON, FL. 34209 (941) 792-5826 • FAX (941) 761-0829 ©	PROJECT: MANATEE COUNTY CIVIC CENTER 1 Haben Boulevard ~ Palmetto, Florida	DRWG. NO. 1.0
DATE: 1/11	DRWN: DHG/	REV:

1	EXISTING STEEL DECK.	8	SHIM STOCK (EVEN W/ITEM #7). ATTACH W/ #10 TECH SGREWS, 8" OC(±), STAGGERED.
2	EXISTING INSULATION - REINSTALLED / REPLACED.	9	SHIM STOCK NAILER PER MECHANICAL CONTRACTOR FOR LEVEL INSTALLATION.
3	EXISTING ROOF MEMBRANE - REINSTALLED / REPLACED.	10	NEW MEMBRANE FLASHING. VERTICAL LEG FULLY ADHERED.
4	ROOF MEMBRANE COATED FASTENER(S) W/BARBED STRESS PLATE INSTALLED PER MANUFACTURER & FBC.	11	NEW MEMBRANE FLASHING HORIZONTAL LEG : 2"(+) HEAT-WELDED TO ROOF MEMBRANE.
5	ROOF INSULATION COATED FASTENER(S) W/STRESS PLATE INSTALLED PER MANUFACTURER & FBC.	12	SEALANT & ALLUM. TERM-BAR OVER TOP OF NEW FLASHING. ATTACH 8" OC W/ #10X1/2" STAINLESS STEEL SCREWS.
6	NEW LOW-SLOPE ROOF RTU CURB. HEIGHT MUST EXCEED 2" ABOVE NEW ROOF LEVEL. ATTACHMENT PER MECHANICAL CONTRACTOR.	13	INSTALL 4" COUNTERFLASHING, 22 GA. GALVANIZED STEEL W/ "PRESSER FOOT" TIGHT TO MEMBRANE. ATTACH 8" OC, W/ #10X1/2" STAINLESS STEEL FLAT HEAD SCREWS.
7	BLOCKING SUPPLIED W/CURB		

SECTION DETAIL
RTU MOUNTING CURB TIE-IN.
SCALE: 3" = 1'-0"(±)

NOTE: BIDDERS & CONTRACTORS ARE RESPONSIBLE FOR CONFIRMING ALL DIMENSIONS, AREAS, FEATURES & COMPONENTS.

D.H. GRACEY & ASSOCIATES, INC. © 5608 4TH AVENUE, N.W. • BRADENTON, FL. 34209-1804 PH: 941/792-5826 • FAX: 941/761-0829	PROJECT: MANATEE COUNTY CIVIC CENTER 1 Haben Boulevard ~ Palmetto, Florida	DRWG. NO. 2.0
DATE: 1/11	DRWN: DHG/	REV:

ALL DETAILS ON THIS SHEET CREATED BY
D. H. GRACEY & ASSOCIATES, INC.

NO.	DATE	BY	REVISIONS

D. H. GRACEY AND ASSOCIATES, INC.
5608 4TH AVE. N.W. BRADENTON, FL. 34209-1804
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MANATEE CONVENTION CENTER
MANATEE COUNTY, FL

ROOFING DETAILS

DATE: 01/10/11

SCALE: AS NOTED

JOB NO. 1019-G

Drawn/Checked By: DHG/DHG

SHEET NO. A-6

PANELBOARD: "PNL1-ROOF"	
ESTIMATED FAULT CURRENT	
CONDUCTOR SIZE	2X 400 KCM
CONDUCTOR LENGTH	225'
CONDUCTOR "C"	33,000
ESTIMATED TRANSFORMER SCA	65,000 A
VOLTAGE	480 V
FAULT CURRENT	25,008 A
25,008A SHORT CIRCUIT AMPS ESTIMATED AT PANEL	

PANELBOARD: "PNL2-ROOF"	
ESTIMATED FAULT CURRENT	
CONDUCTOR SIZE	2X 400 KCM
CONDUCTOR LENGTH	260'
CONDUCTOR "C"	33,000
ESTIMATED TRANSFORMER SCA	65,000 A
VOLTAGE	480 V
FAULT CURRENT	22,823 A
22,823A SHORT CIRCUIT AMPS ESTIMATED AT PANEL	

PANELBOARD: "PNL3-ROOF"	
ESTIMATED FAULT CURRENT	
CONDUCTOR SIZE	1/0 AWG
CONDUCTOR LENGTH	255'
CONDUCTOR "C"	7,190
ESTIMATED TRANSFORMER SCA	65,000 A
VOLTAGE	480 V
FAULT CURRENT	6,975 A
6,975A SHORT CIRCUIT AMPS ESTIMATED AT PANEL	

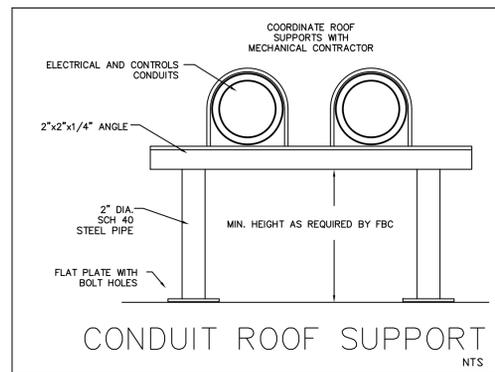
PANELBOARD: "S3N-1032A"		
ELECTRICAL SERVICE CALCULATION		
LOAD	CONNECTED	DEMAND
REMOVED HVAC	-1,582,851	-1582851
NEW HVAC	1,542,812	1,542,812
25% LARGEST MOTOR		13,510
TOTAL		-40,039 -26,529
-32A DEMAND		
TOTAL HVAC DEMAND REDUCED BY 32 AMPS.		

CONDUIT AND WIRE SCHEDULE					
C/B	POLE	WIRE SIZE (BASE ON TYPE THW)	CONDUIT	PHASE	
20A	1	2-#12, 1-#12 E.G.	3/4"	1φ 2W	
20A	2	2-#12, 1-#12 E.G.	3/4"	1φ 2W	
20A	3	3-#12, 1-#12 E.G.	3/4"	3φ 3W	
20A	3	3-#12, 1-#12 N., 1-#12 E.G.	3/4"	3φ 4W	
25A	1	2-#10, 1-#10 E.G.	3/4"	1φ 2W	
25A	2	2-#10, 1-#10 E.G.	3/4"	1φ 2W	
25A	3	3-#10, 1-#10 E.G.	3/4"	3φ 3W	
25A	3	3-#10, 1-#10 N., 1-#10 E.G.	3/4"	3φ 4W	
30A	1	2-#10, 1-#10 E.G.	3/4"	1φ 2W	
30A	2	2-#10, 1-#10 E.G.	3/4"	1φ 2W	
30A	3	3-#10, 1-#10 E.G.	3/4"	3φ 3W	
30A	3	3-#10, 1-#10 N., 1-#10 E.G.	3/4"	3φ 4W	
35A	3	3-#8, 1-#10 E.G.	1"	3φ 3W	
35A	3	3-#8, 1-#8 N., 1-#10 E.G.	1"	3φ 4W	
40A	2	2-#8, 1-#10 E.G.	1"	1φ 2W	
40A	3	3-#8, 1-#10 E.G.	1"	3φ 3W	
40A	3	3-#8, 1-#8 N., 1-#10 E.G.	1"	3φ 4W	
45A	2	2-#8, 1-#10 E.G.	1"	1φ 2W	
45A	3	3-#8, 1-#10 E.G.	1"	3φ 3W	
45A	3	3-#8, 1-#8 N., 1-#10 E.G.	1"	3φ 4W	
50A	2	2-#8, 1-#10 E.G.	1"	1φ 2W	
50A	3	3-#8, 1-#10 E.G.	1"	3φ 3W	
50A	3	3-#8, 1-#8 N., 1-#10 E.G.	1"	3φ 4W	
60A	2	2-#6, 1-#10 E.G.	1 1/4"	1φ 2W	
60A	3	3-#6, 1-#10 E.G.	1 1/4"	3φ 3W	
60A	3	3-#6, 1-#6 N., 1-#10 E.G.	1 1/4"	3φ 4W	
70A	2	2-#4, 1-#8 E.G.	1"	1φ 2W	
70A	3	3-#4, 1-#8 E.G.	1 1/4"	3φ 3W	
70A	3	3-#4, 1-#4 N., 1-#8 E.G.	1 1/4"	3φ 4W	
80A	2	2-#4, 1-#8 E.G.	1"	1φ 2W	
80A	3	3-#4, 1-#8 E.G.	1 1/4"	3φ 3W	
80A	3	3-#4, 1-#4 N., 1-#8 E.G.	1 1/4"	3φ 4W	
90A	2	2-#3, 1-#8 E.G.	1 1/4"	1φ 2W	
90A	3	3-#3, 1-#8 E.G.	1 1/4"	3φ 3W	
90A	3	3-#3, 1-#3 N., 1-#8 E.G.	1 1/4"	3φ 4W	
100A	2	2-#3, 1-#8 E.G.	1 1/4"	1φ 2W	
100A	3	3-#3, 1-#8 E.G.	1 1/4"	3φ 3W	
100A	3	3-#3, 1-#3 N., 1-#8 E.G.	1 1/2"	3φ 4W	

NOTES:
1. ALL CONDUCTORS SHALL BE COPPER
2. ALL CONDUIT SHALL HAVE GROUNDING CONDUCTOR INSTALLED.
3. CONDUIT BELOW GRADE OUTSIDE OF BUILDING SHALL BE 1" MINIMUM.
4. SIZING OF CONDUCTORS MUST BE ALTERED FOR DERATING PER N.E.C. OR VOLTAGE DROP CONSIDERATIONS.
5. SEE RISER DIAGRAM FOR SIZING OF CIRCUITS GREATER THAN 100A.
6. USE 10 AWG CU. CONDUCTORS FOR 20 AMPERE, 120 VOLT BRANCH CIRCUITS LONGER THAN 75 FEET; USE 10 AWG CU. CONDUCTORS FOR 20 AMPERE, 277 VOLT BRANCH CIRCUITS LONGER THAN 200 FEET, WHERE WIRE SIZE IS INCREASED IN SIZE FOR VOLTAGE DROP, E.G. SHALL BE INCREASED PROPORTIONATELY, PER NEC 250.122 (B).
7. MC CABLE SHALL BE ALLOWED. CONDUCTORS FOR MC CABLE SHALL BE THHN. JACKET SHALL BE THE MANUFACTURER'S STANDARD SIZE FOR CONDUCTORS UTILIZED.

DISCONNECT SCHEDULE								
D/C #	SIZE	POLES	PHASE	NEMA	FUSE	VOLT.	SERVES	COMMENTS
D-1	200A	3	3R	NON-F	480V	AHU-6	AHU-6	MOUNT ON UNIT
D-2	200A	3	3R	NON-F	480V	AHU-8	AHU-8	MOUNT ON UNIT
D-3	30A	2	1R	NON-F	120V	EF-7A	EF-7A	MOUNT ON UNIT
D-4	600A	3	3R	NON-F	480V	EM-GH	EM-GH	MOUNT ON WALL

NOTES:
1. VERIFY FUSE SIZES FOR ACTUAL EQUIPMENT SUBMITTED.
2. FUSES SHALL BE DUAL ELEMENT, TIME DELAY, 100,000 AIC MINIMUM.
3. FINAL CONNECTIONS TO MECHANICAL EQUIPMENT FROM DISCONNECT SHALL BE FLEX. FLEX SHALL BE WATERTIGHT AT EXTERIOR OR WET LOCATIONS.
4. PROVIDE POLE TO DISCONNECT NEUTRAL WHERE REQUIRED.



PANELBOARD DESIGNATION: PNL1-ROOF (AHU-3)									
VOLTAGE: 480/277V		3φ-4W	MAINS RATING: 600 AMPS		MAIN CB TRIP RATING: - AMPS				
<input type="checkbox"/> SURFACE	<input type="checkbox"/> MCB	COPPER BUS		INTERRUPTING RATING: 42 KAIC		ENCLOSURE: NEMA 4X, S/S			
<input type="checkbox"/> FLUSH	<input type="checkbox"/> MLO	CB SIZE	LOAD VA	CCT#	PHASE	CCT#	LOAD VA	CB SIZE	SERVES
SERVES		300	68680	1	X	2	3880	30	CHWP-3
AHU-3			68680	3	X	4	3880		
			68680	5	X	6	3880		
CH-3		400	76778	7	X	8			
			76778	9	X	10			
			76778	11	X	12			
				13	X	14			
				15	X	16			
				17	X	18			
				19	X	20			
				21	X	22			
				23	X	24			
				25	X	26			
				27	X	28			
				29	X	30			
CONNECTED:		448.0 KVA	A	B	C	EST. DEMAND	461.5 KVA		

PANELBOARD DESIGNATION: PNL2-ROOF (AHU-4)									
VOLTAGE: 480/277V		3φ-4W	MAINS RATING: 600 AMPS		MAIN CB TRIP RATING: - AMPS				
<input type="checkbox"/> SURFACE	<input type="checkbox"/> MCB	COPPER BUS		INTERRUPTING RATING: 42 KAIC		ENCLOSURE: NEMA 4X, S/S			
<input type="checkbox"/> FLUSH	<input type="checkbox"/> MLO	CB SIZE	LOAD VA	CCT#	PHASE	CCT#	LOAD VA	CB SIZE	SERVES
SERVES		300	68680	1	X	2	3880	30	CHWP-4
AHU-4			68680	3	X	4	3880		
			68680	5	X	6	3880		
CH-4		400	76778	7	X	8	540	15	MPZ-1
			76778	9	X	10			
			76778	11	X	12			
				13	X	14			
				15	X	16			
				17	X	18			
				19	X	20			
				21	X	22			
				23	X	24			
				25	X	26			
				27	X	28			
				29	X	30			
CONNECTED:		448.6 KVA	A	B	C	EST. DEMAND	461.5 KVA		

PANELBOARD DESIGNATION: PNL3-ROOF (AHU-7)									
VOLTAGE: 480/277V		3φ-4W	MAINS RATING: 150 AMPS		MAIN CB TRIP RATING: - AMPS				
<input type="checkbox"/> SURFACE	<input type="checkbox"/> MCB	COPPER BUS		INTERRUPTING RATING: 22 KAIC		ENCLOSURE: NEMA 4X, S/S			
<input type="checkbox"/> FLUSH	<input type="checkbox"/> MLO	CB SIZE	LOAD VA	CCT#	PHASE	CCT#	LOAD VA	CB SIZE	SERVES
SERVES		60	11085	1	X	2	3880	30	CHWP-1
AHU-7			11085	3	X	4	3880		
			11085	5	X	6	3880		
MAU-1		20	2106	7	X	8	3880	30	CHWP-2
			2106	9	X	10	3880		
			2106	11	X	12	3880		
				13	X	14			
				15	X	16			
				17	X	18			
				19	X	20			
				21	X	22			
				23	X	24			
				25	X	26			
				27	X	28			
				29	X	30			
CONNECTED:		62.9 KVA	A	B	C	EST. DEMAND	71.2 KVA		

PANELBOARD DESIGNATION: S3N-1032A (EXISTING TO REMAIN)									
VOLTAGE: 480/277V		3φ-4W	MAINS RATING: 1600 AMPS		MAIN CB TRIP RATING: - AMPS				
<input type="checkbox"/> SURFACE	<input type="checkbox"/> MCB	COPPER BUS		INTERRUPTING RATING: KAIC		ENCLOSURE: NEMA 1			
<input type="checkbox"/> FLUSH	<input type="checkbox"/> MLO	CB SIZE	LOAD VA	CCT#	PHASE	CCT#	LOAD VA	CB SIZE	SERVES
SERVES		600	149338	1	X	2	149338	600	PNL2-ROOF(AHU/CU-4)
			149338	3	X	4	149338		
			149338	5	X	6	149338		
-		75	7	X	8				
			9	X	10				
			11	X	12				
AHU-5		100	333	13	X	14		100	OUT OF SERVICE
			333	15	X	16			
			333	17	X	18			
P4N-1030		100	19	X	20			100	OFF
			21	X	22				
			23	X	24				
P3N-1038		225	25	X	26				
			27	X	28				
			29	X	30				
AHU-6 (NOT USED)		125	31	X	32			100	A3E-1032 A.T.S.
			33	X	34				
			35	X	36				
BAD		225	37	X	38	32486	150	AHU-6 (MAU-1)	
			39	X	40	32486			
			41	X	42	32486			
AHU-8 (CU-6)		150	20951	43	X	44	37752	150	PNL3-ROOF (AHU-6)
			20951	45	X	46	37752		
			20951	47	X	48	37752		
CH-2 (AHU/CU-8)		350	65686	49	X	50	65686	350	CH-1 (AHU/CU-7)
			65686	51	X	52	65686		
			65686	53	X	54	65686		
P3N-1015		400	55	X	56				
			57	X	58				
			59	X	60				
CONNECTED:		1,564.7 KVA	A	B	C	EST. DEMAND	KVA		

NEW FEEDER (OLD FEEDER)

ELECTRICAL SYMBOL LEGEND

WIRING DEVICES

JUNCTION BOX.

FIRE ALARM

SUP FIRE ALARM SMOKE DETECTOR, DUCT MOUNTED WITH SAMPLING TUBES. "SUP" INDICATES SUPPLY RETURN DUCT MOUNTED. PROVIDE PHOTOELECTRIC TYPE U.S.O. PROVIDE REMOTE TEST STATION FOR EACH DUCT MOUNTED SMOKE DETECTOR. COORDINATE LOCATION OF TEST STATION WITH MECHANICAL CONTRACTOR AND ENGINEER PRIOR TO ROUGH-IN. TEST STATION IS REQUIRED WHETHER SHOWN ON FLOOR PLANS OR NOT. DUCT DETECTOR FURNISHED AND WIRED BY ELECTRICAL CONTRACTOR, INSTALLED IN DUCT BY MECHANICAL CONTRACTOR.

RET REMOTE TEST STATION FOR DUCT MOUNTED SMOKE DETECTOR. RECESS MOUNT 48" AFF TO CENTER OF BACKBOX IN FINISHED SPACES, SURFACE MOUNT IN BACK OF HOUSE. PROVIDE DEVICE WITH KEY OPERATED TEST SWITCH AND LED ALARM INDICATOR LIGHT. PROVIDE ENGRAVED NAMEPLATE ON COVER PLATE STATING NAME OF EQUIPMENT MONITORED.

RELAY FOR EQUIPMENT SHUTDOWN. COORDINATE DEVICE LOCATION WITH MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN. LOCATE RELAY WITHIN THREE FEET OF EQUIPMENT STARTER.

END OF LINE RESISTOR.

MISCELLANEOUS

KEYED NOTE INDICATOR. REFER TO THE "KEYED NOTES" ON SHEET WHERE INDICATED.

POWER DISTRIBUTION (REFER TO ELECTRICAL RISER)

PANELBOARD, RECESS MOUNT IN FINISHED SPACES, SURFACE MOUNT IN BACK OF HOUSE. REFER TO THE "PANELBOARD SCHEDULES", THIS SHEET.

FEEDER OR BRANCH CIRCUIT RACEWAY CONCEALED IN WALL, CEILING.

FEEDER OR BRANCH CIRCUIT RACEWAY CONCEALED UNDER FLOOR, IN SLAB OR BELOW GRADE.

DISCONNECT SWITCH. PROVIDE DISCONNECT SWITCH AS INDICATED ON THE SCHEDULES. REFER TO PLANS AND SCHEDULES FOR ADDITIONAL REQUIREMENTS. FUSES SHALL BE DUAL ELEMENT TIME DELAY. VERIFY NAMEPLATE RATINGS OF FRAME SIZE AND FUSING OF THE ACTUAL EQUIPMENT TO BE INSTALLED.

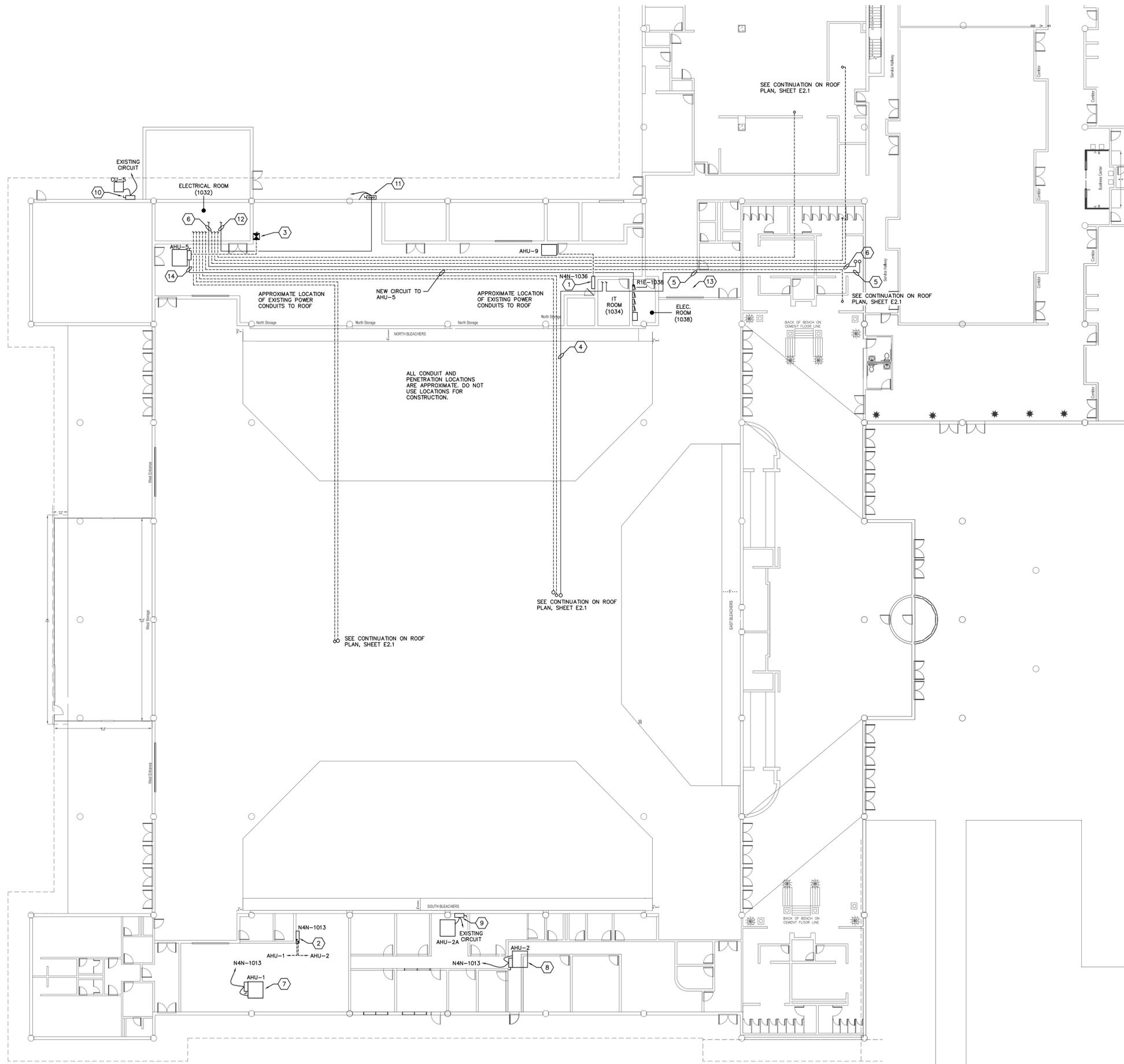
COMBINATION MOTOR STARTER. REFER TO SPECIFICATIONS, AND FLOOR PLANS FOR ADDITIONAL ELECTRICAL REQUIREMENTS. SUPPLIED BY MECHANICAL CONTRACTOR (U.N.O.) AND INSTALLED BY ELECTRICAL CONTRACTOR. ALL CONNECTIONS TO COMBO STARTER AND EQUIPMENT SERVED SHALL BE BY THE ELECTRICAL CONTRACTOR.

GROUND TO METAL FRAME OF BUILDING, SLAB STEEL, OTHER MADE ELECTRODES, AND METAL UNDERGROUND WATER PIPE. PROVIDE A MINIMUM OF (2) 3/4" DIA. 10 FOOT LONG COPPER CLAD GROUND RODS LOCATED AT LEAST 6 FEET APART. ALL CONCEALED CONNECTIONS SHALL BE EXOTHERMICALLY WELDED. INTERIOR GROUND RODS SHALL STUB ABOVE FLOOR AT LOCATIONS NOT INTERFERING WITH FOOT TRAFFIC. LOCATE EXTERIOR GROUND ROD ASSEMBLY IN LANDSCAPE AREA OR PROVIDE WELL FOR ACCESS TO EACH GROUND ROD IF ASSEMBLY IS LOCATED IN HARD SURFACE AREAS, SUCH AS CONCRETE, ASPHALT, ETC. PROVIDE BOLTED PRESSURE CLAMP WITH AT LEAST TWO BOLTS ON RODS IN TEST WELLS. ALL GROUND ROD LOCATIONS SHALL BE ACCESSIBLE.

VARIABLE FREQUENCY DRIVE. REFER TO SPECIFICATIONS, AND FLOOR PLANS FOR ADDITIONAL ELECTRICAL REQUIREMENTS. VFD SUPPLIED BY MECHANICAL CONTRACTOR (U.N.O.) AND INSTALLED BY ELECTRICAL CONTRACTOR. ALL CONNECTIONS TO VFD, DISCONNECT AND EQUIPMENT SERVED SHALL BE BY THE ELECTRICAL CONTRACTOR. CIRCUIT SHALL UTILIZE METAL CONDUIT TO MINIMIZE RFI NOISE.

ABBREVIATIONS

A	AMPERE	N.I.C.	NOT IN CONTRACT
AFF	HEIGHT ABOVE FINISHED FLOOR	NF	NON-FUSED
AFO	HEIGHT ABOVE FINISHED GRADE	P	POLE
ETR	EXISTING TO REMAIN	PH	PHASE
GFI	GROUND FAULT CIRCUIT INTERRUPTING	U.N.O.	UNLESS NOTED OTHERWISE
	TYPE WIRING DEVICE OR CIRCUIT BREAKER		



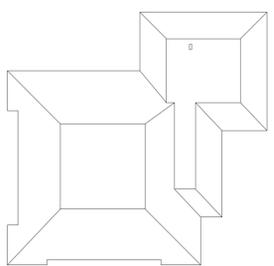
- ### KEYED NOTES
- 1 EXISTING TO REMAIN SIEMENS-ALLIS MOTOR CONTROL CENTER "N4N-1036". REPLACE EXISTING SIEMENS SIRIUS 3R OVERLOAD (0.4-1.8A) FOR "AHU-5" WITH NEW 2.1A OVERLOAD. SEE ELECTRICAL DETAILS, SHEET E3.0.
 - 2 EXISTING SIEMENS-ALLIS MOTOR CONTROL CENTER "N4N-1013". ADJUST OVERLOAD FOR "AHU-1" TO FULL LOAD AMPS OF NEW "AHU-1". REPLACE EXISTING SIEMENS-ALLIS OL8000 OVERLOAD (4.0-6.3A) FOR "AHU-2" WITH NEW OVERLOAD SET TO NEW "AHU-2" FULL LOAD AMPS. SEE ELECTRICAL DETAILS.
 - 3 EXISTING SIEMENS-ALLIS COMBO MOTOR STARTER SERVING EXISTING "AHU-5". IF NEW "AHU-5" IS PROVIDED WITH 480VAC CONNECTABLE MOTOR, REPLACE EXISTING SIEMENS-ALLIS OL8000 OVERLOAD (5-8A) FOR "AHU-5" WITH NEW OVERLOAD SET TO NEW "AHU-5" FULL LOAD AMPS. SEE ELECTRICAL DETAILS, SHEET E3.0. IF NEW "AHU-5" IS PROVIDED WITH 208VAC MOTOR, REMOVE 480VAC FEED BACK TO COMBO STARTER AND PROVIDE NEW 208VAC ELECTRICAL SERVICE (SEE KEYED NOTE #13).
 - 4 NEW 1" RIGID PVC CONTROLS CONDUIT FROM IDF ROOM (134) TO "HIGH" ROOF. FOLLOW ROUTING OF EXISTING POWER CONDUITS. SEE CONTINUATION ON ROOF PLAN, SHEET E2.1.
 - 5 NEW 1" RIGID PVC CONTROLS CONDUIT FROM IDF ROOM (134) TO "LOW" ROOF. FOLLOW ROUTING OF EXISTING POWER CONDUITS. SEE CONTINUATION ON ROOF PLAN, SHEET E2.1.
 - 6 NEW 2" RMC CONDUIT FROM "S3N-1032A" TO NEW "AHU-8" WITH (3) 1/0 AWG AND (1) #1 CU E.G.
 - 7 NEW "AHU-1". RE-USE EXISTING DISCONNECT.
 - 8 NEW "AHU-2". RE-USE EXISTING DISCONNECT.
 - 9 NEW "AHU-2A". RE-USE EXISTING DISCONNECT.
 - 10 EXISTING 30A DISCONNECT FOR NEW "AHU-5". RE-USE EXISTING DISCONNECT.
 - 11 NEW 600A, 600VAC, NEMA 3R, NON-FUSED DISCONNECT FOR EMERGENCY CHILLER (EM-CH) CONNECTION. COORDINATE LOCATION WITH MECHANICAL PIPING.
 - 12 NEW (3) SETS 2" CONDUIT WITH (3) 3/0 AWG AND (1) #1 AWG CU E.G. IN EACH.
 - 13 INSTALL NEW 15A, 3-POLE CIRCUIT BREAKER IN EXISTING PANEL "RIE-1038" AT SPACES 38,40,42.
 - 14 INSTALL NEW FEEDER CIRCUIT TO "AHU-5" IN NEW 3/4" CONDUIT WITH (3) #12 AWG AND (1) #14 AWG CU E.G.

GENERAL NOTES

ALL CONDUIT AND PENETRATION LOCATIONS ARE APPROXIMATE. DO NOT USE LOCATIONS FOR CONSTRUCTION.

CONDUIT LEGEND

— NEW CONDUIT
 - - - - - EXISTING TO REMAIN CONDUIT



1 ELECTRICAL PARTIAL FLOOR PLAN
 1/16" = 1'-0"

2 KEY PLAN

NO.	DATE	BY	REVISIONS	SEAL

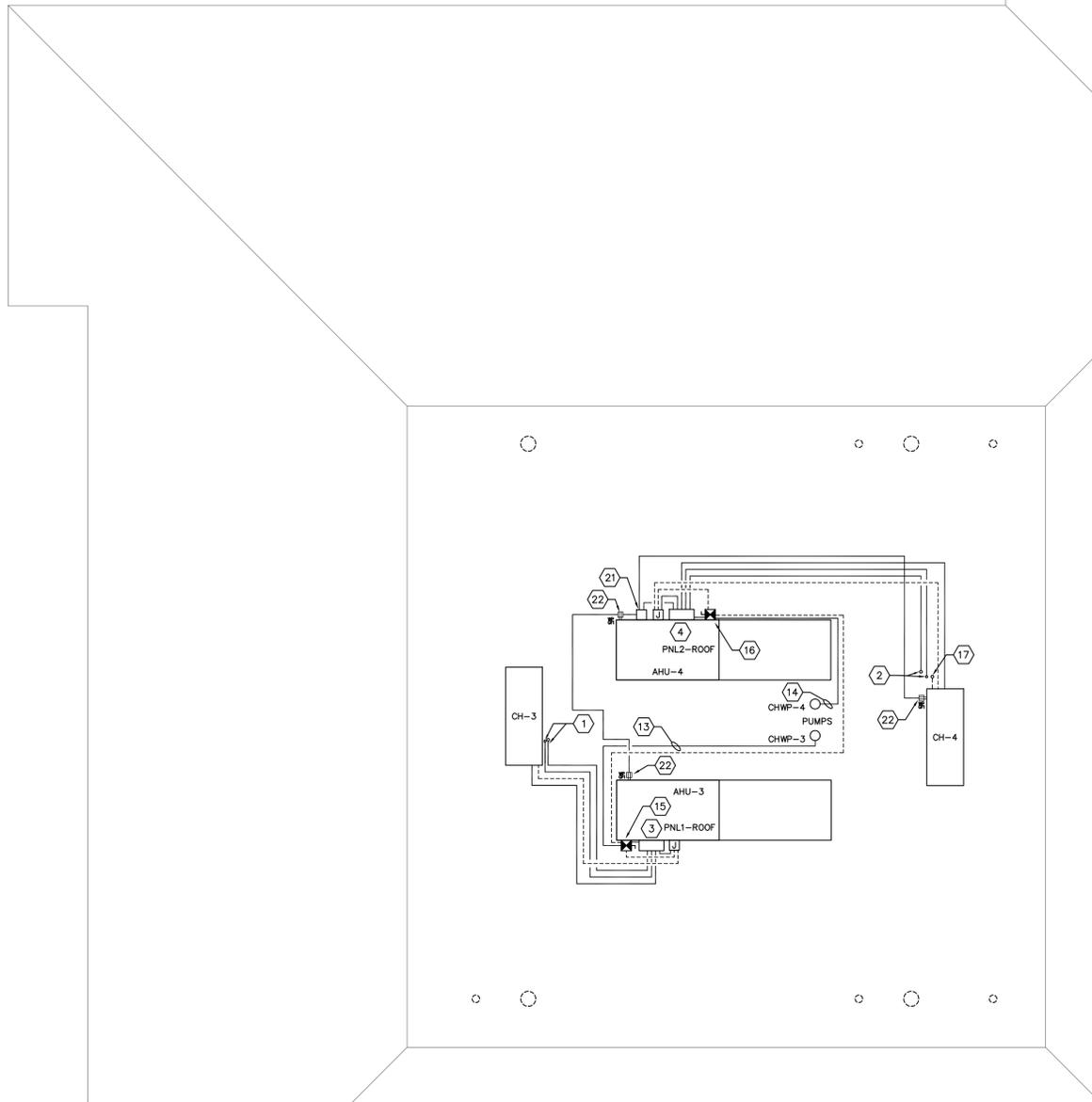
GLOBAL MEP & FIRE ENGINEERING, INC.
 8450 LINGER LODGE ROAD BRADENTON, FL 34202
 PHONE: 941-758-2551 FAX: 941-739-6383
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AIA
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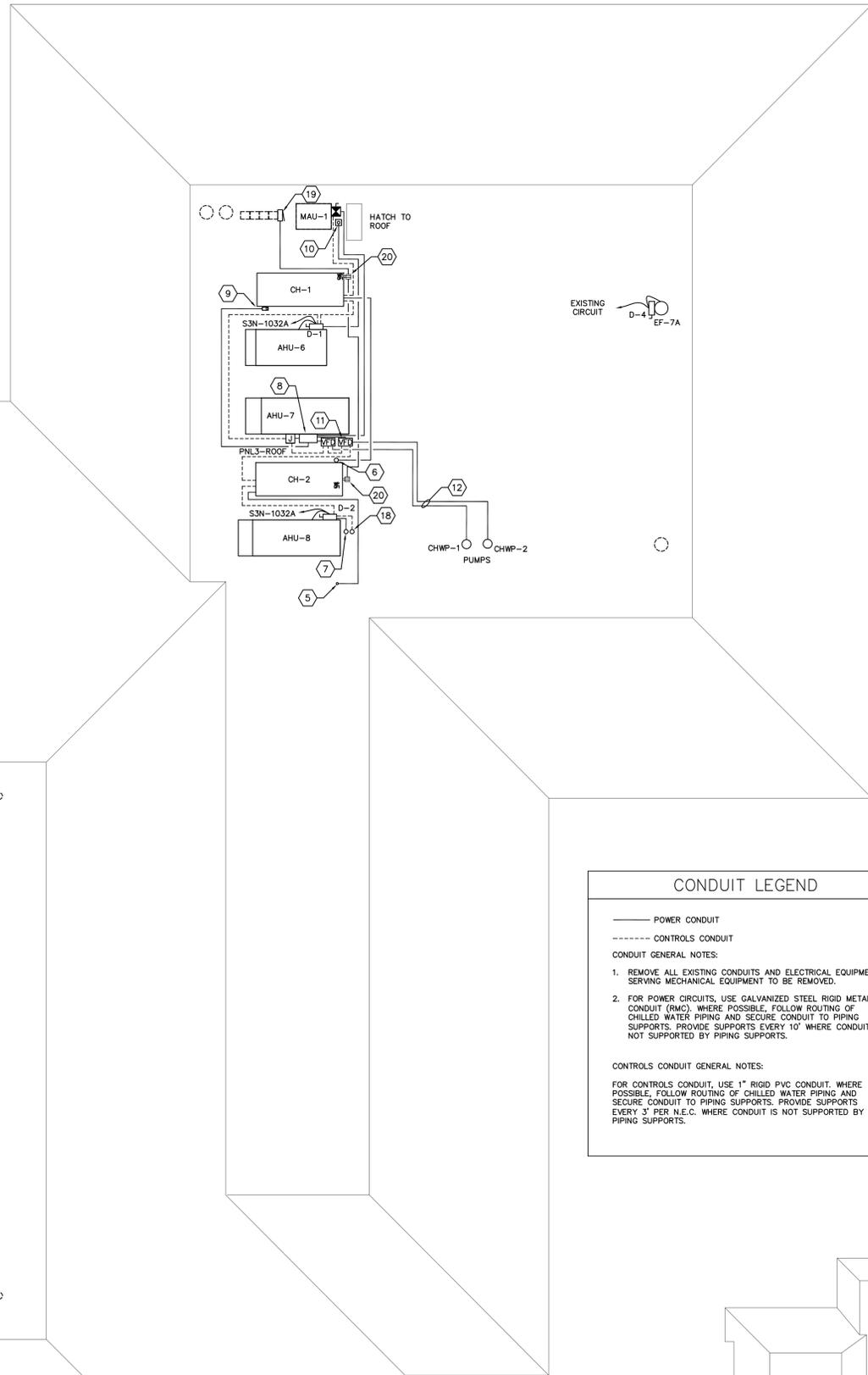
MANATEE CONVENTION CENTER
 MANATEE COUNTY, FL

DATE: 01/10/11
 SCALE: AS NOTED
 GLOBAL JOB NO. 3372-10
 Drawn/Checked By: P JF / P JF
 SHEET NO. **E2.0**

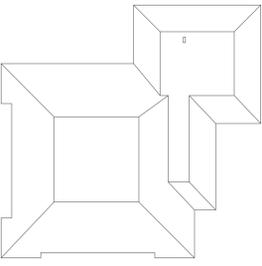
KEYED NOTES	
1	EXTEND EXISTING (2) SETS (3) X 400KCM PARALLEL FEEDS IN (1) 3" C. AND (1) 2-1/2" C. FROM EXISTING CONDUIT PENETRATIONS CURRENTLY SERVING "AHU/CU-3" TO NEW PANEL "PNL1-ROOF".
2	EXTEND EXISTING (2) SETS (3) X 400KCM PARALLEL FEEDS IN (1) 3" C. AND (1) 2-1/2" C. FROM EXISTING CONDUIT PENETRATIONS CURRENTLY SERVING "AHU/CU-4" TO NEW PANEL "PNL2-ROOF".
3	NEW PANEL "PNL1-ROOF", NEMA TYPE 4X, STAINLESS STEEL ENCLOSURE. MOUNT TO AHU-3. 600A MAIN BUS RATING, MLO TYPE. SEE ELECTRICAL RISER/DETAILS.
4	NEW PANEL "PNL2-ROOF", NEMA TYPE 4X, STAINLESS STEEL ENCLOSURE. MOUNT TO AHU-4. 600A MAIN BUS RATING, MLO TYPE. SEE ELECTRICAL RISER/DETAILS.
5	PULL NEW (3) 400MCM AND (1) #3 AWG CU E.G. IN EXISTING 2-1/2" CONDUIT CURRENTLY SERVING "AHU/CU-8". EXTEND CONDUIT AND CONDUCTORS TO "CH-2".
6	PULL NEW (3) 400MCM AND (1) #3 AWG CU E.G. IN EXISTING 2-1/2" CONDUIT CURRENTLY SERVING "AHU/CU-7". EXTEND CONDUIT AND CONDUCTORS TO "CH-1".
7	NEW (3) #1/0 AWG AND (1) #6AWG CU E.G. IN NEW 2" CONDUIT TO "AHU-8".
8	NEW PANEL "PNL3-ROOF", NEMA TYPE 4X, STAINLESS STEEL ENCLOSURE. MOUNT TO AHU-3. 150A MAIN BUS RATING, MLO TYPE. SEE ELECTRICAL RISER/DETAILS.
9	REMOVE (3) #1/0 AWG CONDUCTORS (CURRENTLY SERVING "AHU-6") FROM EXISTING 2-1/2" CONDUIT CURRENTLY SERVING "AHU/CU-6". TURN EXISTING LB AND EXTEND (3) REMAINING #1/0 CONDUCTORS TO "PNL3-ROOF".
10	EXTEND EXISTING 1-1/2" CONDUIT (VERIFY SIZE) AND (3) #1/0 AWG CONDUCTORS CURRENTLY SERVING "MAU-1" TO "AHU-6".
11	(2) VFD'S PROVIDED BY MECHANICAL CONTRACTORS FOR "CHWP-1" AND "CHWP-2". ELECTRICAL CONTRACTOR SHALL INSTALL AND MAKE CONNECTIONS.
12	(2) 3/4" RMC CONDUITS WITH (3) #10 AWG AND (1) #10 AWG CU E.G. IN EACH TO CHWP-1 AND "CHWP-2".
13	3/4" RMC CONDUIT WITH (3) #10 AWG AND (1) #10 AWG CU E.G. TO "CHWP-3".
14	3/4" RMC CONDUIT WITH (3) #10 AWG AND (1) #10 AWG CU E.G. TO "CHWP-4".
15	COMBINATION STARTER PROVIDED BY MECHANICAL CONTRACTOR FOR "CHWP-3". ELECTRICAL CONTRACTOR SHALL INSTALL AND MAKE CONNECTIONS.
16	COMBINATION STARTER PROVIDED BY MECHANICAL CONTRACTOR FOR "CHWP-4". ELECTRICAL CONTRACTOR SHALL INSTALL AND MAKE CONNECTIONS.
17	CONTROLS CONDUIT TO HIGH ROOF. SEE CONTINUATION ON ELECTRICAL FLOOR PLAN
18	CONTROLS CONDUIT TO LOW ROOF. SEE CONTINUATION ON ELECTRICAL FLOOR PLAN
19	EXISTING TO REMAIN KITCHEN EQUIPMENT (CONDENSORS) ELECTRICAL PANEL. INSTALL NEW 20A C.B. FOR CONVENIENCE RECEPTACLES.
20	MOUNT CONVENIENCE RECEPTACLE TO MECHANICAL EQUIPMENT. EXTEND NEW 20A CIRCUIT IN 3/4" CONDUIT FROM KITCHEN EQUIPMENT PANEL.
21	SQUARE-D MINI POWER-ZONE, SINGLE-PHASE 5KVA TRANSFORMER WITH 25KVA MAIN AND NO PANELBOARD INTERIOR. TAG "MP2-1". PROVIDE WITH (2) 20A CIRCUIT BREAKERS.
22	MOUNT CONVENIENCE RECEPTACLE TO MECHANICAL EQUIPMENT. EXTEND (1) NEW 20A CIRCUIT IN 3/4" CONDUIT FROM PANEL "MP2-1" TO (3) RECEPTACLES.



1 ELECTRICAL PARTIAL ROOF PLAN
1/16" = 1'-0"



CONDUIT LEGEND	
——	POWER CONDUIT
----	CONTROLS CONDUIT
CONDUIT GENERAL NOTES:	
1. REMOVE ALL EXISTING CONDUITS AND ELECTRICAL EQUIPMENT SERVING MECHANICAL EQUIPMENT TO BE REMOVED.	
2. FOR POWER CIRCUITS, USE GALVANIZED STEEL RIGID METALLIC CONDUIT (RMC). WHERE POSSIBLE, FOLLOW ROUTING OF CHILLED WATER PIPING AND SECURE CONDUIT TO PIPING SUPPORTS. PROVIDE SUPPORTS EVERY 10' WHERE CONDUIT IS NOT SUPPORTED BY PIPING SUPPORTS.	
CONTROLS CONDUIT GENERAL NOTES:	
FOR CONTROLS CONDUIT, USE 1" RIGID PVC CONDUIT. WHERE POSSIBLE, FOLLOW ROUTING OF CHILLED WATER PIPING AND SECURE CONDUIT TO PIPING SUPPORTS. PROVIDE SUPPORTS EVERY 3' PER N.E.C. WHERE CONDUIT IS NOT SUPPORTED BY PIPING SUPPORTS.	



2 KEY PLAN

NO.	DATE	BY	REVISIONS	SEAL

GLOBAL MEP & FIRE ENGINEERING, INC.
8450 LINGER LODGE ROAD BRADENTON, FL 34202
PHONE: 941-758-2551 FAX: 941-739-6363
info@globalmef.com CA#: 6237

JERRY N. ZOLLER
ARCHITECT / PLANNER
914 14th STREET W. BRADENTON, FL. 34205 phone 748-4465

MANATEE CONVENTION CENTER
MANATEE COUNTY, FL

DESCRIPTION:

DATE: 01/10/11

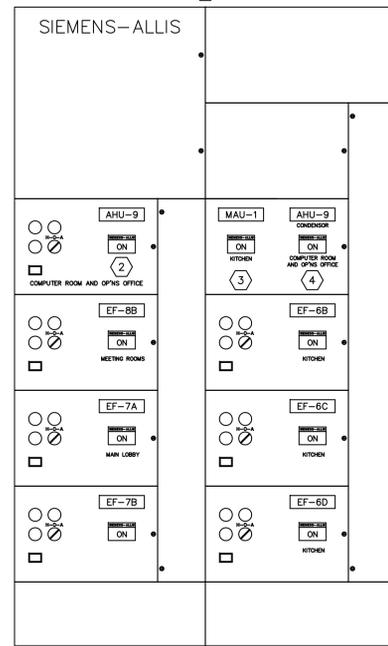
SCALE: AS NOTED

GLOBAL JOB NO. 3372-10

Drawn/Checked By: P JF / P JF

SHEET NO. E2.1

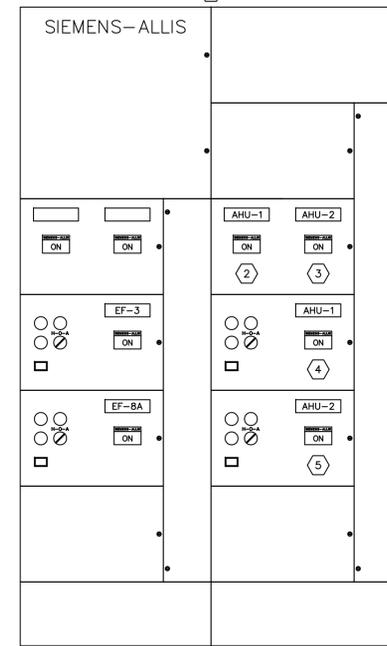
MOTOR CONTROL CENTER "N4N-1036"



"N4N-1036" KEYED NOTES

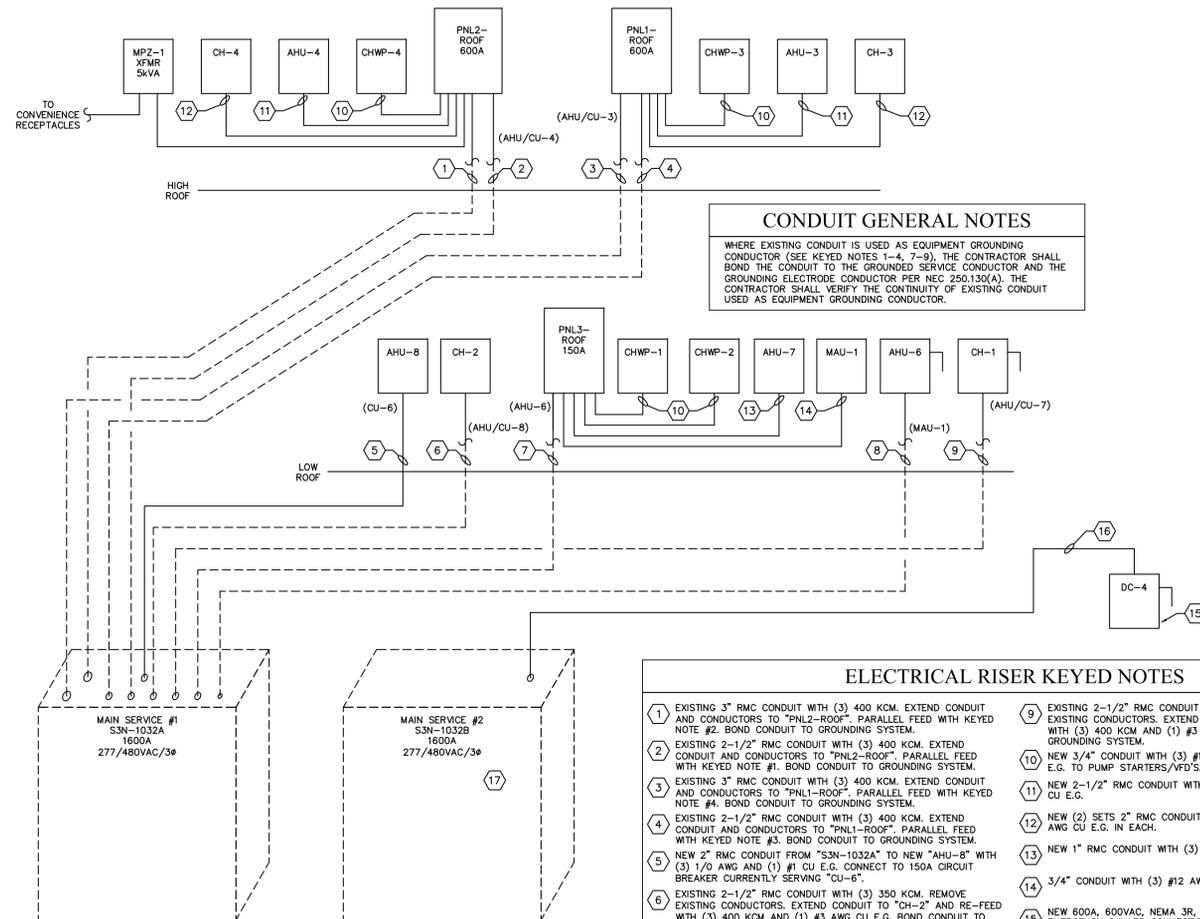
- 1 EXISTING TO REMAIN SIEMENS-ALLIS MOTOR CONTROL CENTER (MCC) "N4N-1036".
- 2 REPLACE EXISTING SIEMENS SIRIUS 3R OVERLOAD (0.4-1.6A) FOR "AHU-9" WITH NEW OVERLOAD SET TO NEW "AHU-9" FULL LOAD AMPS.
- 3 NOT CONNECTED ON LOAD SIDE. REMOVE EXISTING "MAU-1" AND "KITCHEN" TAGS/LABELS.
- 4 MARKED "AHU-9/CONDENSOR" SERVES "CU-9" BEING REMOVED IN THIS PROJECT. REMOVE CONDUCTORS FROM "CU-9" BACK TO MCC AND MAKE SAFE. REMOVE EXISTING TAGS/LABELS.

MOTOR CONTROL CENTER "N4N-1013"



"N4N-1013" KEYED NOTES

- 1 EXISTING TO REMAIN SIEMENS-ALLIS MOTOR CONTROL CENTER (MCC) "N4N-1013"
- 2 MARKED "AHU-1" SERVES "CU-1" BEING REMOVED IN THIS PROJECT. REMOVE CONDUCTORS FROM "CU-1" BACK TO MCC AND MAKE SAFE. REMOVE EXISTING TAGS/LABELS.
- 3 MARKED "AHU-1" SERVES "CU-1" BEING REMOVED IN THIS PROJECT. REMOVE CONDUCTORS FROM "CU-1" BACK TO MCC AND MAKE SAFE. REMOVE EXISTING TAGS/LABELS.
- 4 ADJUST OVERLOAD FOR "AHU-1" TO FULL LOAD AMPS OF NEW "AHU-1".
- 5 REPLACE EXISTING SIEMENS-ALLIS OLRO800 OVERLOAD (4.0-6.3A) FOR "AHU-2" WITH NEW OVERLOAD SET TO NEW "AHU-2" FULL LOAD AMPS.



CONDUIT GENERAL NOTES

WHERE EXISTING CONDUIT IS USED AS EQUIPMENT GROUNDING CONDUCTOR (SEE KEYED NOTES 1-4, 7-9), THE CONTRACTOR SHALL BOND THE CONDUIT TO THE GROUNDED SERVICE CONDUCTOR AND THE GROUNDING ELECTRODE CONDUCTOR PER NEC 250.130(A). THE CONTRACTOR SHALL VERIFY THE CONTINUITY OF EXISTING CONDUIT USED AS EQUIPMENT GROUNDING CONDUCTOR.

CONTROLS RISER KEYED NOTES

- 1 NEW 1" RIGID PVC CONTROLS CONDUIT TO "HIGH" ROOF. SEE CONTINUATION ON ROOF PLAN, SHEET E2.1.
- 2 NEW 1" RIGID PVC CONTROLS CONDUIT TO "LOW" ROOF. SEE CONTINUATION ON ROOF PLAN, SHEET E2.1.

CONTROLS CONDUIT NOTES

FOR CONTROLS CONDUIT, USE 1" RIGID PVC CONDUIT. FOLLOW ROUTING OF EXISTING POWER CONDUITS. PROVIDE SUPPORTS EVERY 3' PER N.E.C.
COORDINATE LOCATION, ROUTING, AND TERMINATION WITH CONTROLS CONTRACTOR BEFORE FABRICATING OR INSTALLING ANY MATERIALS.

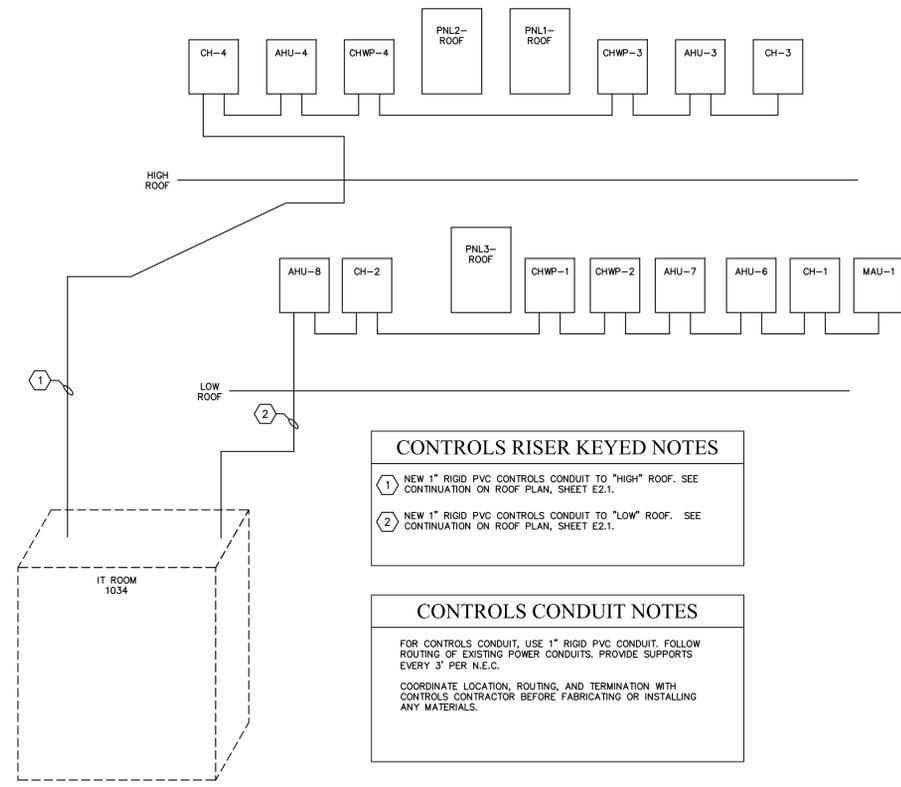
RISER LEGEND

- EXISTING TO REMAIN
- NEW
- (xxx-x) INDICATES EQUIPMENT CURRENTLY SERVED BY FEEDER

ELECTRICAL RISER KEYED NOTES

- 1 EXISTING 3" RMC CONDUIT WITH (3) 400 KCM. EXTEND CONDUIT AND CONDUCTORS TO "PNL2-ROOF". PARALLEL FEED WITH KEYED NOTE #2. BOND CONDUIT TO GROUNDING SYSTEM.
- 2 EXISTING 2-1/2" RMC CONDUIT WITH (3) 400 KCM. EXTEND CONDUIT AND CONDUCTORS TO "PNL2-ROOF". PARALLEL FEED WITH KEYED NOTE #1. BOND CONDUIT TO GROUNDING SYSTEM.
- 3 EXISTING 3" RMC CONDUIT WITH (3) 400 KCM. EXTEND CONDUIT AND CONDUCTORS TO "PNL1-ROOF". PARALLEL FEED WITH KEYED NOTE #3. BOND CONDUIT TO GROUNDING SYSTEM.
- 4 EXISTING 2-1/2" RMC CONDUIT WITH (3) 400 KCM. EXTEND CONDUIT AND CONDUCTORS TO "PNL1-ROOF". PARALLEL FEED WITH KEYED NOTE #3. BOND CONDUIT TO GROUNDING SYSTEM.
- 5 NEW 2" RMC CONDUIT FROM "SN-1032A" TO NEW "AHU-8" WITH (3) 1/0 AWG AND (1) #1 CU E.G. CONNECT TO 150A CIRCUIT BREAKER CURRENTLY SERVING "CU-6".
- 6 EXISTING 2-1/2" RMC CONDUIT WITH (3) 350 KCM. REMOVE EXISTING CONDUCTORS. EXTEND CONDUIT TO "CH-2" AND RE-FEED WITH (3) 400 KCM AND (1) #3 AWG CU E.G. BOND CONDUIT TO GROUNDING SYSTEM.
- 7 EXISTING 2-1/2" RMC CONDUIT WITH (6) 1/0 AWG. REMOVE (3) #1/0 AWG CONDUCTORS FROM C.B. FOR "CU-6". TURN EXISTING LB AND EXTEND CONDUIT AND REMAINING (3) 1/0 AWG CONDUCTORS TO "PNL3-ROOF". ADD JUNCTION/SPLICE BOX AS REQUIRED.
- 8 EXISTING 1-1/2" RMC CONDUIT WITH (3) 1/0 AWG. EXTEND CONDUIT AND CONDUCTORS TO "AHU-6".
- 9 EXISTING 2-1/2" RMC CONDUIT WITH (3) 350 KCM. REMOVE EXISTING CONDUCTORS. EXTEND CONDUIT TO "CH-1" AND RE-FEED WITH (3) 400 KCM AND (1) #3 AWG CU E.G. BOND CONDUIT TO GROUNDING SYSTEM.
- 10 NEW 3/4" CONDUIT WITH (3) #10 AWG CU AND (1) #10 AWG CU E.G. TO PUMP STARTERS/VFD'S.
- 11 NEW 2-1/2" RMC CONDUIT WITH (3) 300 KCM AND (1) #4 AWG CU E.G. IN EACH.
- 12 NEW (2) SETS 2" RMC CONDUIT WITH (3) 1/0 AWG AND (1) #3 AWG CU E.G. IN EACH.
- 13 NEW 1" RMC CONDUIT WITH (3) #6 AWG AND (1) #10 AWG CU E.G.
- 14 3/4" CONDUIT WITH (3) #12 AWG CU AND (1) #12 CU E.G.
- 15 NEW 600A, 600VAC, NEMA 3R, NON-FUSED DISCONNECT FOR EMERGENCY CHILLER CONNECTION. SEE FLOOR PLAN, SHEET E2.0.
- 16 NEW (3) SETS 2" CONDUIT WITH (3) 3/0 AWG AND (1) #1 AWG CU E.G. IN EACH.
- 17 INSTALL NEW 600A, 3-POLE CIRCUIT BREAKER AT SPACE ADJACENT TO 300A C.B. FOR "P3N-1048" IN EXISTING ITE TYPE FC-II SERIES 6 SWITCHBOARD "S3N-1032B".

SEE PANEL SCHEDULES, SHEET E1.0 FOR "PNL1-ROOF", "PNL2-ROOF", AND "PNL3-ROOF".



CONTROLS CONDUIT RISER

PARTIAL ELECTRICAL RISER

1 ELECTRICAL DETAILS
NO SCALE

SEAL	NO.	DATE	BY	REVISIONS
<p>GLOBAL MEP & FIRE ENGINEERING, INC. 8450 LINGER LODGE ROAD BRADENTON, FL 34202 PHONE: 941-758-2551 FAX: 941-739-6383 info@globalmef.com CA# 6237</p> <p>AIA P.A. JERRY N. ZOLLER ARCHITECT / PLANNER 914 14th STREET W. BRADENTON, FL. 34205 phone 748-4465</p>				
<p>MANATEE CONVENTION CENTER MANATEE COUNTY, FL</p>				
<p>DATE: 01/10/11</p>				
<p>SCALE: AS NOTED</p>				
<p>GLOBAL JOB NO. 3372-10</p>				
<p>Drawn/Checked By: P/JF/P/JF</p>				
<p>SHEET NO. E3.0</p>				

ELECTRICAL SPECIFICATIONS - DIVISION 16

ELECTRICAL

PART 1 - GENERAL

0.01 GENERAL SCOPE

A. THIS PROJECT WILL REQUIRE THE MODIFICATION AND EXTENSION OF EXISTING ELECTRICAL EQUIPMENT AND INSTALLATION OF NEW ELECTRICAL EQUIPMENT FOR NEW ROOFTOP HVAC SYSTEMS, NEW ROOFTOP AIR COOLED CHILLERS, AND PUMPS; INSTALLATION OF NEW CONTROLS CONDUIT AND RE-CONNECTION OF FIRE ALARM DEVICES. PLEASE REFER TO DRAWINGS AND SPECIFICATIONS FOR SPECIFIC REQUIREMENTS.

B. THE SCOPE OF WORK SPECIFIED HEREIN CONSISTS OF PROVIDING (DEFINED AS FURNISH AND INSTALL) ALL LABOR, MATERIALS, EQUIPMENT AND SERVICES REQUIRED TO COMPLETE THE ELECTRICAL AND RELATED WORK INDICATED ON THE DRAWINGS, AS SPECIFIED HEREIN AND SUBJECT TO THE TERMS AND CONDITIONS OF THE CONTRACT. ELECTRICAL WORK INCLUDES, BUT IS NOT LIMITED TO, THE FOLLOWING:

- PANELBOARDS
- CIRCUIT BREAKERS
- DISCONNECT SWITCHES
- GROUNDING
- RACEWAY FOR POWER DISTRIBUTION
- CONDUITS FOR POWER DISTRIBUTION
- WIRING DEVICES
- LIGHTING FIXTURES
- RACEWAY FOR COMMUNICATIONS WIRING (VOICE, DATA, CABLE TELEVISION)
- CONNECTION OF MOTORS, CONTROL DEVICES AND ELECTRICAL EQUIPMENT FURNISHED BY OTHERS
- TESTING
- ACCEPTANCE/WARRANTY
- RECORD DRAWINGS

C. ITEMS SPECIFIED HEREIN, SHOWN ON THE DRAWINGS, AND/OR REASONABLY INTERPRETED FROM THE DRAWINGS SHALL BE PROVIDED BY THIS DIVISION, WHETHER ITEM IS SPECIFICALLY SHOWN OR NOT.

1.01 GENERAL DOCUMENTS

A. CONTRACTOR SHALL BECOME THOROUGHLY ACQUAINTED WITH THE PROJECTS CONTRACT DOCUMENTS, INCLUDING THE ENTIRE CONSTRUCTION DOCUMENTS PACKAGE (e.g. ARCHITECTURAL, STRUCTURAL, CIVIL, MECHANICAL, PLUMBING, FIRE PROTECTION, ELECTRICAL DRAWINGS AND SPECIFICATIONS) BEFORE BID SUBMISSION. WORK OF THE ELECTRICAL CONTRACTOR MUST BE COORDINATED WITH THE WORK OF ALL TRADES.

B. THE INTENT OF THE DRAWINGS AND SPECIFICATIONS IS TO DESCRIBE THAT COMPLETE ELECTRICAL AND SPECIAL SYSTEMS ARE REQUIRED. HOWEVER, THE WORK SHALL BE COMPLETE EVEN THOUGH ITEMS MAY NOT BE SPECIFICALLY CALLED FOR OR SHOWN. INSTALLATIONS SHALL MEET ALL GOVERNING CODES, SHALL BE SUBJECT TO THE APPROVAL OF THE ARCHITECT/ENGINEER AND ALL AGENCIES HAVING JURISDICTION.

C. WORK NOT COVERED IN THIS SECTION, REVISIONS, CHANGES, AND OTHER PROVISIONS TO BE MADE IN THE STRUCTURE AS REQUIRED TO ACCOMMODATE ELECTRICAL ITEMS, SUCH AS CONDUIT, PANELS, ETC. SHALL BE PROVIDED BY THE TRADES CONCERNED. THE ELECTRICIAN SHALL, HOWEVER, NOTIFY ALL SUCH TRADES OF HIS EXACT REQUIREMENTS AHEAD OF TIME AND SHALL PAY THE COSTS OF ANY CUTTING OR PATCHING CAUSED BY FAILURE TO DO SO, ALL SUCH REPAIRS SHALL BE DONE ONLY BY MECHANICS OF THE TRADES INVOLVED.

1.02 PERMITS, TAXES, FEES.

A. CONTRACTOR SHALL OBTAIN ALL GOVERNMENTAL PERMITS, PAY ALL SALES TAXES AND OTHER ASSOCIATED FEES, INCLUDING COSTS FOR UTILITY CONNECTIONS, REQUIRED TO PERFORM THE INTENDED ELECTRICAL WORK. CONTRACTOR SHALL FILE ALL NECESSARY PERMITS, PREPARE ALL NECESSARY DOCUMENTS AND OBTAIN ALL NECESSARY APPROVALS OF ALL GOVERNMENTAL AGENCIES HAVING JURISDICTION. CONTRACTOR SHALL OBTAIN ALL NECESSARY APPROVALS OF INSPECTION FOR ELECTRICAL WORK AND DELIVER SAME TO THE OWNER AND ARCHITECT BEFORE REQUEST FOR ACCEPTANCE AND FINAL PAYMENT FOR WORK. ALL LOCKS SHALL BE KEPT A LIKE. TURN OVER ALL KEYS TO OWNER.

B. CONTRACTOR SHALL INCLUDE IN THE WORK, WITHOUT EXTRA COST TO THE OWNER, ALL LABOR, MATERIALS, SERVICES, APPARATUS, OR DRAWINGS NECESSARY TO COMPLY WITH ALL APPLICABLE LAWS, ORDINANCES, RULES AND REGULATIONS, WHETHER OR NOT SHOWN ON DRAWINGS AND/OR SPECIFIED.

C. ALL MATERIALS FURNISHED AND ALL WORK INSTALLED SHALL COMPLY WITH THE FOLLOWING:

- NATIONAL FIRE ALARM CODE
- APPLICABLE STATE AND LOCAL CODES
- NATIONAL BUREAU OF FIRE UNDERWRITERS REGULATIONS OF THE SERVING UTILITY COMPANIES

D. ALL MATERIAL AND EQUIPMENT PROVIDED FOR THE ELECTRICAL WORK SHALL BEAR THE APPROVAL LABEL, OR SHALL BE LISTED, BY UNDERWRITERS LABORATORIES, INC.

1.03 MEASUREMENTS

A. SHOULD THE CONTRACTOR DISCOVER ANY DISCREPANCY BETWEEN ACTUAL MEASUREMENTS AND THOSE INDICATED ON THE DRAWINGS, WHICH PREVENTS FOLLOWING GOOD PRACTICE OR THE INTENT OF THE DRAWINGS AND SPECIFICATIONS, HE SHALL NOTIFY THE ARCHITECT/ENGINEER THROUGH THE GENERAL CONTRACTOR, AND SHALL NOT PROCEED WITH HIS WORK UNTIL HE HAS RECEIVED INSTRUCTIONS FROM THE ARCHITECT/ENGINEER. ALL REQUESTS FOR INFORMATION (RFI) SHALL INCLUDE A PROPOSED SOLUTION.

B. PRIOR TO ROUGH-IN OF THE EQUIPMENT THE OWNER, ARCHITECT AND ENGINEER RESERVE THE RIGHT TO RELOCATE ANY PANELBOARD, DISCONNECT, STARTER, LIGHTING FIXTURE, WIRING DEVICE, COMMUNICATIONS OUTLET, ETC. THREE (3) FEET IN ANY DIRECTION WITHOUT ANY ADDITIONAL CHARGE, FEE, OR CHANGE ORDER.

1.04 DRAWINGS

A. DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL LOCATION OF THE ELECTRICAL AND SPECIAL SYSTEMS WORK INCLUDED IN THE CONTRACT. THE ENTIRE CONSTRUCTION DOCUMENTS PACKAGE (DRAWINGS AND SPECIFICATIONS) SHALL BE EXAMINED FOR EXACT LOCATION OF FIXTURES, DEVICES AND EQUIPMENT. WHERE ITEMS ARE NOT LOCATED BY THE DRAWINGS OR SPECIFICATIONS OR THE GENERAL CONTRACTORS CONSULTANTS THEN THE ITEMS SHALL BE LOCATED PER THE ENGINEERING DRAWINGS, HOWEVER, THE DRAWINGS ARE NOT TO BE SCALED.

B. CONTRACTOR SHALL FOLLOW THE ELECTRICAL DRAWINGS IN LAYING OUT WORK AND SHALL COORDINATE WITH THE DRAWINGS OF OTHER TRADES TO VERIFY SPACES IN WHICH WORK WILL BE INSTALLED, MAINTAINING CLEARANCES, HEADROOM AND SPACE AT ALL LOCATIONS. WHERE HEADROOM OR SPACE CONDITIONS APPEAR INADEQUATE, THE ARCHITECT/ENGINEER SHALL BE NOTIFIED BEFORE PROCEEDING WITH INSTALLATION. ALL REQUESTS FOR INFORMATION (RFI) SHALL INCLUDE A PROPOSED SOLUTION.

C. IF DIRECTED BY THE ARCHITECT/ENGINEER, THE CONTRACTOR SHALL, WITHOUT EXTRA CHARGE, MAKE REASONABLE MODIFICATIONS IN THE LOCATIONS OF ELECTRICAL WORK AS NEEDED TO PREVENT CONFLICTS WITH WORK OF OTHER TRADES AND FOR PROPER INSTALLATION OF THE WORK.

1.05 SUBSTITUTION OF SPECIFIED EQUIPMENT

A. MATERIALS OR PRODUCTS SPECIFIED BY TRADE NAME, MANUFACTURER'S NAME OR CATALOG NUMBER SHALL BE PROVIDED AS SPECIFIED.

B. SUBSTITUTIONS ARE NOT PERMITTED WITHOUT WRITTEN APPROVAL FROM THE ENGINEER VIA THE ARCHITECT TEN (10) WORKING DAYS PRIOR TO BID DATE. APPROVALS OF "EQUIVALENT" MATERIALS OR PRODUCTS WILL BE MADE AVAILABLE TO ALL KNOWN BIDDERS AND ISSUED AS AN ADDENDUM (PRIOR TO BID) TO THE CONTRACT DOCUMENTS IF SUBSTITUTED MATERIALS OR PRODUCTS ARE APPROVED BY ARCHITECT/ENGINEER.

C. ANY CONTRACTOR PROPOSING AN "EQUIVALENT" MATERIAL OR PRODUCT MUST SUBMIT, WITH THE REQUEST, COMPLETE CATALOG INFORMATION TO PERMIT EVALUATION OF THE PRODUCT. IN THE CASE OF LIGHTING FIXTURES, AN INDEPENDENT TESTING LABORATORY TEST REPORT (NOT THE MANUFACTURER'S) STATING FIXTURE EFFICIENCY AND PERFORMANCE IN THIS SPECIFICATION. WHERE CONDUIT TYPE IS NOT NOTED ON THE DRAWINGS.

D. CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE CORRECTIONS TO ALL SITUATIONS CREATED BY THE SUBSTITUTION OF MATERIALS OR PRODUCTS. THE ACCEPTANCE OF SUBSTITUTED MATERIALS OR PRODUCTS, EITHER PRIOR TO BID OR THEREAFTER, DOES NOT RELIEVE THE CONTRACTOR FROM THE RESPONSIBILITY TO PROVIDE CORRECTIONS, AT HIS/HER EXPENSE, FOR ALL DISCREPANCIES AND CONFLICTS CREATED BY THE SUBSTITUTION OF MATERIALS OR PRODUCTS.

1.06 SHOP DRAWINGS

A. CONTRACTOR SHALL SUBMIT FOR REVIEW AND APPROVAL SHOP DRAWINGS OF ALL MATERIALS OR PRODUCTS REQUIRED TO COMPLETE THE PROJECT AND NO MATERIALS OR PRODUCTS SHALL BE DELIVERED TO THE JOB SITE OR INSTALLED UNTIL THE CONTRACTOR HAS ENGINEER APPROVED SHOP DRAWINGS. SHOP DRAWINGS FOR MATERIALS OR PRODUCTS SHALL BE SUBMITTED AS ONE COMPLETE PACKAGE. CONTRACTOR SHALL FURNISH THE NUMBER OF COPIES REQUIRED BY THE GENERAL AND SPECIAL CONDITIONS OF THE CONTRACT, BUT IN NO CASE LESS THAN SIX (6) IDENTICAL COPIES. SHOP DRAWINGS SHALL BE MANUFACTURED BY SQUARE "D", GENERAL ELECTRIC, CUTLER-HAMMER OR SIEMENS.

B. SAMPLES, DRAWINGS, SPECIFICATIONS, CUT SHEETS, ETC. SUBMITTED FOR REVIEW SHALL BE PROPERLY LABELED AND SHALL INDICATE THE SPECIFIC ITEM FOR WHICH THE CONTRACTOR IS PROPOSING TO PROVIDE.

C. "NO EXCEPTION" RENDERED ON SHOP DRAWINGS SHALL NOT BE CONSIDERED AS A GUARANTEE THAT THE MATERIAL OR MEASUREMENTS, WHERE SHOP DRAWINGS ARE REVIEWED, SAID "NO EXCEPTION" DOES NOT IN ANY WAY RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY OF PROVIDING LABOR, MATERIAL OR PRODUCTS REQUIRED TO PERFORM THE ELECTRICAL WORK REQUIRED BY THE DRAWINGS AND SPECIFICATIONS.

D. SHOP DRAWINGS SUBMITTALS ARE REQUIRED ON ELECTRICAL DISTRIBUTION EQUIPMENT, PANELBOARDS, TRANSFORMERS, CONDUIT, CONDUCTORS (WIRE), CIRCUIT BREAKERS, DISCONNECT SWITCHES, LIGHT FIXTURES, TIMECLOCKS, CONTACTORS AND SURGE PROTECTION DEVICES (TVSS).

PART 2 - PRODUCTS

2.01 PANELBOARDS

A. PROVIDE POWER DISTRIBUTION EQUIPMENT AS INDICATED ON THE ELECTRICAL RISER DIAGRAM AND PANEL SCHEDULES. PANELBOARDS SHALL BE OF DEAD FRONT CONSTRUCTION AND SHALL BE MANUFACTURED BY SQUARE "D", GENERAL ELECTRIC, CUTLER-HAMMER OR SIEMENS.

B. PANELBOARDS SHALL NOT BE LESS THAN 20" WIDE AND SHALL BE FABRICATED FROM COE GAUGE STEEL WITH A POST FABRICATION APPLIED GRAY ENAMEL FINISH.

C. PANELBOARD AND INTERNAL COMPONENTS SHALL BE CONSTRUCTED AND UL LISTED TO WITHSTAND THE THERMAL AND SHORT CIRCUIT RATED CURRENT ON THE ELECTRICAL RISER DIAGRAM OR PANEL SCHEDULES.

D. WIRE GUTTER SPACE SHALL COMPLY WITH UL AND NEC STANDARDS FOR PANELBOARDS.

E. PANELBOARDS SHALL BE SURFACE OR FLUSH MOUNTED AS SHOWN ON PANEL SCHEDULES AND/OR FLOOR PLANS. PANEL SHALL BE EQUIPPED WITH RECESSED HINGES, FLUSH LOCKS WITH CATCH AND SPRING LOADED DOOR FULL. ALL LOCKS SHALL BE KEPT A LIKE. TURN OVER ALL KEYS TO OWNER.

F. PROVIDE TYPED CIRCUIT IDENTIFICATION CARD INSIDE EACH PANEL. BASE DESCRIPTION ON LOAD SCHEDULE.

2.02 CIRCUIT BREAKERS:

A. CIRCUIT BREAKERS SHALL BE QUICK-MAKE, QUICK-BREAK, THERMAL MAGNETIC MOLDED CASE OF FRAME SIZE, NUMBER OF POLES AND TRIP RATINGS AS SHOWN ON THE ELECTRICAL RISER DIAGRAM AND PANEL SCHEDULES. MULTI-POLE BREAKERS SHALL HAVE A SINGLE HANDLE TO TRIP ALL POLES AT ONCE. CIRCUIT BREAKERS SHALL BE FROM LARGER SIZE MANUFACTURER AS THE POWER DISTRIBUTION EQUIPMENT. PROVIDE CIRCUIT BREAKERS WITH GROUND FAULT AND ARC FAULT PROTECTION WHERE REQUIRED.

B. DISCONNECT SWITCHES SHALL BE UL LISTED AND FROM SAME MANUFACTURER AS POWER DISTRIBUTION EQUIPMENT. SWITCH BLADES SHALL BE MADE WITH BRASS. ALL CURRENT CARRYING PARTS SHALL BE PLATED TO RESIST CORROSION.

C. SWITCHES SHALL BE QUICK-MAKE, QUICK-BREAK SUCH THAT, DURING NORMAL OPERATION, THE CONTACTS SHALL NOT BE CAPABLE OF BEING RESTRAINED BY THE OPERATING HANDLE AFTER THE CLOSING OR OPENING ACTION OF THE CONTACTS HAS STARTED. THE HANDLE AND MECHANISM SHALL BE AN INTEGRAL PART OF THE BOX, NOT THE COVER, WITH POSITIVE PADLOCKING PROVISIONS IN THE "OFF" POSITION.

D. PROVIDE HEAVY-DUTY, NEMA-1 ENCLOSURE UNLESS NEMA-3R (RAIN PROOF) IS REQUIRED BY THE DRAWINGS. LOCATION, ENCLOSURES SHALL BE PROVIDED WITH A POST FABRICATION APPLIED GRAY ENAMEL FINISH.

E. FUSIBLE SWITCHES SHALL BE CAPABLE OF FIELD CONVERSION FROM STANDARD CLASS-H FUSES SPACING TO CLASS-R FUSES SPACING WITHOUT AFFECTING THE UL LISTING. THE SWITCH MUST ALSO ACCEPT CLASS-R FUSES AND HAVE A FIELD ADJUSTABLE (UL LISTED) REJECT FEATURE TO REJECT ALL FUSES EXCEPT CLASS-R. THE UL LISTED SHORT CIRCUIT RATING, WHEN EQUIPPED WITH CLASS-R OR CLASS-R FUSES, SHALL BE 20,000 AMPERES RMS SYMMETRICAL.

2.04 GROUNDING

A. PROVIDE A SINGLE, COMPLETE GROUNDING NETWORK FOR THE ENTIRE ELECTRICAL AND SPECIAL SYSTEMS WHICH COMPLIES WITH NEC REQUIREMENTS.

B. SERVICE NEUTRAL AND EQUIPMENT GROUND SHALL BE CONNECTED AT ONE POINT INSIDE THE MAIN DISTRIBUTION PANEL WITH ONE CONTINUOUS CONDUCTOR FROM THIS LOCATION TO THREE TO FIVE LONG DRIVEN GROUND RODS LOCATED IN A TRIANGULAR PATTERN, TO BUILDING STEEL AND TO METAL WATER PIPE.

C. PROVIDE BONDING CONNECTION WITH GROUND BUSHING TO CONDUIT FROM DISTRIBUTION PANEL TO THE BREAKERS AND PANELS SERVED.

D. CONNECTIONS TO GROUND RODS SHALL BE MADE WITH EXOTHERMIC WELDS. PROVIDE TEST WELL OVER EACH GROUND ROD.

2.05 CONDUIT FOR POWER DISTRIBUTION WIRING

A. WIRING FOR POWER DISTRIBUTION SHALL BE INSTALLED IN RIGID METALLIC (GALVANIZED STEEL) CONDUIT (RMC), INTERMEDIATE METAL CONDUIT (IMC), ELECTRICAL METALLIC TUBING (EMT), FLEXIBLE METAL CONDUIT OR SCHEDULE 40/80 PVC CONDUIT. PROVIDE THE CONDUIT TYPE INDICATED IN THIS SPECIFICATION. WHERE CONDUIT TYPE IS NOT NOTED ON THE DRAWINGS.

B. RIGID GALVANIZED STEEL (RGS) CONDUIT WITH THREADED FITTINGS SHALL BE PROVIDED ABOVE GROUND AT EXPOSED INTERIOR AND EXTERIOR LOCATIONS WHERE CONDUIT MAY BE SUBJECT TO PHYSICAL DAMAGE FROM VEHICLES, MAINTENANCE EQUIPMENT, ETC. PROVIDE LARGE RADIUS SWEEP ELBOWS FOR RGS CONDUIT.

C. IMC CONDUIT WITH THREADED FITTINGS SHALL BE PROVIDED IN ABOVE GROUND, EXPOSED INTERIOR AND EXTERIOR LOCATIONS WHERE CONDUIT WILL NOT BE SUBJECT TO PHYSICAL DAMAGE, BUT WILL BE EXPOSED TO RAIN WATER, HAZARDOUS CONDITIONS, ETC. THREADED FITTINGS FOR IMC IS NOT ACCEPTABLE.

D. EMT CONDUIT WITH SET SCREW FITTINGS SHALL BE PROVIDED IN ABOVE GROUND INTERIOR LOCATIONS WHERE CONDUIT WILL NOT BE SUBJECT TO PHYSICAL DAMAGE AND WILL REMAIN COMPLETELY DRY DURING ALL WEATHER CONDITIONS.

E. EMT CONDUIT SHALL NOT BE USED IN LOCATIONS WHERE CONDUIT COULD BE EXPOSED TO DIRECT/INDIRECT RAIN/WATER/LIQUIDS, WIND DRIVEN RAIN, HOSE DOWN AREAS, OPEN AIR AREAS WITHOUT AIR CONDITIONING (UNLESS CONDUIT WILL REMAIN COMPLETELY DRY DURING ALL WEATHER CONDITIONS) AND AREAS WHERE RAIN/WATER/LIQUIDS MIGHT DRIP OR RUN INTO CONDUIT, BACKBOXES OR DEVICES.

F. SCHEDULE 80 PVC CONDUIT SHALL BE USED FOR UNDERGROUND SERVICE ENTRANCE FEEDERS AND ALL BELOW ROADWAYS (I.N.U.) ON THE RISER DIAGRAMS AND/OR FLOOR PLANS. PROVIDE LARGE RADIUS RIGID GALVANIZED STEEL ELBOWS FOR SCHEDULE 80 PVC MECHANICAL COAT RGS ELBOWS WITH BLACK MASTIC.

G. SCHEDULE 40 PVC CONDUIT SHALL BE USED FOR ALL UNDERGROUND FEEDERS AND WIRING EXCEPT FOR SERVICE ENTRANCE FEEDERS AND UNDER ROADWAYS. PROVIDE LARGE RADIUS RIGID GALVANIZED STEEL ELBOWS FOR SCHEDULE 40 PVC CONDUIT WHERE OVER ALL CONDUIT RUN IS GREATER THAN 100 FEET. COAT RGS ELBOWS WITH BLACK MASTIC.

H. PVC CONDUIT SHALL NOT BE USED MORE THAN SIX INCHES ABOVE FINISHED GRADE IN EITHER INTERIOR OR EXTERIOR LOCATIONS. PVC CONDUIT SHALL TRANSITION TO METAL CONDUIT NO MORE THAN SIX INCHES ABOVE GRADE.

I. ALL PVC CONNECTIONS SHALL BE WATERTIGHT.

J. FLEXIBLE METAL CONDUIT SHALL BE USED TO CONNECT LIGHTING FIXTURES AND EQUIPMENT SUBJECT TO VIBRATION, INCLUDING A/C EQUIPMENT, MOTORS, TRANSFORMERS, ETC. PROVIDE ELECTRICAL DRAWINGS AND CONDUIT AND FITTINGS FOR EXTERIOR APPLICATIONS.

K. ALL CONDUIT IN WALLS, PARTITIONS, OR CEILINGS IN FINISHED AREAS, CONDUIT SHALL NOT BE EXPOSED IN FINISHED AREAS EXCEPT WHEN ABSOLUTELY NECESSARY. CONDUIT SHALL BE STRAIGHT AND PARALLEL TO BUILDING LINES.

L. DURING CONSTRUCTION CONDUIT SHALL BE PROTECTED AGAINST DAMAGE AND ENTRANCE OF WATER, DIRT OR FOREIGN MATERIAL WITH WATERTIGHT CAPS. FIRE RATED ASSEMBLIES SHALL BE PROVIDED WHERE CONDUIT PASSES THROUGH FIRE RATED CONSTRUCTION. REFER TO THE ARCHITECTURAL DRAWINGS FOR EXACT LOCATION OF FIRE RATED CONSTRUCTION. REFER TO THE FIRE STOP PENETRATION DETAILS ON THE ELECTRICAL DRAWINGS.

M. INSULATING BUSHINGS WITH DOUBLE LOCK-NUTS SHALL BE USED WHEREVER A NEW CONDUIT 1-1/2" DIA. LARGER ENTERS A BOX, PANEL, DISCONNECT OR ELECTRICAL EQUIPMENT.

N. CONDUIT SIZES SHOWN ON THE DRAWINGS AND SCHEDULES ARE THE MINIMUM SIZES REQUIRED. LARGER SIZE CONDUIT TO FACILITATE WIRE PULLS, ETC. IS PERMITTED.

2.06 CONDUCTORS

A. PROVIDE 75 DEGREE CELSIUS (167 DEGREE FAHRENHEIT) TYPE THW, THW, THWN, OR XHHW INSULATED COPPER CONDUCTORS RATED AT 600V FOR POWER DISTRIBUTION WIRING. CONDUIT WIRE FILL SHOWN ON THE DRAWINGS AND FEEDER SCHEDULES ARE BASED ON TYPE THW WIRE UNLESS NOTED OTHERWISE.

B. CONDUCTORS UP TO AND INCLUDING NO. 10 AWG SHALL BE SOLID AND CONDUCTORS NO. 8 AWG AND LARGER SHALL BE STRANDED. MINIMUM CONDUCTOR SIZE SHALL BE NO.12 AWG. CONDUCTORS SHALL BE CONTINUOUS BETWEEN EQUIPMENT AND DEVICES. SPLICES ARE TO BE MADE ONLY IN ACCESSIBLE JUNCTION OR OUTLET BOXES AND SHOULD BE KEPT TO A MINIMUM SPACES WHERE CONDUIT AND NO.10 WIRE SHALL BE MADE WITH PRESSURE CONNECTORS CAPABLE OF CARRYING FULL WIRE CAPACITY. SPLICES ON ABOVE WIRE AND LARGER SHALL BE MADE WITH SOLDERLESS LUGS WRAPPED WITH BOTH RUBBER AND PLASTIC ELECTRICAL TAPE. CONNECTIONS TO FIXED EQUIPMENT TERMINALS ARE TO BE MADE WITH SOLDERLESS LUGS.

C. ALL NEW CONDUIT USED FOR POWER DISTRIBUTION SHALL CONTAIN A GROUNDING CONDUCTOR. CONDUIT RACEWAY SHALL NOT BE USED IN PLACE OF A GROUNDING CONDUCTOR.

D. MC TYPE CABLE MAY BE UTILIZED IF ALLOWED BY THE JURISDICTION.

2.07 WIRING DEVICES

A. THE EXTENT OF WIRING DEVICE WORK IS INDICATED ON THE DRAWINGS. WIRING DEVICES ARE DEFINED AS SINGLE DISCRETE UNITS OF ELECTRICAL DISTRIBUTION SYSTEMS THAT ARE INTENDED TO CARRY BUT NOT UTILIZE ELECTRIC ENERGY. TYPES OF WIRING DEVICES IN THIS SECTION INCLUDE:

- RECEPTACLES,
- GROUND FAULT CIRCUIT INTERRUPTERS,
- NEMA-3R (RAIN PROOF) IS REQUIRED BY THE DRAWINGS.
- LIGHT SWITCHES.

B. PROVIDE WHITE COLORED WIRING DEVICES AND MATCHING THERMOPLASTIC COVERPLATES UNLESS NOTED OTHERWISE. FINAL COLOR SELECTION SHALL BE COORDINATED WITH OWNER/ARCHITECT PRIOR TO BID.

2.08 LIGHTING FIXTURES

A. CONTRACTOR SHALL PROVIDE, WIRE AND LAMP ALL LIGHTING FIXTURES SHOWN ON SITE PLAN, FLOOR PLANS AND LIGHTING FIXTURE SCHEDULE. AT SUBSTANTIAL COMPLETION, CONTRACTOR SHALL CLEAN DUST, DEBRIS, FINGERPRINTS, ETC. FROM ALL FIXTURE LENSES, LOVERS, AND REFLECTORS AND SHALL REPLACE ALL LAMPS, BALLASTS, ETC. THAT ARE NOT WORKING.

B. CONTRACTOR SHALL REVIEW THE ARCHITECTURAL DRAWINGS (SECTIONS, ELEVATIONS, DETAILS, ETC.) FOR LIGHTING FIXTURES WHICH MAY BE SHOWN AND SHALL NOTIFY THE ARCHITECT/ENGINEER PRIOR TO BID IF FIXTURES APPEAR ON THE ARCHITECTURAL DRAWINGS THAT DO NOT APPEAR ON ELECTRICAL DRAWINGS.

C. OVERLOAD RELAYS: AMBIENT-COMPENSATED TYPE WITH INVERSE-TIME-CURRENT CHARACTERISTIC. PROVIDE WITH HEATERS OR SENSORS IN EACH PHASE MATCHED TO EQUIPMENT. PROVIDE WITH THERMISTOR MOTOR TO WHICH CONNECTED WITH APPROPRIATE ADJUSTMENT FOR DUTY CYCLE.

D. ENCLOSURES: FOR INDIVIDUALLY MOUNTED MOTOR CONTROLLERS AND CONTROL DEVICES, COMPLY WITH NEMA STANDARD 250. ENCLOSURES FOR ELECTRICAL EQUIPMENT (1000 VOLTS MAXIMUM). PROVIDE ENCLOSURES SUITABLE FOR THE ENVIRONMENTAL CONDITIONS AT THE CONTROLLER LOCATION.

E. PROVIDE CONTROL POWER TRANSFORMER INTEGRAL WITH CONTROLLER WHERE NO OTHER SUPPLY OF CONTROL POWER TO CONTROLLER IS INDICATED. PROVIDE CONTROL POWER TO CONTROLLER WITH ADEQUATE CAPACITY TO OPERATE IN CONNECTED PILOT, INDICATING AND CONTROL DEVICES.

F. COMBINATION CONTROLLER: SWITCH TYPE, FUSED, QUICK-MAKE, QUICK-BREAK SWITCH, FACTORY ASSEMBLED WITH CONTROLLER AND ARRANGED TO DISCONNECT IT FROM THE MAIN WIRE AND LARGER SHALL BE MADE WITH PRESSURE MANUFACTURERS RECOMMENDATION. INTERLOCK SWITCH WITH UNIT COVER OR DOOR.

G. AUXILIARY CONTROL DEVICES SHALL BE FACTORY INSTALLED IN CONTROLLER ENCLOSURE.

H. AUTOMATIC SELECTOR SWITCHES: INSTALL IN COVERS OF CONTROLLERS OF MOTORS STARTED AND STOPPED BY AUTOMATIC CONTROLS OR INTERLOCKS WITH OTHER EQUIPMENT. MAKE CONTROL CONNECTIONS SO ONLY THE MANUAL AND AUTOMATIC CONTROL DEVICES THAT HAVE NO SAFETY FUNCTIONS WILL BE BYPASSED WHEN THE SWITCH IS IN THE HAND POSITION. CONNECT 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. MAKE CONTROL AND CIRCUIT CONNECTIONS TO A HAND-OFF-AUTOMATIC SWITCH OR TO MORE THAN ONE AUTOMATIC CONTROL DEVICE IN ACCORDANCE WITH MANUFACTURER PROVIDED WIRING DIAGRAM.

I. RACEWAY FOR CONTROLS WIRING

A. PROVIDE EACH CONDUIT WITH PULL STRING ROUTED BETWEEN EACH JUNCTION BOX OR ENCLOSURE.

B. USE SCHEDULE 80 RIGID PVC ON ROOF.

C. PROVIDE CONDUIT WITH PULL STRING ROUTED BETWEEN EACH JUNCTION/PULL BOX.

PART 3 - EXECUTION

3.01 COOPERATION WITH OTHER TRADES

A. CONTRACTOR SHALL GIVE FULL COOPERATION TO OTHER TRADES AND SHALL FURNISH IN WRITING TO THE ARCHITECT/ENGINEER ANY INFORMATION NECESSARY TO PERMIT THE WORK OF OTHER TRADES TO BE INSTALLED SATISFACTORILY AND WITH THE LEAST POSSIBLE INTERFERENCE OR DELAY.

B. WHERE ELECTRICAL WORK WILL BE INSTALLED IN CLOSE PROXIMITY TO, OR MAY INTERFERE WITH, WORK OF OTHER TRADES THE CONTRACTORS SHALL ASSIST EACH OTHER IN WORKING OUT A SATISFACTORY SPACE FOR EACH CONTRACTORS WORK. IF DIRECTED BY THE ARCHITECT/ENGINEER, THE CONTRACTOR SHALL PREPARE COMPOSITE WORKING DRAWINGS AND SECTIONS AT SUITABLE SCALE, NOT LESS THAN 1/4" = 1'-0", CLEARLY SHOWING HOW WORK IS TO BE INSTALLED IN RELATION TO WORK OF

D. RECEPTACLES

1. SIMPLEX, PROVIDE SPECIFICATION GRADE 20-AMPERE, 125 VOLT, HEAVY-DUTY, 2-POLE, 3-WIRE, RECEPTACLE WITH GREEN HEXAGONAL EQUIPMENT GROUND SCREW AND METAL PLASTER EARS DESIGNED FOR SIDE AND BACK WIRING WITH SPRING LOADED, SCREW ACTIVATED PRESSURE PLATE IN NEMA 5-20R INTERIOR METAL CONDUIT (IMC). RECEPTACLES SHALL BE COORDINATE AND "SPECIAL" RECEPTACLES WITH THE EQUIPMENT SERVED PRIOR TO ROUGH-IN. PROVIDE RECEPTACLE RATING AND CONFIGURATION TO MATCH EQUIPMENT SERVED.

2. DUPLEX: PROVIDE SPECIFICATION GRADE 20-AMPERE, 125 VOLT, HEAVY-DUTY, 2-POLE, 3-WIRE, RECEPTACLE WITH GREEN HEXAGONAL EQUIPMENT GROUND SCREW AND METAL PLASTER EARS DESIGNED FOR SIDE AND BACK WIRING WITH SPRING LOADED, SCREW ACTIVATED PRESSURE PLATE IN NEMA 5-20R CONFIGURATION.

E. GROUND-FAULT CIRCUIT INTERRUPTERS

1. PROVIDE SPECIFICATION GRADE "FEED-THRU" TYPE GROUND-FAULT CIRCUIT INTERRUPTERS, WITH NOT HEAVY-DUTY DUPLEX RECEPTACLES, CAPABLE OF PROTECTING CONNECTED DOWNSTREAM RECEPTACLES ON SINGLE CIRCUIT, AND OF BEING INSTALLED IN A 2-3/4" DEEP OUTLET BOX WITHOUT ADAPTER, GROUNDING TYPE UL RATED CLASS A, GROUP 1, RATED 20-AMPERES, 120-VOLTS, 60 HZ, WITH SOLID-STATE GROUND-FAULT SENSING AND SIGNALING, WITH 5 MILLIAMPERES GROUND-FAULT TRIP LEVEL, EQUIP WITH NEMA 5-20R CONFIGURATION.

F. LIGHT SWITCHES

1. SINGLE AND TWO POLE: PROVIDE HARD USE SPECIFICATION GRADE RECESS MOUNTED SINGLE AND TWO-POLE QUIET TOGGLE SWITCHES, 20-AMPERE, 120/277 VOLTS AC. PROVIDE WITH MOUNTING YUGS INSULATED FROM MECHANISM, PLASTER EARS, SWITCH HANDLE, AND SIDE-WIRED SCREW TERMINALS.

2. THREE AND FOUR WAY: PROVIDE HARD USE SPECIFICATION GRADE RECESS MOUNTED 3 AND 4-WAY AC QUIET SWITCHES, 20-AMPERES, 120/277 VOLTS PROVIDE WITH MOUNTING YUGS INSULATED FROM MECHANISM, PLASTER EARS, SWITCH HANDLE, AND SIDE-WIRED SCREW TERMINALS, WITH BREAK-OFF TAB FEATURES, WHICH ALLOWS WIRING WITH SEPARATE OR COMMON TERMINALS.

2.09 EQUIPMENT FURNISHED BY OTHERS

A. CONTRACTOR SHALL PROVIDE ELECTRICAL SERVICE TO EQUIPMENT PROVIDED BY OTHERS INCLUDING, BUT NOT LIMITED TO, CIRCUIT BREAKERS, CONDUIT, WIRE, DISCONNECT SWITCHES, ETC AS REQUIRED BY OTHERS.

2.10 MOTOR CONTROLLERS

A. PROVIDE FULL-VOLTAGE, NON-REVERSING, ACROSS-THE-LINE, MAGNETIC MOTOR CONTROLLER(S) WITH THE RATINGS AND CHARACTERISTICS OF THE SUPPLY CIRCUIT, THE MOTOR, THE REQUIRED CONTROL SEQUENCE, AND THE DUTY CYCLE OF THE MOTOR. PROVIDE THE PILOT DEVICE, AND CONTROL CIRCUITING AFFECTING CONTROLLER FUNCTIONS. PROVIDE CONTROLS THAT ARE HORSEPOWER RATED BY THE MOTOR CONTROLLER.

B. CONTACTS SHALL OPEN EACH UNGROUNDING CONNECTION TO THE MOTOR.

C. OVERLOAD RELAYS: AMBIENT-COMPENSATED TYPE WITH INVERSE-TIME-CURRENT CHARACTERISTIC. PROVIDE WITH HEATERS OR SENSORS IN EACH PHASE MATCHED TO EQUIPMENT. PROVIDE WITH THERMISTOR MOTOR TO WHICH CONNECTED WITH APPROPRIATE ADJUSTMENT FOR DUTY CYCLE.

D. ENCLOSURES: FOR INDIVIDUALLY MOUNTED MOTOR CONTROLLERS AND CONTROL DEVICES, COMPLY WITH NEMA STANDARD 250. ENCLOSURES FOR ELECTRICAL EQUIPMENT (1000 VOLTS MAXIMUM). PROVIDE ENCLOSURES SUITABLE FOR THE ENVIRONMENTAL CONDITIONS AT THE CONTROLLER LOCATION.

E. PROVIDE CONTROL POWER TRANSFORMER INTEGRAL WITH CONTROLLER WHERE NO OTHER SUPPLY OF CONTROL POWER TO CONTROLLER IS INDICATED. PROVIDE CONTROL POWER TO CONTROLLER WITH ADEQUATE CAPACITY TO OPERATE IN CONNECTED PILOT, INDICATING AND CONTROL DEVICES.

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H. AUTOMATIC SELECTOR SWITCHES: INSTALL IN COVERS OF CONTROLLERS OF MOTORS STARTED AND STOPPED BY AUTOMATIC CONTROLS OR INTERLOCKS WITH OTHER EQUIPMENT. MAKE CONTROL CONNECTIONS SO ONLY THE MANUAL AND AUTOMATIC CONTROL DEVICES THAT HAVE NO SAFETY FUNCTIONS WILL BE BYPASSED WHEN THE SWITCH IS IN THE HAND POSITION. CONNECT 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. MAKE CONTROL AND CIRCUIT CONNECTIONS TO A HAND-OFF-AUTOMATIC SWITCH OR TO MORE THAN ONE AUTOMATIC CONTROL DEVICE IN ACCORDANCE WITH MANUFACTURER PROVIDED WIRING DIAGRAM.

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3.01 COOPERATION WITH OTHER TRADES

A. CONTRACTOR SHALL GIVE FULL COOPERATION TO OTHER TRADES AND SHALL FURNISH IN WRITING TO THE ARCHITECT/ENGINEER ANY INFORMATION NECESSARY TO PERMIT THE WORK OF OTHER TRADES TO BE INSTALLED SATISFACTORILY AND WITH THE LEAST POSSIBLE INTERFERENCE OR DELAY.

B. WHERE ELECTRICAL WORK WILL BE INSTALLED IN CLOSE PROXIMITY TO, OR MAY INTERFERE WITH, WORK OF OTHER TRADES THE CONTRACTORS SHALL ASSIST EACH OTHER IN WORKING OUT A SATISFACTORY SPACE FOR EACH CONTRACTORS WORK. IF DIRECTED BY THE ARCHITECT/ENGINEER, THE CONTRACTOR SHALL PREPARE COMPOSITE WORKING DRAWINGS AND SECTIONS AT SUITABLE SCALE, NOT LESS THAN 1/4" = 1'-0", CLEARLY SHOWING HOW WORK IS TO BE INSTALLED IN RELATION TO WORK OF

OTHER TRADES. IF THE CONTRACTOR INSTALLS HIS WORK BEFORE COORDINATING WITH OTHER TRADES, OR CAUSES ANY INTERFERENCE WITH WORK OF OTHER TRADES, THE CONTRACTOR SHALL MAKE THE NECESSARY CHANGES IN THE ELECTRICAL WORK TO CORRECT THE CONDITIONS WITHOUT EXTRA CHARGE.

C. CONTRACTOR SHALL FURNISH TO OTHER TRADES, AS REQUIRED, ALL NECESSARY TEMPLATES, PATTERNS, AND ASSEMBLY DETAILS FOR THE PROPER INSTALLATION OF WORK AND FOR THE PURPOSE OF COORDINATING ADJACENT WORK.

3.02 SCAFFOLDING, RIGGING, HOISTING

A. CONTRACTOR SHALL PROVIDE ALL SCAFFOLDING, RIGGING AND HOISTING NECESSARY FOR ERECTION AND DELIVERY INTO THE PREMISES OF ALL ELECTRICAL EQUIPMENT. REMOVE SAME FROM PREMISES WHEN NO LONGER REQUIRED.

3.03 EXCAVATING AND BACKFILLING

A. CONTRACTOR SHALL PROVIDE ALL TRENCH AND PIT EXCAVATION AND BACKFILLING REQUIRED FOR WORK UNDER THIS SECTION OF THE SPECIFICATIONS, BOTH INSIDE AND OUTSIDE OF THE BUILDING, INCLUDING REPAIRING OF FINISHED SURFACES, ALL REQUIRED SHORING, BRACING, PUMPING, AND ALL PROTECTION FOR SAFETY OF PERSONS AND PROPERTY. LOCAL OR STATE SAFETY CODES SHALL BE FOLLOWED.

B. IN ADDITION, THE CONTRACTOR SHALL CHECK THE ELEVATIONS OF THE UTILITIES ENTERING AND LEAVING THE BUILDING, IF SUCH ELEVATIONS REQUIRE EXCAVATIONS LOWER THAN THE FINISH FLOOR LEVELS, THE ARCHITECT/ENGINEER SHALL BE NOTIFIED OF SUCH CONDITIONS BEFORE THE COMMENCEMENT OF WORK. CONTRACTOR SHALL MAKE EXCAVATIONS AT THE MINIMUM REQUIRED DEPTHS IN ORDER NOT TO UNDERCUT THE FOOTINGS. CONTRACTOR SHALL MAKE EXCAVATIONS IN AREAS WHERE FLORIDA "TRENCH SAFETY ACT": FILLING, BACKFILLING AND COMPACTION SHALL AS SPECIFIED IN OTHER AREAS OF THE CONTRACT DOCUMENTS AND SPECIFICATIONS.

3.04 MATERIAL AND WORKMANSHIP

A. ALL MATERIALS AND APPARATUS REQUIRED FOR ELECTRICAL WORK, EXCEPT AS SPECIFICALLY NOTED OTHERWISE, SHALL COMPLY WITH THE QUALITY AND SHALL BE DELIVERED, FURNISHED, DELIVERED, ERECTED, CONNECTED AND FINISHED IN EVERY DETAIL AND SHALL BE SO SELECTED AND INSTALLED AS TO PROVIDE THE BEST QUALITY AND DURABLE SPACES. WHERE NO SPECIFIC KIND OR QUALITY OF MATERIAL IS SPECIFIED, THE CONTRACTOR SHALL BE APPROVED BY THE ENGINEER, SHALL BE PROVIDED.

B. CONTRACTOR SHALL SECURE THE SERVICES OF AN EXPERIENCED SUPERINTENDENT, WHO SHALL BE CONSTANTLY IN CHARGE OF THE INSTALLATION OF THE WORK. ALL WORK SHALL BE DONE BY THE SUPERINTENDENT, FITTERS, METAL WORKERS, WELDERS, HELPERS, AND LABOR REQUIRED TO UNLOAD, TRANSFER, ERECT, CONNECT, AND START OPERATE EACH SYSTEM.

C. ALL EQUIPMENT AND MATERIALS SHALL BE INSTALLED IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE MANUFACTURER. THIS INCLUDES THE PERFORMANCE OF ALL TESTS RECOMMENDED BY THE MANUFACTURER.

3.05 CUTTING AND PATCHING

A. CONTRACTOR SHALL



MANATEE CONVENTION CENTER HVAC REPLACEMENT

BID DOCUMENTS

PREPARED FOR:



PREPARED BY:

JERRY N. ZOLLER
AA C000557
ARCHITECT / PLANNER

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AND

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DRAWING INDEX:

THIS SHEET	GO.0 COVER
M0.0	MECHANICAL NOTES
M1.0	MECHANICAL PARTIAL DEMOLITION FLOOR PLAN
M1.1	MECHANICAL PARTIAL DEMOLITION FLOOR PLAN
M1.2	MECHANICAL PARTIAL DEMOLITION FLOOR PLAN
M1.3	MECHANICAL PARTIAL DEMOLITION FLOOR PLAN
M1.4	MECHANICAL PARTIAL ROOF DEMOLITION PLAN
M2.0	MECHANICAL PARTIAL FLOOR PLAN
M2.1	MECHANICAL PARTIAL FLOOR PLAN
M2.2	MECHANICAL PARTIAL FLOOR PLAN
M2.3	MECHANICAL PARTIAL FLOOR PLAN
M2.4	MECHANICAL PARTIAL ROOF PLAN
M3.0	MECHANICAL DETAILS
M3.1	MECHANICAL DETAILS
M4.0	MECHANICAL SCHEDULES
M4.1	MECHANICAL SCHEDULES
M5.0	MECHANICAL CONTROLS
M5.1	MECHANICAL CONTROLS
M5.2	MECHANICAL CONTROLS
M5.3	MECHANICAL CONTROLS
M5.4	MECHANICAL CONTROLS
E1.0	ELECTRICAL LEGEND
E2.0	ELECTRICAL FLOOR PLAN
E2.1	ELECTRICAL ROOF PLAN
E3.0	ELECTRICAL DETAILS
E4.0	ELECTRICAL SPECIFICATIONS
S2.0	PARTIAL UPPER ROOF FRAMING PLAN
S2.1	PARTIAL LOWER ROOF FRAMING PLAN
S3.0	STRUCTURAL NOTES AND MISCELLANEOUS DETAILS
A-6	ROOFING DETAILS



NO.	DATE	BY	REVISIONS

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MANATEE CONVENTION CENTER
MANATEE COUNTY, FL

COVER

DESCRIPTION:

DATE: 01/10/11

SCALE: AS NOTED

GLOBAL JOB NO. 3372-10

Drawn/Checked By: KAT/MAS

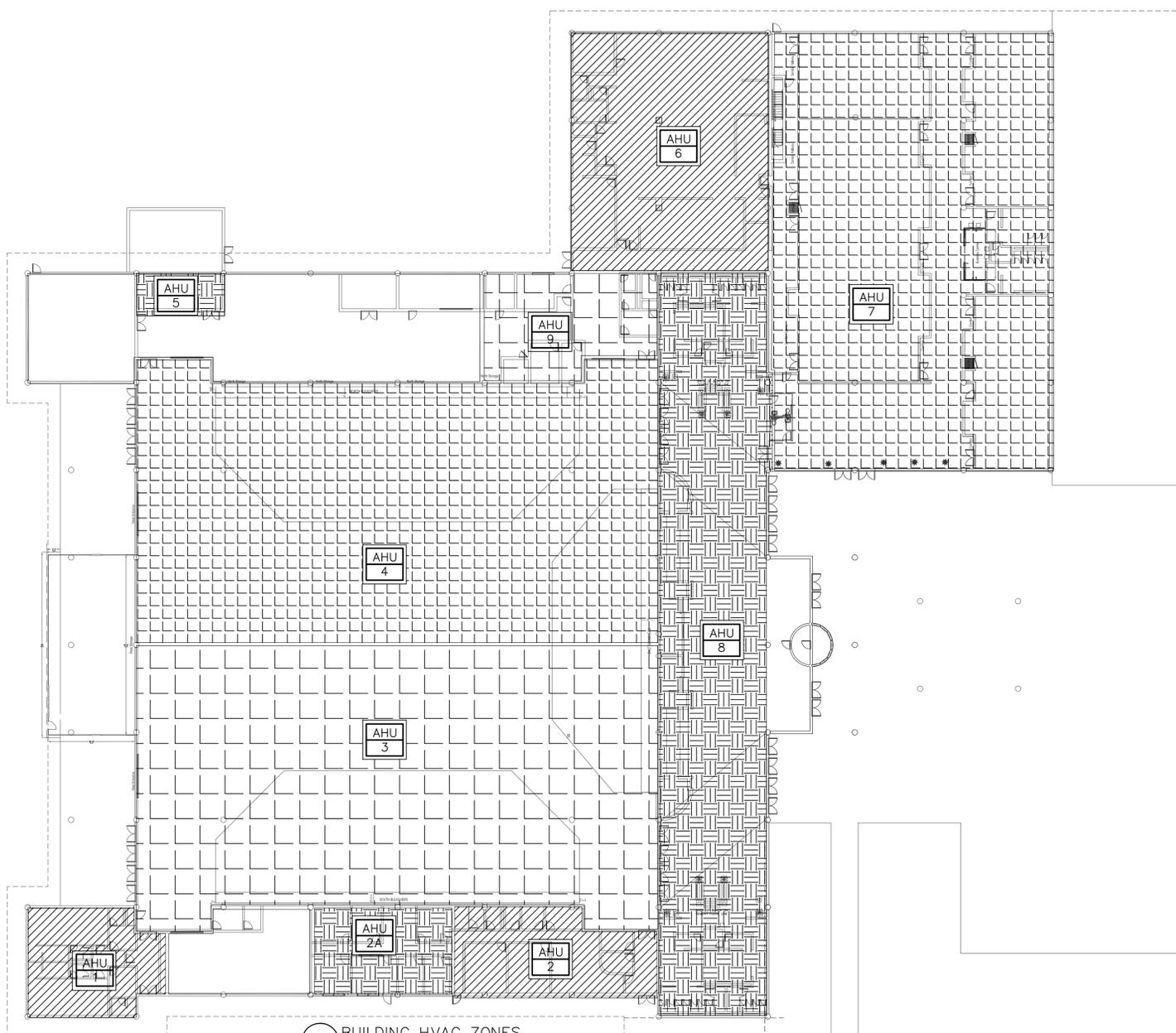
SHEET NO. 1 COVER SHEET
NO SCALE

GO.0

REQUIRED SUBMITTAL SUMMARY	
SPECIFICATION SECTION	DESCRIPTION
15061	HANGERS AND SUPPORTS
15074	VIBRATION ISOLATION
15077	MECHANICAL IDENTIFICATION
15081	DUCTWORK INSULATION
15082	EQUIPMENT INSULATION
15083	PIPING INSULATION
15181	HYDRONIC PIPING
15182	HYDRONIC SPECIALTIES
15183	TESTING OF PIPING SYSTEMS
15184	PLUMBING PIPING
15185	HVAC PUMPS
15189	WATER TREATMENT
15200	HVAC CONTROLS
15300	TESTING, ADJUSTING AND BALANCING
15701	AIR COOLED CHILLER
15726/15727	AIR HANDLING UNITS
15740	ELECTRIC DUCT HEATERS
15838	POWER ROOF VENTILATORS
-	SHOP DRAWINGS/SYSTEM LAYOUT DRAWINGS
-	CONSTRUCTION SCHEDULE - SUBMIT WITHIN 10 CALENDAR DAYS OF NTP

GENERAL SCOPE OF WORK

- PART 1 - GENERAL**
- 0.01 GENERAL SCOPE**
- A. THIS PROJECT WILL REQUIRE THE INSTALLATION OF NEW ROOFTOP HVAC SYSTEMS, NEW ROOFTOP AIR COOLED CHILLERS, CHILLED WATER PIPING AND PUMPS AS WELL AS NEW CONTROLS. PLEASE REFER TO DRAWINGS AND SPECIFICATIONS FOR SPECIFIC REQUIREMENTS.
- 1.01 GENERAL DOCUMENTS**
- A. INSTALLATION SHALL BE IN ACCORDANCE WITH THE FLORIDA BUILDING CODE 2007, WHICH INCLUDES THE FLORIDA BUILDING CODE, MECHANICAL. ALL EQUIPMENT SHALL BE UL LISTED.
- B. IT IS THE INTENT OF THESE DOCUMENTS THAT THE MECHANICAL CONTRACTOR BE THE PRIME CONTRACTOR FOR THIS PROJECT, AND THAT IT PROCURE THE SERVICES OF SUB-CONTRACTORS (ELECTRICAL, ROOFING, TEST AND BALANCE, INSULATION, ETC...) IN ORDER TO COMPLETE ALL WORK OUTLINED IN THESE DRAWINGS AND ASSOCIATED SPECIFICATIONS.
- C. THE WORK SHALL INCLUDE FURNISHING ALL LABOR, EQUIPMENT, MATERIALS AND SERVICE NECESSARY FOR AND REASONABLY INCIDENTAL TO THE PROPER COMPLETION OF ALL WORK SHOWN ON THE DRAWINGS AND AS SPECIFIED. ALL MATERIAL SHALL BE NEW.
- D. EACH PROSPECTIVE CONTRACTOR SHALL EVALUATE THE SCOPE OF WORK THOROUGHLY PRIOR TO SUBMITTING A BID. SOME CONDUIT, PIPING, AND OTHER OBSTACLES MAY NEED TO BE RELOCATED AND SUCH RELOCATION SHOULD BE INCLUDED IN EACH PROSPECTIVE MECHANICAL CONTRACTOR'S BID. SOME CEILINGS MAY NEED TO BE REMOVED AND RE-INSTALLED, AND SUCH REMOVAL AND RE-INSTALLATION SHALL BE INCLUDED IN EACH PROSPECTIVE MECHANICAL CONTRACTOR'S BID.
- 1.02 SUBMITTALS**
- A. MATERIALS OR PRODUCTS SPECIFIED HEREIN AND/OR INDICATED ON DRAWINGS BY TRADE NAME, MANUFACTURER'S NAME OR CATALOG NUMBERS SHALL BE INTERPRETED AS ESTABLISHING A STANDARD OF QUALITY AND DESIGN. SUBSTITUTIONS MAY BE ALLOWED IF THEY MEET THE QUALITY STANDARDS AND DESIGN INTENT, UNLESS OTHERWISE NOTED.
- B. PRIOR TO STARTING THE PROJECT, THE MECHANICAL CONTRACTOR SHALL STUDY THE COMPLETE SET OF CONSTRUCTION DOCUMENTS, INCLUDING ALL SPECIFICATIONS, AND COORDINATE WITH THE MANUFACTURER(S) AS REQUIRED TO PROVIDE EQUIPMENT SUBMITTALS TO SUBMIT TO THE ENGINEER OF RECORD FOR REVIEW AND APPROVAL. THE EQUIPMENT SUBMITTALS SHALL INCLUDE DIMENSIONS, WEIGHTS, SPECIFIED ACCESSORIES AND REQUIRED CLEARANCES, AS WELL AS FAN CURVES, SOUND LEVELS, CONSTRUCTION DETAILS, WARRANTY INFORMATION, AND ALL OTHER RELEVANT DATA.
- C. IF SUBSTITUTIONS TO THE BASIS OF DESIGN ARE SUBMITTED, THE CONTRACTOR SHALL PROVIDE A CLEAR, DETAILED SUMMARY IN THE SUBMITTALS OF THE DIFFERENCES BETWEEN THE SUBMITTED EQUIPMENT AND THE BASIS OF DESIGN. THE ENGINEER MAY ACCEPT OR REJECT THE SUBSTITUTIONS.
- D. REFER TO SPECIFICATION SECTION 15010 GENERAL MECHANICAL REQUIREMENTS, DIVISION 15 INDIVIDUAL EQUIPMENT SPECIFICATIONS AND DIVISION 1 SPECIFICATION SECTIONS FOR ADDITIONAL REQUIREMENTS, AS WELL AS THIS SHEET FOR REQUIRED SUBMITTAL SUMMARY.
- 1.03 SHOP DRAWINGS**
- A. PRIOR TO STARTING THE PROJECT, THE MECHANICAL CONTRACTOR SHALL STUDY THE COMPLETE SET OF CONSTRUCTION DOCUMENTS AND COORDINATE WITH THE OTHER TRADES AS REQUIRED TO PROVIDE SHOP DRAWINGS TO SUBMIT TO THE ENGINEER FOR APPROVAL. THE SHOP DRAWINGS MAY BE SUBMITTED AS HAND-DRAWN NOTES UPON A COPY OF THE CONSTRUCTION DOCUMENTS. THE CONSTRUCTION DOCUMENTS ARE DIAGRAMMATIC IN NATURE AND INTENDED SOLELY TO CLARIFY THE SCOPE OF WORK AND INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS. THE CONSTRUCTION DOCUMENTS ARE NOT INTENDED TO ALERT THE CONTRACTOR(S) OF ALL OBSTACLES. THE SHOP DRAWINGS SHALL SHOW THE COORDINATION OF DUCTWORK AND MECHANICAL EQUIPMENT INSTALLATION WITH EXISTING AND NEW OBSTACLES INCLUDING, BUT NOT LIMITED TO, ELECTRICAL CONDUITS, FIRE PROTECTION PIPING, RAIN LEADERS, SANITARY DRAINS, STRUCTURAL MEMBERS, AND WATER PIPING, AS WELL AS THE MECHANICAL EQUIPMENT MANUFACTURERS' RECOMMENDED CLEARANCES. THE MECHANICAL CONTRACTOR SHALL ALSO SHOW THE EXISTING CONDITIONS ON THE SHOP DRAWINGS WHERE THE EXISTING CONDITIONS ARE DIFFERENT FROM THOSE SHOWN ON THESE DOCUMENTS.
- B. REFER TO SPECIFICATION SECTION 15010 GENERAL MECHANICAL REQUIREMENTS, INDIVIDUAL EQUIPMENT SPECIFICATIONS, AS WELL AS DIVISION 1 SPECIFICATION SECTIONS FOR ADDITIONAL REQUIREMENTS.
- 1.04 RECORD DRAWINGS**
- A. AFTER COMPLETION OF ALL WORK, THE MECHANICAL CONTRACTOR SHALL PROVIDE THE OWNER WITH AS BUILT HARD COPY AND ELECTRONIC RECORD DRAWINGS IN AUTOCAD 2007 OR NEWER. CONTRACTOR SHALL KEEP A RECORD OF THE LOCATIONS OF ALL CONCEALED WORK AND UPON COMPLETION OF THE JOB, SHALL SUPPLY AS-BUILT DRAWINGS SHOWING ANY DEVIATION FROM THE ORIGINAL DRAWINGS.
- PART 2 - INSTALLATION**
- 2.01 EQUIPMENT**
- A. ALL MECHANICAL EQUIPMENT SHALL BE INSTALLED AS REQUIRED BY THE MANUFACTURER'S INSTALLATION AND MAINTENANCE MANUALS. THOSE MANUALS WILL TYPICALLY PROVIDE MORE DETAIL THAN THE CONSTRUCTION DOCUMENTS. IF THERE IS A CONFLICT BETWEEN THE INSTALLATION AND MAINTENANCE MANUALS AND THE CONSTRUCTION DOCUMENTS, THEN THE MECHANICAL CONTRACTOR SHALL SUBMIT A REQUEST-FOR-INFORMATION TO THE ENGINEER. REFER TO INDIVIDUAL DIVISION 15 SPECIFICATIONS FOR EQUIPMENT REQUIREMENTS AS WELL AS THESE DRAWINGS.
- B. VIBRATION ISOLATION: THE MECHANICAL CONTRACTOR SHALL PROVIDE VIBRATION ISOLATION AS RECOMMENDED BY THE MANUFACTURER(S) AND/OR REQUIRED BY THE ENGINEER TO ENSURE QUIET OPERATION OF THE MECHANICAL EQUIPMENT. NO UNDUE VIBRATION OR SOUND SHALL BE TRANSMITTED TO THE STRUCTURE OR ANY OCCUPIED SPACES WITHIN THE STRUCTURE. REFER TO SPECIFICATION SECTION 15074 VIBRATION ISOLATION, INDIVIDUAL EQUIPMENT SPECIFICATIONS AS WELL AS DRAWINGS ADDITIONAL INFORMATION.
- C. ROOF CURBS: THE MECHANICAL CONTRACTOR SHALL SET EACH ITEM OF ROOF-MOUNTED MECHANICAL EQUIPMENT ON A FACTORY CURB, OR ON EQUIPMENT SUPPORTS AT THE HEIGHT REQUIRED BY TABLE 1509.7 OF THE 2007 FLORIDA BUILDING CODE WITH 2009 SUPPLEMENTS, UNLESS OTHERWISE NOTED ON THE CONSTRUCTION DOCUMENTS. REFER TO STRUCTURAL DRAWINGS FOR EQUIPMENT SUPPORT DETAILS AS WELL AS MECHANICAL DRAWINGS AND SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
- D. FILTERS: THE MECHANICAL CONTRACTOR SHALL PROVIDE FILTER RACKS FOR THE MECHANICAL EQUIPMENT AS REQUIRED. THE FILTER RACKS SHALL BE INSTALLED SUCH THAT SUFFICIENT CLEARANCES ARE PROVIDED FOR MAINTENANCE AND SHALL BE SEALED AIRTIGHT. THE MECHANICAL CONTRACTOR SHALL PROVIDE A TOTAL OF TWO (2) COMPLETE SETS OF FILTERS FOR ALL MECHANICAL EQUIPMENT IN THE SIZE AND ARRANGEMENT RECOMMENDED BY THE MANUFACTURER. THE FILTERS SHALL PROVIDE ASHRAE FILTRATION EFFICIENCY AS SHOWN ON THE CONSTRUCTION DOCUMENTS OR 30% ASHRAE FILTRATION EFFICIENCY (MERV 6) IF NO HIGHER VALUE IS SPECIFIED.
- E. THE MECHANICAL CONTRACTOR SHALL PROVIDE ALL STARTERS, COMBINATION STARTER/DISCONNECTS, CONTACTORS, RELAYS, CONTROLS, AND ACCESSORIES NECESSARY TO PROVIDE A COMPLETE AND WORKING POWER AND CONTROL SYSTEM FOR THE MECHANICAL EQUIPMENT WITHIN THE SCOPE OF WORK. THE ELECTRICAL CONTRACTOR WILL PROVIDE ALL DISCONNECT SWITCHES, CONDUIT, AND WIRING FOR THE MECHANICAL EQUIPMENT WITHIN THE SCOPE OF WORK. ALL ELECTRICAL WORK SHALL COMPLY WITH THE REQUIREMENTS OF THE NATIONAL ELECTRIC CODE. THE MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROPER OPERATION OF THE COMPLETE SYSTEM AND SHALL ENSURE THAT WIRING DIAGRAMS ARE PROVIDED TO THE OWNER. NO WIRING OF ANY KIND SHALL BE EXPOSED IN FINISHED AREAS.
- F. THE MECHANICAL CONTRACTOR SHALL PROVIDE 'PATE' PIPE CURB ASSEMBLIES FOR ALL PIPING ROOF PENETRATIONS.
- G. THE MECHANICAL CONTRACTOR SHALL MAINTAIN A SET OF CONTINUOUSLY UPDATED, REPRODUCIBLE AS-BUILT DRAWINGS DURING CONSTRUCTION AND PROVIDE A COMPLETE SET OF THOSE DRAWINGS IN BOTH ELECTRONIC AND HARDCOPY FORMATS TO THE OWNER UPON FINAL COMPLETION.
- H. THE MECHANICAL CONTRACTOR SHALL CLEAN ALL COOLING AND HEATING COILS, CONDENSATE PANS, AND CONDENSATE DRAIN LINES PRIOR TO SUBSTANTIAL COMPLETION. THE MECHANICAL CONTRACTOR SHALL ALSO REPLACE ALL FILTERS AND BELTS PRIOR TO SUBSTANTIAL COMPLETION AND PROVIDE TWO (2) COMPLETE REPLACEMENT SETS OF FILTERS AND (2) SETS OF BELTS FOR ALL MECHANICAL EQUIPMENT TO THE OWNER UPON FINAL COMPLETION.
- I. THE MECHANICAL CONTRACTOR SHALL PROVIDE IDENTIFICATION TAGS FOR ALL NEW EQUIPMENT, PIPING AND VALVES IN THE BUILDING. TAGS SHALL BE METAL WITH ENGRAVED UNIT/TAG NUMBER. REFER TO SPECIFICATION SECTION 15077, MECHANICAL IDENTIFICATION.
- J. THE MECHANICAL CONTRACTOR SHALL PROVIDE COPIES OF ALL MECHANICAL CONTRACTOR WARRANTIES, MANUFACTURER'S WARRANTIES, PARTS LISTS, AND INSTALLATION AND MAINTENANCE MANUALS FOR ALL MECHANICAL EQUIPMENT, AS WELL AS INSTRUCTIONS FOR OPERATING AND MAINTAINING ALL MECHANICAL EQUIPMENT TO THE OWNER UPON FINAL COMPLETION. REFER TO SPECIFICATION SECTION 15010, GENERAL MECHANICAL REQUIREMENTS, DIVISION 1 SPECIFICATION SECTIONS AS WELL AS DIVISION 15 INDIVIDUAL EQUIPMENT SPECIFICATIONS FOR WARRANTY REQUIREMENTS.
- 2.02 SUB-CONTRACTORS**
- A. THE PRIME CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION OF SCOPE BETWEEN TRADES.
- B. THE MECHANICAL CONTRACTOR SHALL PROVIDE THE SERVICES OF AN INDEPENDENT TEST AND BALANCE AGENCY TO TEST, BALANCE, AND CERTIFY THE PERFORMANCE OF THE ALL NEW HEATING, VENTILATION, AND AIR CONDITIONING SYSTEMS. THE TEST AND BALANCE CONTRACTOR SHALL PERFORM ALL TESTING, ADJUSTING, BALANCING, AND DATA RECORDING NECESSARY TO ESTABLISH THE CAPACITY AND QUALITY OF THE SYSTEMS AND CONFIRM THE SATISFACTORY COMPLETION OF ALL ASPECTS OF THE SCOPE OF WORK. TEST AND BALANCE CONTRACTOR SHALL FULLY COOPERATE WITH THE CONTROLS CONTRACTOR. REFER TO SPECIFICATION SECTION 15300, TESTING ADJUSTING AND BALANCING, FOR ADDITIONAL REQUIREMENTS.
- C. A NEW CONTROL SYSTEM IS REQUIRED FOR THE NEW AND EXISTING TO REMAIN MECHANICAL EQUIPMENT. REFER TO DRAWINGS AND SPECIFICATION SECTION 15200, HVAC CONTROLS, FOR ADDITIONAL REQUIREMENTS.
- D. THE MECHANICAL CONTRACTOR SHALL ENGAGE AS A SUB-CONTRACTOR A FIRE SPRINKLER CONTRACTOR TO REINSTALL ANY FIRE SPRINKLER PIPING IN CONFLICT WITH THE PROJECT WORK. SUCH FIRE SPRINKLER WORK SHALL COMPLY WITH NFPA 13.
- E. THE MECHANICAL CONTRACTOR SHALL ENGAGE AS A SUB-CONTRACTOR A FIRE ALARM CONTRACTOR TO DISCONNECT AND RECONNECT ANY FIRE ALARM DEVICES SUCH AS DUCT SMOKE DETECTORS AFFECTED BY THE PROJECT WORK. SUCH FIRE ALARM WORK SHALL COMPLY WITH NFPA 72.
- F. THE MECHANICAL CONTRACTOR SHALL ENGAGE AS A SUB-CONTRACTOR AN ELECTRICAL CONTRACTOR TO PERFORM WORK AS OUTLINED IN THE DOCUMENTS.
- G. THE MECHANICAL CONTRACTOR SHALL ENGAGE AS A SUB-CONTRACTOR A STRUCTURAL CONTRACTOR TO PERFORM WORK AS OUTLINED IN THE DOCUMENTS.
- H. THE MECHANICAL CONTRACTOR SHALL ENGAGE AS A SUB-CONTRACTOR A ROOFING CONTRACTOR TO FLASH AND SEAL ROOF SUPPORTS.



2 BUILDING HVAC ZONES
NO SCALE

1 MECHANICAL NOTES
NO SCALE

NO.	DATE	BY	REVISIONS

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MANATEE COUNTY, FL

MECHANICAL NOTES

DATE: 01/10/11

SCALE: AS NOTED

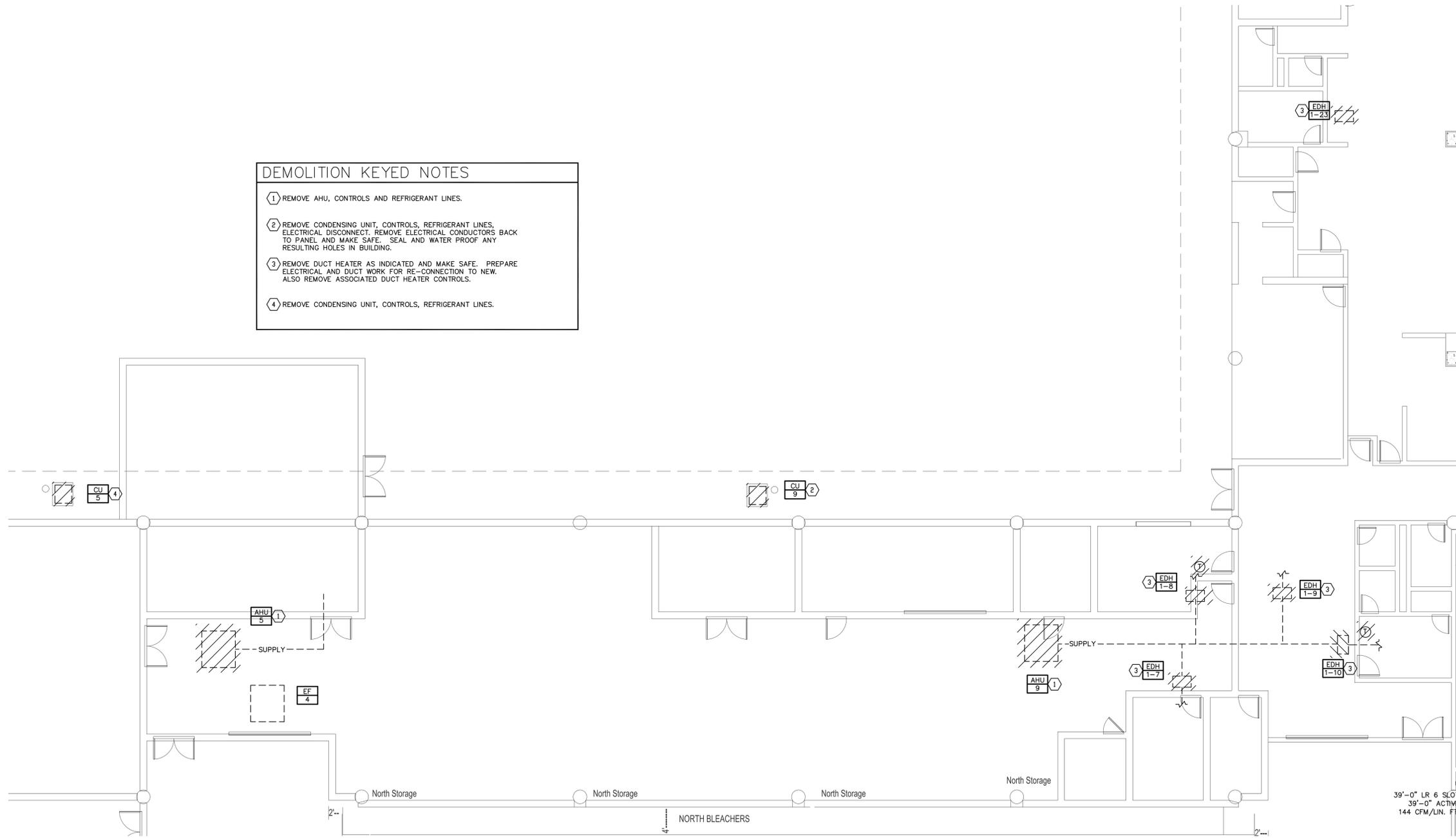
GLOBAL JOB NO. 3372-10

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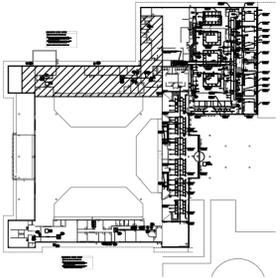
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DEMOLITION KEYED NOTES

- ① REMOVE AHU, CONTROLS AND REFRIGERANT LINES.
- ② REMOVE CONDENSING UNIT, CONTROLS, REFRIGERANT LINES, ELECTRICAL DISCONNECT, REMOVE ELECTRICAL CONDUCTORS BACK TO PANEL AND MAKE SAFE, SEAL AND WATER PROOF ANY RESULTING HOLES IN BUILDING.
- ③ REMOVE DUCT HEATER AS INDICATED AND MAKE SAFE. PREPARE ELECTRICAL AND DUCT WORK FOR RE-CONNECTION TO NEW. ALSO REMOVE ASSOCIATED DUCT HEATER CONTROLS.
- ④ REMOVE CONDENSING UNIT, CONTROLS, REFRIGERANT LINES.



1 MECHANICAL PARTIAL DEMOLITION PLAN
1/8" = 1'



2 KEY PLAN
1" = 128'

39'-0" LR 6 SLO1
39'-0" ACTIVE
144 CFM/LIN. FT

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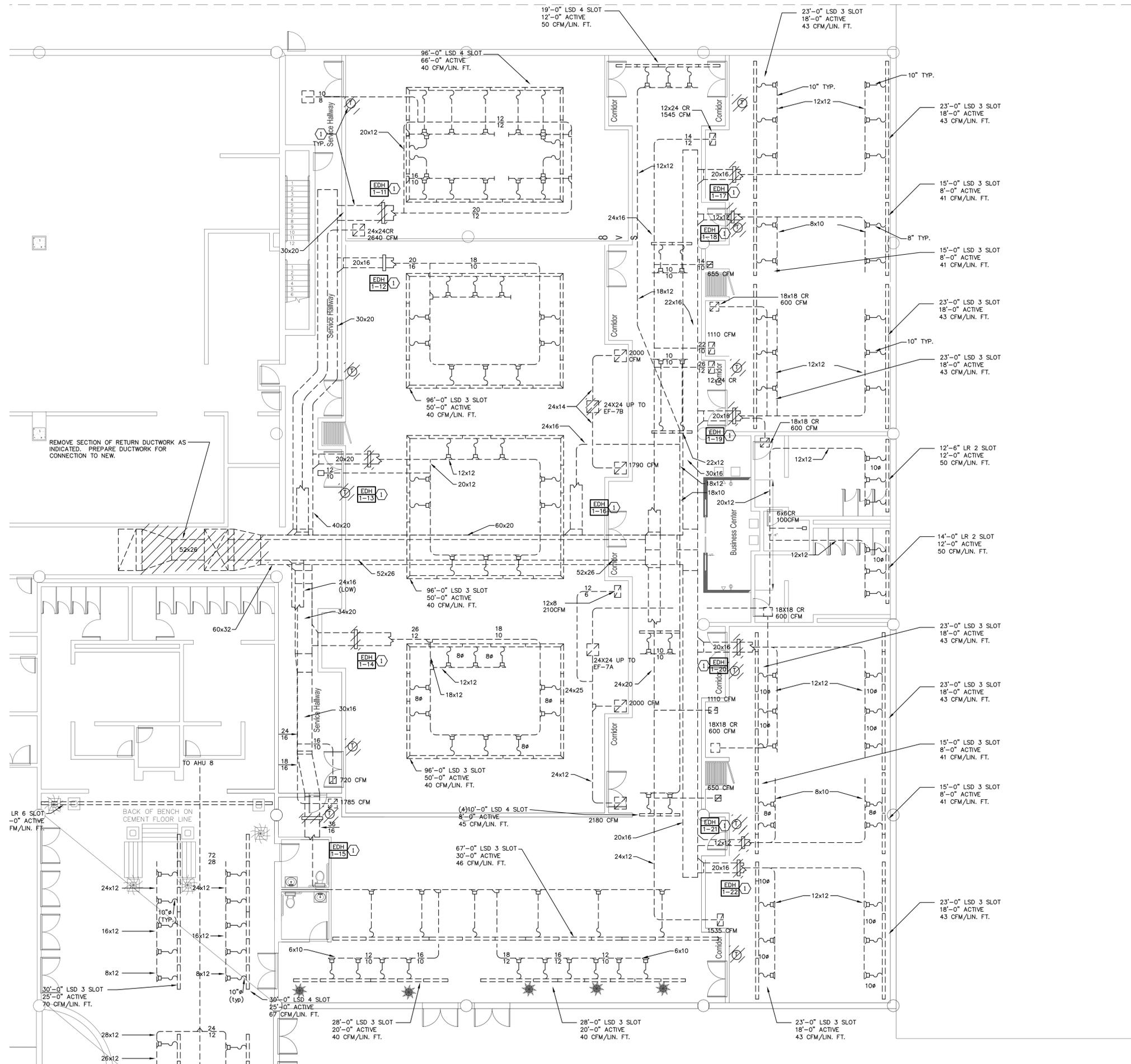
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MECHANICAL DEMOLITION PLAN

DATE:	01/10/11
SCALE:	AS NOTED
GLOBAL JOB NO.	3372-10
Drawn/Checked By:	KAT/MAS
SHEET NO.	M1.2

SEAL



DEMOLITION KEYED NOTES

1 REMOVE EXISTING TEMPERATURE SENSOR, ELECTRIC DUCT HEATER (MAKE SAFE) AND DUCT MOTORIZED VOLUME DAMPER. PREPARE ELECTRICAL AND DUCT WORK FOR RE-CONNECTION TO NEW. ALSO REMOVE ASSOCIATED DUCT HEATER CONTROLS.

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MECHANICAL DEMOLITION PLAN

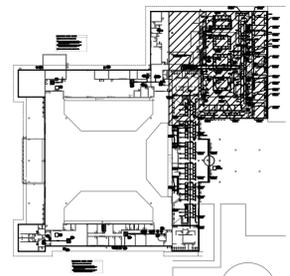
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SCALE: AS NOTED

GLOBAL JOB NO. 3372-10

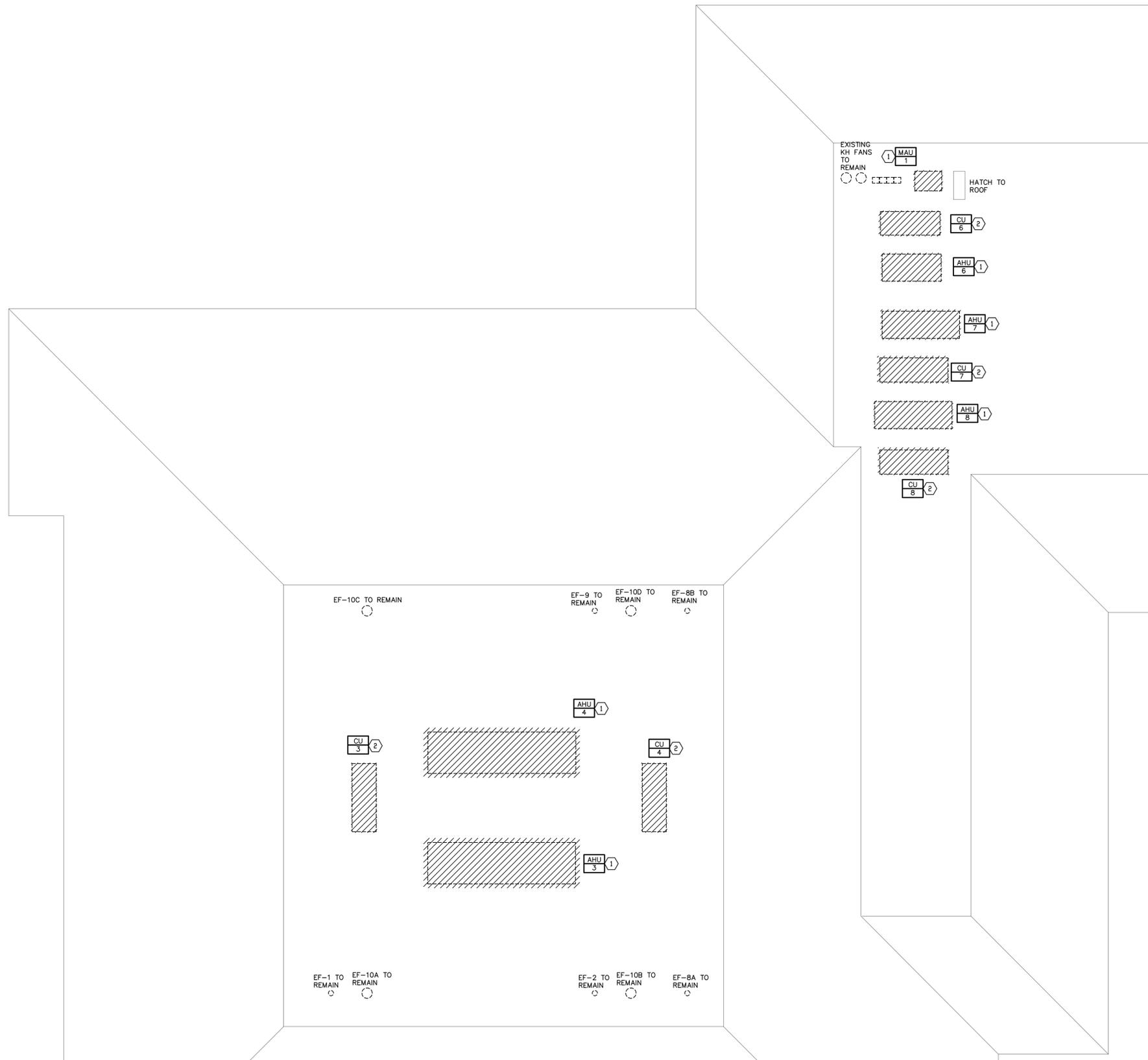
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SHEET NO. **M1.3**



2 KEY PLAN
 1" = 128'

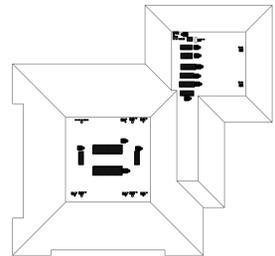
1 MECHANICAL PARTIAL DEMOLITION PLAN
 1/8" = 1'



DEMOLITION KEYED NOTES

- 1 REMOVE RTU, CONTROLS AND REFRIGERANT LINES.
- 2 REMOVE CONDENSING UNIT, CONTROLS, REFRIGERANT LINES, ELECTRICAL DISCONNECT.

1 MECHANICAL PARTIAL ROOF DEMOLITION PLAN
1/16" = 1'



2 KEY PLAN
1" = 128'

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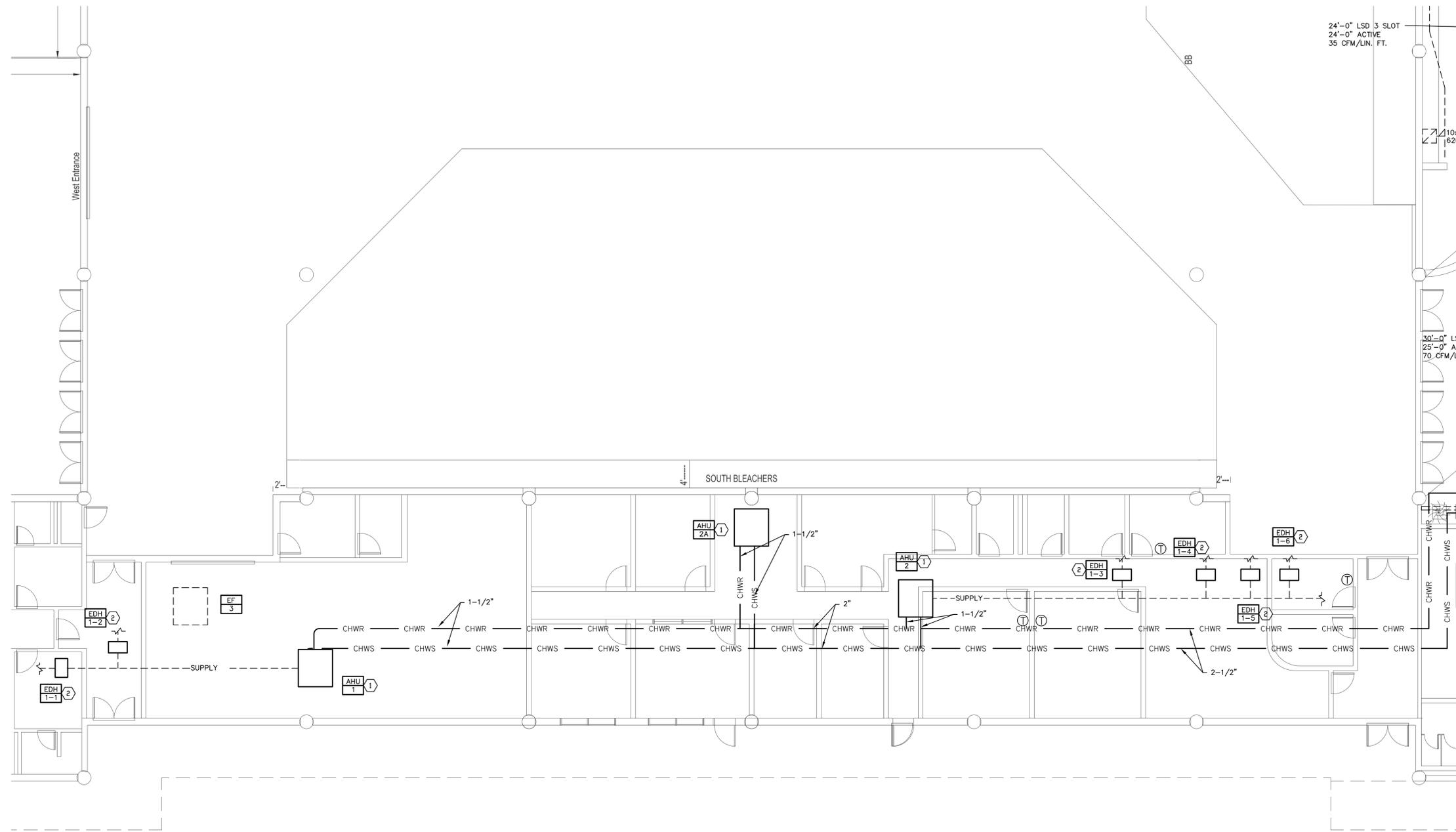
MECHANICAL ROOF DEMOLITION PLAN

DATE:	01/10/11
SCALE:	AS NOTED
GLOBAL JOB NO.	3372-10
Drawn/Checked By:	KAT/MAS
SHEET NO.	M1.4

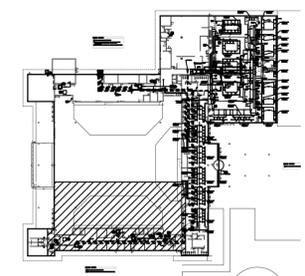
SEAL

KEYED NOTES

- ① INSTALL NEW AHU AND CHILLED WATER LINES.
- ② INSTALL NEW ELECTRIC DUCT HEATER AND ASSOCIATED TEMPERATURE SENSOR.



1 MECHANICAL PARTIAL PLAN
1/8" = 1'



2 KEY PLAN
1" = 128'

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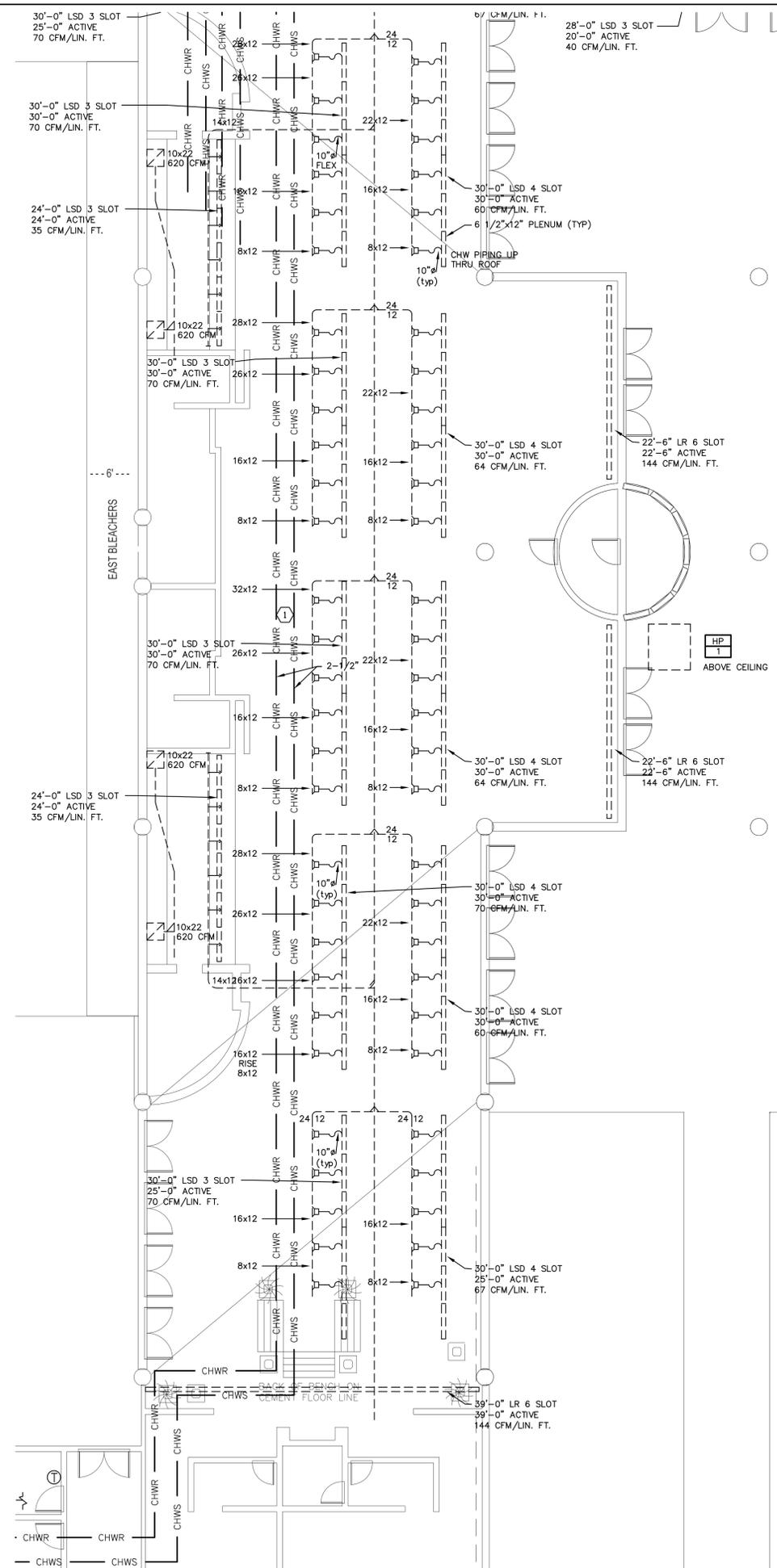
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MECHANICAL FLOOR PLAN

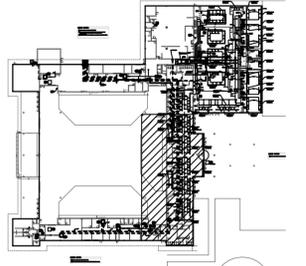
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GLOBAL JOB NO.	3372-10
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SHEET NO.	M2.0



KEYED NOTES

① INSTALL NEW CHILLED WATER LINES ABOVE CEILING.

1 MECHANICAL PARTIAL PLAN
1/8" = 1'



2 KEY PLAN
1" = 128'

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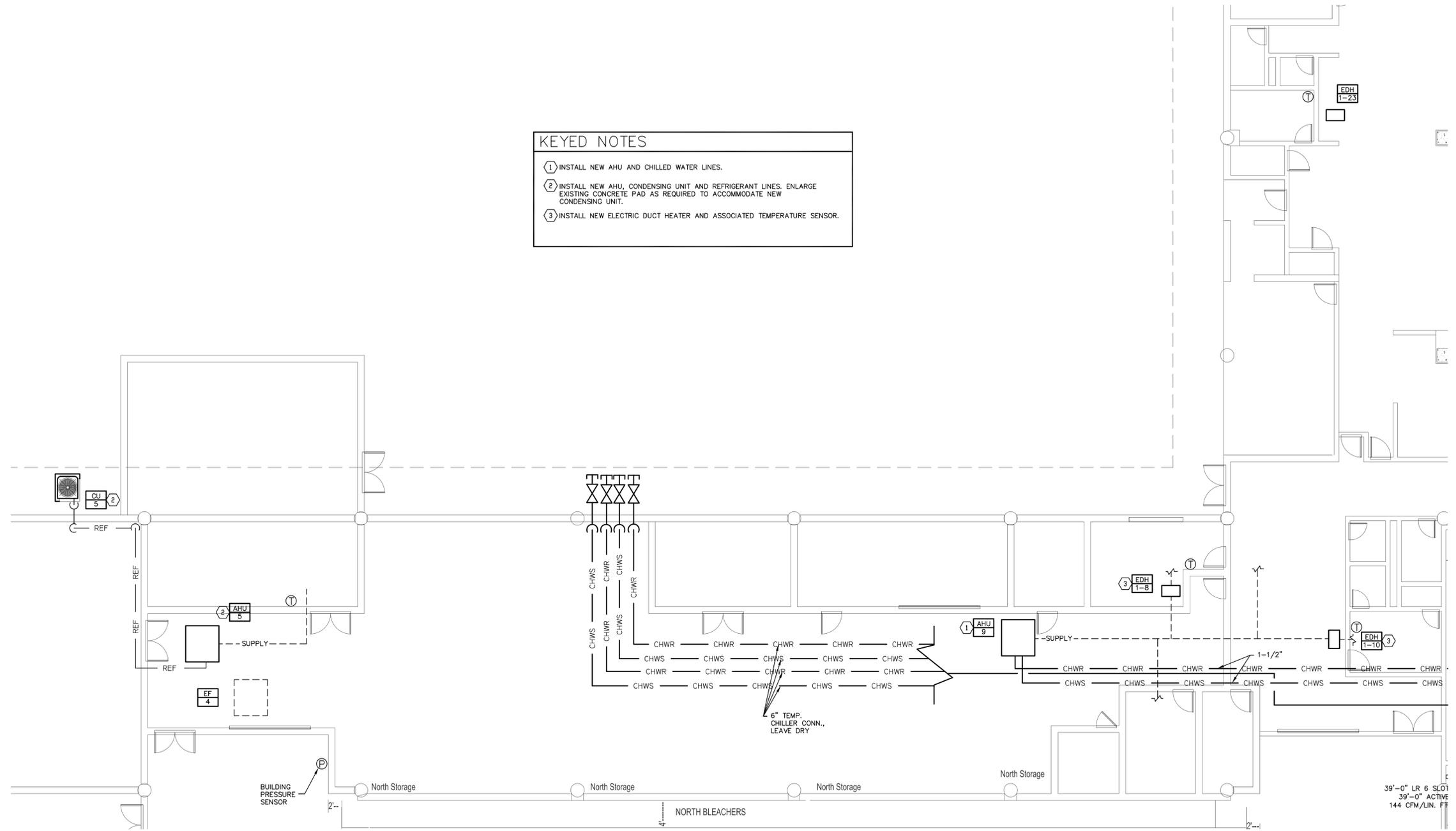
MECHANICAL FLOOR PLAN

DESCRIPTION:

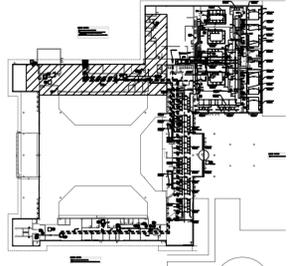
DATE:	01/10/11
SCALE:	AS NOTED
GLOBAL JOB NO.	3372-10
Drawn/Checked By:	KAT/MAS
SHEET NO.	M2.1

KEYED NOTES

- ① INSTALL NEW AHU AND CHILLED WATER LINES.
- ② INSTALL NEW AHU, CONDENSING UNIT AND REFRIGERANT LINES, ENLARGE EXISTING CONCRETE PAD AS REQUIRED TO ACCOMMODATE NEW CONDENSING UNIT.
- ③ INSTALL NEW ELECTRIC DUCT HEATER AND ASSOCIATED TEMPERATURE SENSOR.



1 MECHANICAL PARTIAL PLAN
1/8" = 1'



2 KEY PLAN
1" = 128'

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MECHANICAL FLOOR PLAN

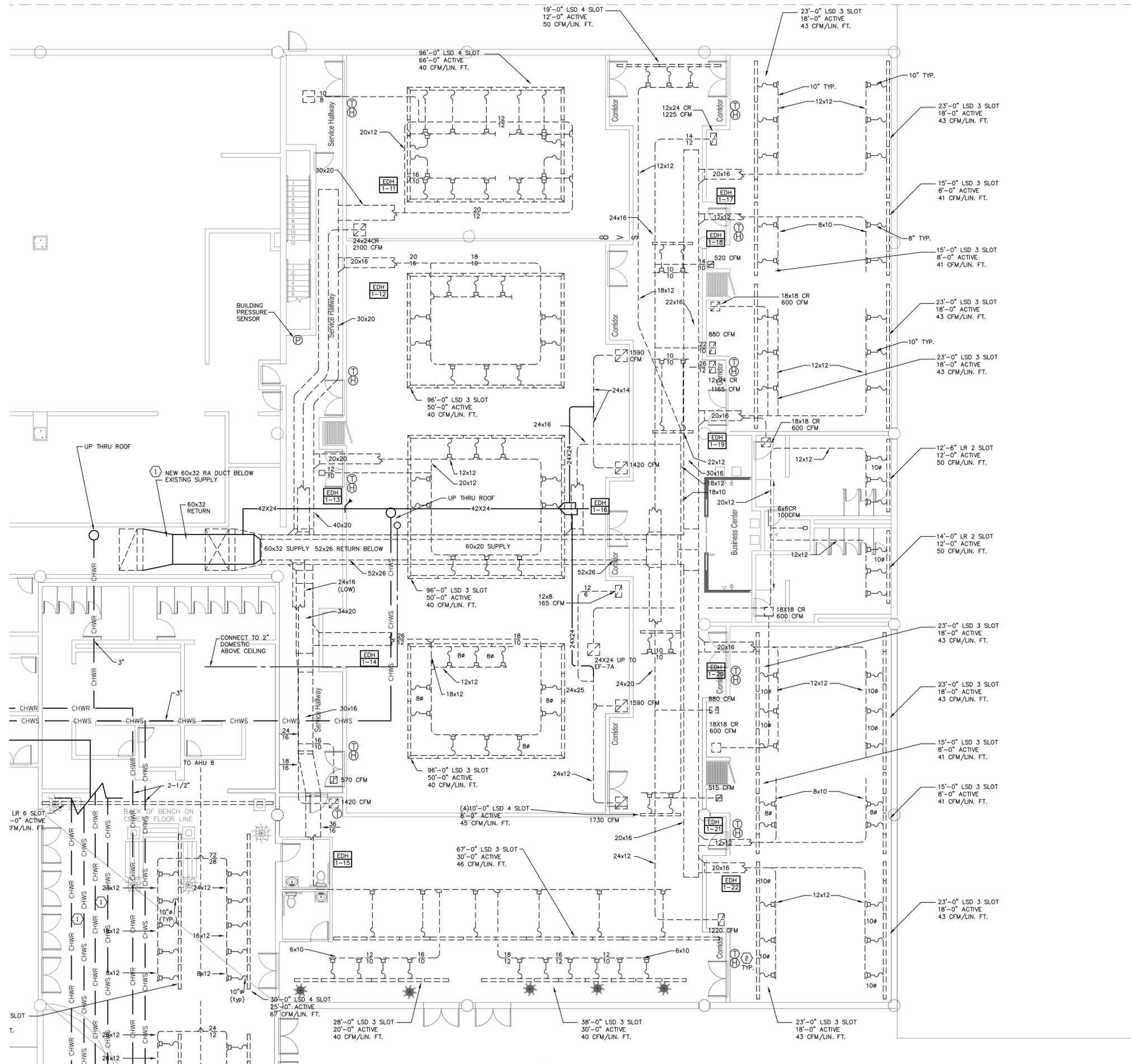
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SCALE: AS NOTED

GLOBAL JOB NO. 3372-10

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SHEET NO. M2.2



KEYED NOTES

① NEW RETURN DUCT SHALL BE SHEET METAL, NEGATIVE 2" STATIC PRESSURE CONSTRUCTION AND SHALL COMPLY WITH SMACNA.

② NEW TEMPERATURE AND HUMIDITY SENSORS.

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MECHANICAL FLOOR PLAN

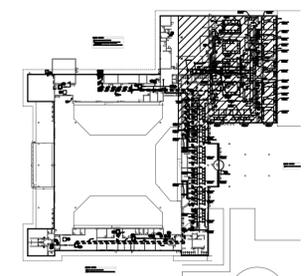
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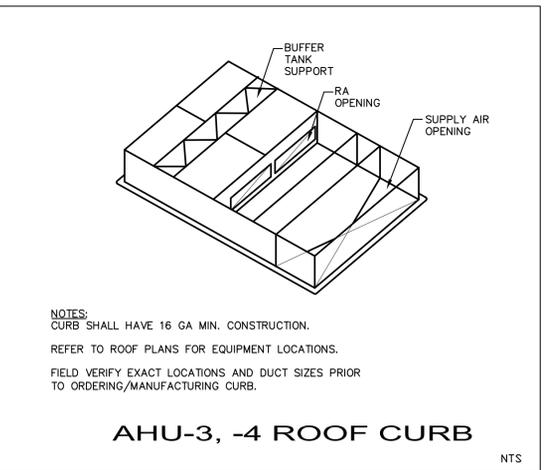
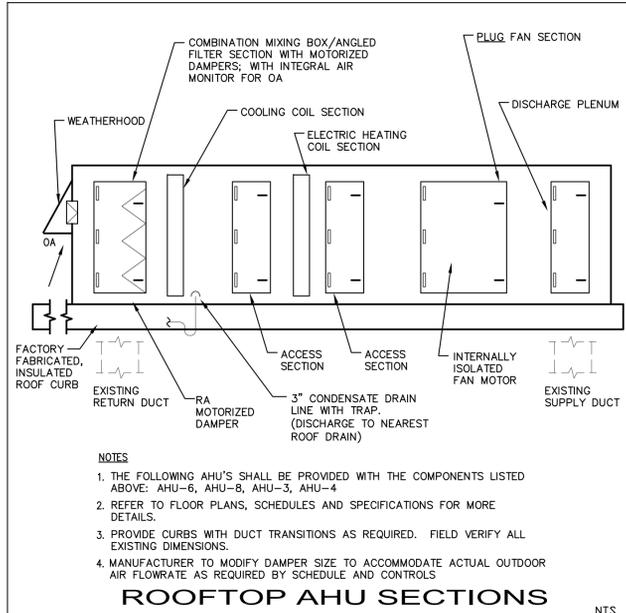
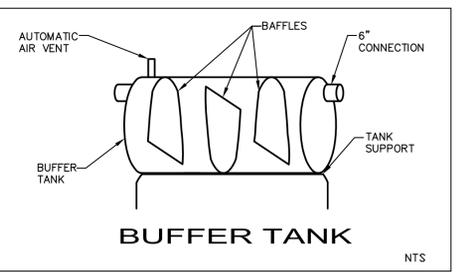
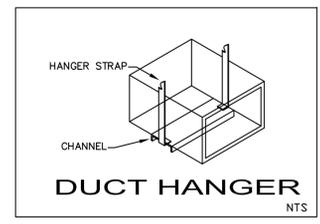
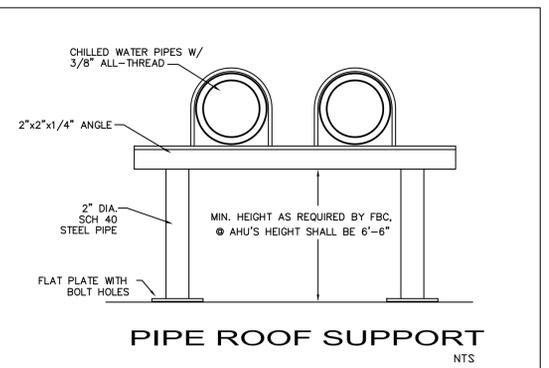
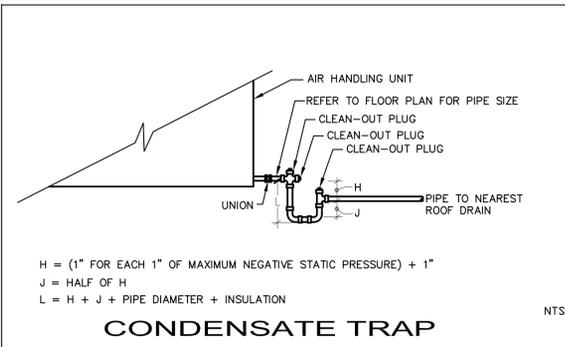
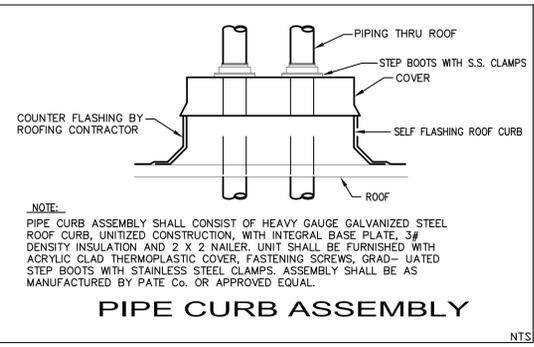
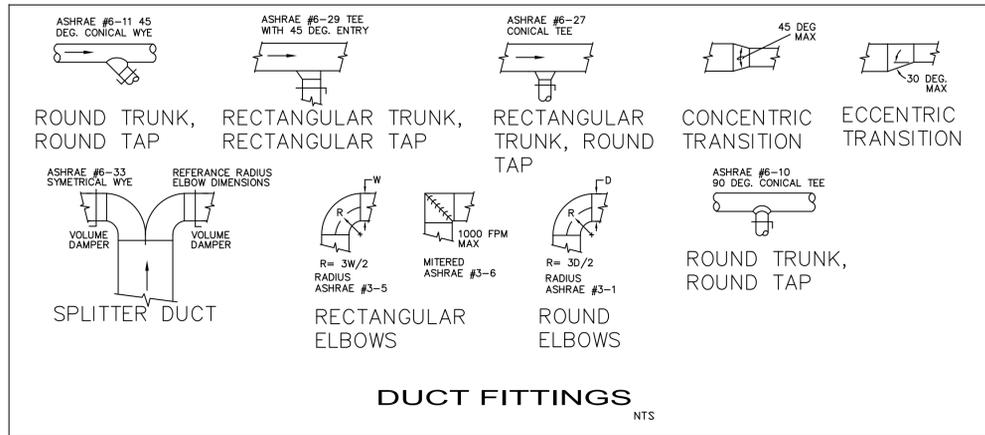
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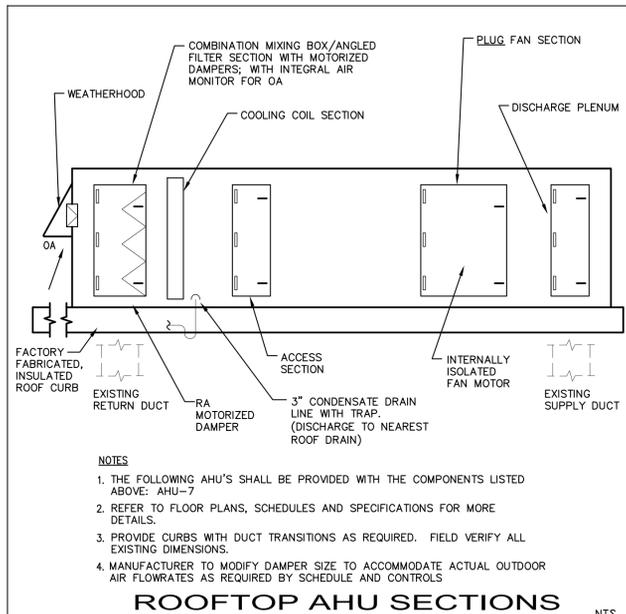
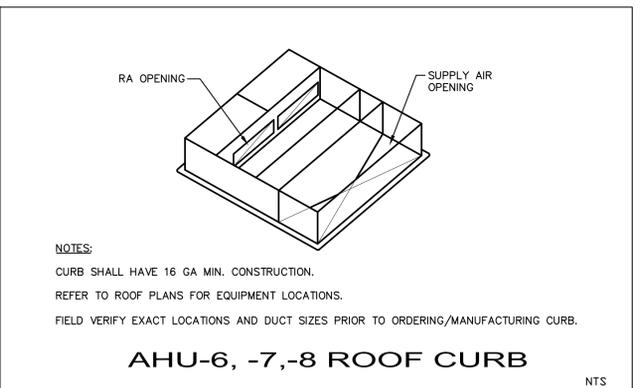
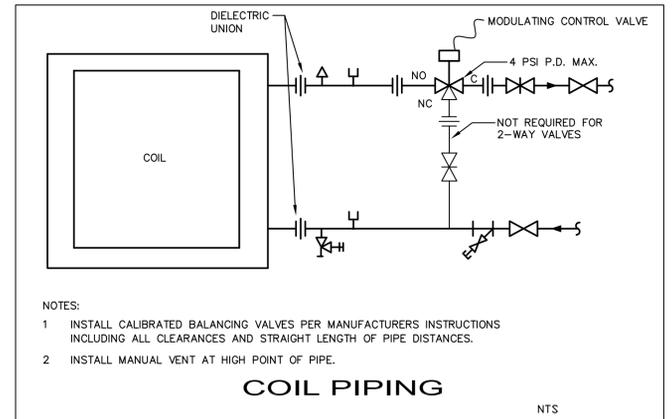
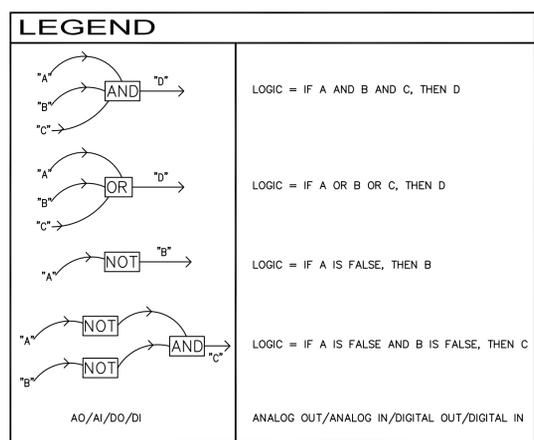
2 KEY PLAN
 1" = 128'

1 MECHANICAL PARTIAL PLAN
 1/8" = 1'



LEGEND

	EXISTING LINE TYPE
	RIGID DUCT - DOUBLE LINE
	RIGID DUCT - SINGLE LINE
	NEW EQUIPMENT/DUCTWORK LINE TYPE
	FLEXIBLE DUCT - INSULATED
	SUPPLY AIR DUCT - SECTION
	RETURN AIR DUCT - SECTION
	DUCT TRANSITION
	ELBOW WITH "AIRFOIL" TURNING VANES
	MANUAL VOLUME DAMPER (VD)
	SUPPLY AIR DIFFUSER
	RETURN AIR OR VENTILATION EXH. GRILLE
	THERMOSTAT OR HUMIDISTAT
	FIRE DAMPER
	3/4\"/>
	16X16 DOOR GRILLE
	SPIN-IN FITTING WITH VOLUME DAMPER



SEAL

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MANATEE CONVENTION CENTER
 MANATEE COUNTY, FL

MECHANICAL DETAILS

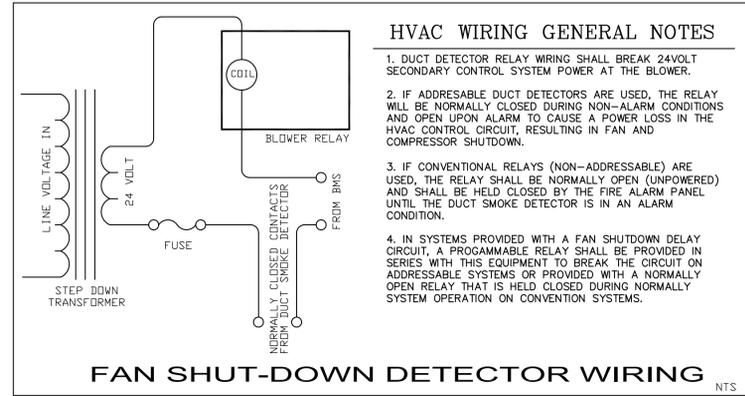
DATE: 01/10/11

SCALE: AS NOTED

GLOBAL JOB NO. 3372-10

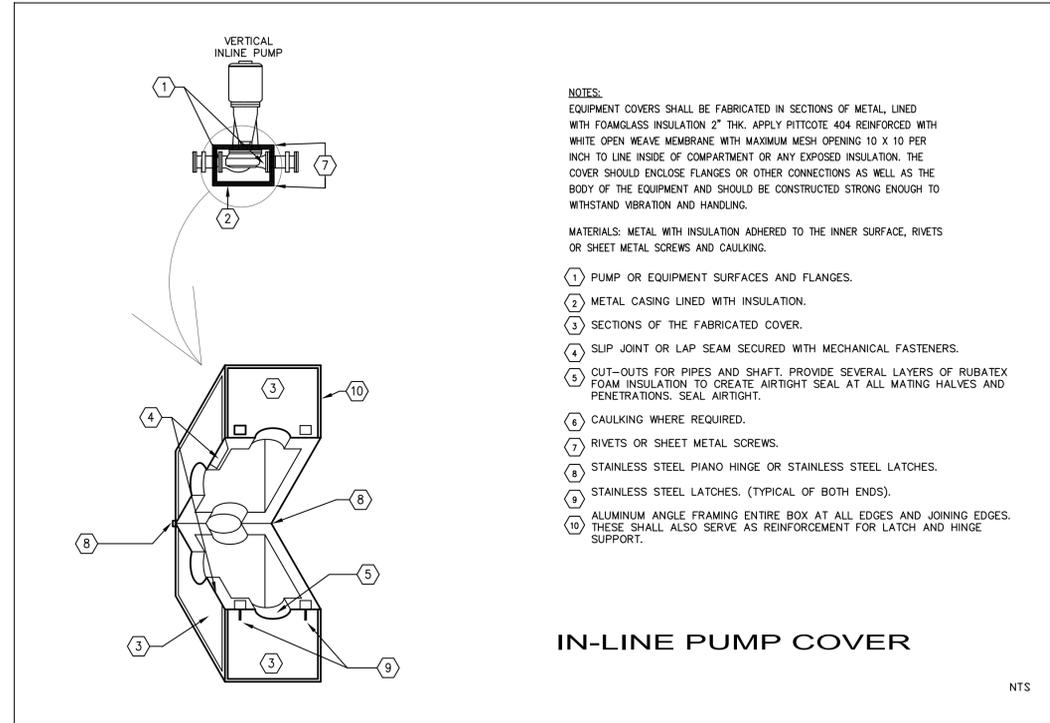
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SHEET NO. M3.0

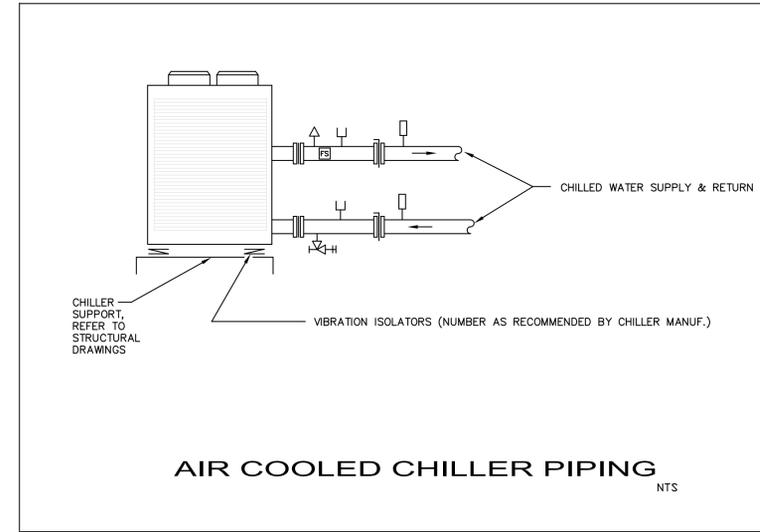
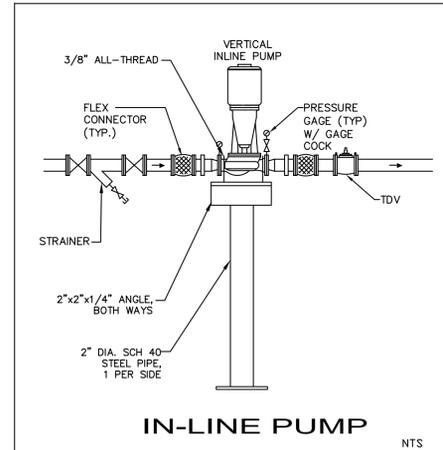


HVAC WIRING GENERAL NOTES

1. DUCT DETECTOR RELAY WIRING SHALL BREAK 24VOLT SECONDARY CONTROL SYSTEM POWER AT THE BLOWER.
2. IF ADDRESSABLE DUCT DETECTORS ARE USED, THE RELAY WILL BE NORMALLY CLOSED DURING NON-ALARM CONDITIONS AND OPEN UPON ALARM TO CAUSE A POWER LOSS IN THE HVAC CONTROL CIRCUIT, RESULTING IN FAN AND COMPRESSOR SHUTDOWN.
3. IF CONVENTIONAL RELAYS (NON-ADDRESSABLE) ARE USED, THE RELAY SHALL BE NORMALLY OPEN (UNPOWERED) AND SHALL BE HELD CLOSED BY THE FIRE ALARM PANEL UNTIL THE DUCT SMOKE DETECTOR IS IN AN ALARM CONDITION.
4. IN SYSTEMS PROVIDED WITH A FAN SHUTDOWN DELAY CIRCUIT, A PROGRAMMABLE RELAY SHALL BE PROVIDED IN SERIES WITH THIS EQUIPMENT TO BREAK THE CIRCUIT ON ADDRESSABLE SYSTEMS OR PROVIDED WITH A NORMALLY OPEN RELAY THAT IS HELD CLOSED DURING NORMALLY SYSTEM OPERATION ON CONVENTION SYSTEMS.



- NOTES:**
EQUIPMENT COVERS SHALL BE FABRICATED IN SECTIONS OF METAL, LINED WITH FOAMGLASS INSULATION 2" THK. APPLY PITTCOTE 404 REINFORCED WITH WHITE OPEN WEAVE MEMBRANE WITH MAXIMUM MESH OPENING 10 X 10 PER INCH TO LINE INSIDE OF COMPARTMENT OR ANY EXPOSED INSULATION. THE COVER SHOULD ENCLOSE FLANGES OR OTHER CONNECTIONS AS WELL AS THE BODY OF THE EQUIPMENT AND SHOULD BE CONSTRUCTED STRONG ENOUGH TO WITHSTAND VIBRATION AND HANDLING.
- MATERIALS:** METAL WITH INSULATION ADHERED TO THE INNER SURFACE, RIVETS OR SHEET METAL SCREWS AND CAULKING.
- 1 PUMP OR EQUIPMENT SURFACES AND FLANGES.
 - 2 METAL CASING LINED WITH INSULATION.
 - 3 SECTIONS OF THE FABRICATED COVER.
 - 4 SLIP JOINT OR LAP SEAM SECURED WITH MECHANICAL FASTENERS.
 - 5 CUT-OUTS FOR PIPES AND SHAFT. PROVIDE SEVERAL LAYERS OF RUBATEX FOAM INSULATION TO CREATE AIRTIGHT SEAL AT ALL MATING HALVES AND PENETRATIONS. SEAL AIRTIGHT.
 - 6 CAULKING WHERE REQUIRED.
 - 7 RIVETS OR SHEET METAL SCREWS.
 - 8 STAINLESS STEEL PIANO HINGE OR STAINLESS STEEL LATCHES.
 - 9 STAINLESS STEEL LATCHES. (TYPICAL OF BOTH ENDS).
 - 10 ALUMINUM ANGLE FRAMING ENTIRE BOX AT ALL EDGES AND JOINING EDGES. THESE SHALL ALSO SERVE AS REINFORCEMENT FOR LATCH AND HINGE SUPPORT.



SEAL		REVISIONS	
NO.	DATE	BY	

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Drawn/Checked By: MAS/MAS

SHEET NO. M3.1

EXPANSION TANK SCHEDULE				
MARK	-	BT-1	BT-2	BT-3
MANUFACTURER	-	CEMLINE	CEMLINE	CEMLINE
MODEL #	-	H500 CWB	H500 CWB	H850 CWB
CAPACITY	GALLOONS	500	500	850
WEIGHT (EMPTY)	POUNDS	1600	1600	3400
DIMENSIONS	LXW (IN.)	42X69	42X69	54X94
NOTES	-	①	①	①

- KEYED NOTES:
 ① PROVIDE TANK WITH:
 A) ELASTOMERIC 1-1/2" INSULATION WITH STUCCO-EMBOSSED ALUMINUM JACKET.
 B) INTERNAL BAFFLES.
 C) AUTOMATIC AIR VENT AT TOP OF TANK.
 D) 6" FLANGED CONNECTIONS.
 E) 12X16 MANHOLE.

IN-LINE PUMP SCHEDULE					
MARK	-	CHWP-1	CHWP-2	CHWP-3	CHWP-4
MANUFACTURER	-	B&G	B&G	B&G	B&G
MODEL #	-	SERIES 80SC	SERIES 80SC	SERIES 80	SERIES 80
SIZE	-	3X3X9-1/2	3X3X9-1/2	4X4X9-1/2	4X4X9-1/2
WATER FLOW RATE	GPM	300	300	350	350
TOTAL HEAD	FT. H ₂ O	64	64	60	60
MOTOR SIZE	HP	10	10	10	10
MOTOR SPEED	RPM	1750	1750	1750	1750
MOTOR TYPE	-	TEFC	TEFC	TEFC	TEFC
MINIMUM PUMP EFFICIENCY	%	70.6	70.6	71	71
SUCTION/DISCHARGE DIAMETER	IN/IN	3/3	3/3	4/4	4/4
ELECTRICAL CHARACTERISTICS	V/ø/HZ	480/3/60	480/3/60	480/3/60	480/3/60
WEIGHT	LBS.	500	500	500	500
LOCATION	-	ON ROOF	ON ROOF	ON ROOF	ON ROOF
NOTES	-	①②	①②	①③	①③

- KEYED NOTES:
 ① CONTRACTOR SHALL PROVIDE PROVISIONS FOR REMOVAL OF PUMP IMPELLER AND RETURNING IMPELLER TO PUMP MANUFACTURER FOR SHAVING PURPOSES. CONTRACTOR SHALL BE RESPONSIBLE FOR REINSTALLATION OF PUMP IMPELLER AND BRINGING PUMP BACK ON LINE.
 ② PROVIDE WITH VFD COMPATIBLE MOTOR, INVERTER DUTY RATED AND LABELED AND MATCHING VFD. REFER TO VFD SCHEDULE. VFD TO BE MOUNTED BY MECHANICAL, WIRED BY ELECTRICAL.
 ③ PROVIDE COMBINATION STARTER/DISCONNECT. MOUNTED BY MECHANICAL, WIRED BY ELECTRICAL.

EXPANSION TANK		
MARK	-	ET-1,-2
MANUFACTURER	-	AMTROL
MODEL #	-	AX-80H
TOTAL TANK VOLUME	GALLONS	44.5
ACCEPTANCE VOLUME	GALLONS	22.6
LOCATION	-	ON ROOF
WEIGHT	LBS.	500
NOTES	-	①

- KEYED NOTES:
 ① MOUNT ADJACENT TO BUFFER TANKS.

ALTERNATE 2
 PROVIDE A DEDUCT COST FOR REPLACEMENT OF EXISTING SPLIT SYSTEMS ON THE GROUND FLOOR (UNITS 1, 2, 2A, AND 9) IN LIEU OF NEW CHILLED WATER BLOWER COIL UNITS, CHILLED WATER PIPING ABOVE CEILING AND CONTROLS. BASE BID SHALL BE BASED ON INSTALLATION OF CHILLED WATER PIPING AND CHILLED WATER AHU'S AS SHOWN AND SPECIFIED.

BLOWER COIL UNIT SCHEDULE						
MARK	-	AHU-1	AHU-2	AHU-2A	AHU-5	AHU-9
MANUFACTURER	-	JCI	JCI	JCI	JCI	JCI
MODEL #	-	AH120	AH120	AH120	AH120	AH120
SUPPLY AIR QUANTITY	CFM	1800	4000	1800	1800	1800
OUTSIDE AIR QUANTITY	CFM	180	400	180	165	210
FAN SPEED/MAX FAN SPEED	RPM/RPM	1186/1800	1000/1200	1186/1800	1186/1800	1186/1800
STATIC PRESS. DROP EXT./TOTAL	IN. H ₂ O/IN. H ₂ O	1/1.48	1/1.48	1/1.48	1/1.48	1/1.48
MOTOR SIZE	HP	925 WATTS	2269 WATTS	925 WATTS	925 WATTS	925 WATTS
ELECTRICAL CHARACTERISTICS	V/ø/HZ	480/3/60	480/3/60	480/3/60	480/3/60	480/3/60
FILTER TYPE	-	2"	2"	2"	2"	2"
COOLING COIL	TOTAL COOLING CAPACITY	MBH	85,110	189,250	85,110	85,110
	SENSIBLE COOLING CAPACITY	MBH	50,400	110,380	50,400	50,400
	ENTERING AIR TEMP. DB./WB.	F°/F°	77.4/67.8	77.4/67.8	77.4/67.8	77.4/67.8
	LEAVING AIR TEMP. DB./WB.	F°/F°	52.7/52.3	52.7/52.3	52.7/52.3	52.7/52.3
	COOLING COIL MAX. AIR PRESS. DROP	INCHES W.G.	0.25	0.25	0.25	0.25
	COOLING COIL EWT/LWT	F°/F°	44/56	44/56	44/56	44/56
	COOLING COIL WATER FLOWRATE	GPM	12.2	31.4	12.2	12.2
COOLING MAX. WATER PRESS. DROP	FT. H ₂ O	15.7	15.7	15.7	15.7	
HEATING COIL	TOTAL COOLING CAPACITY	KW	-	-	13	-
	CONTROL	-	-	SCR	-	-

ROOFTOP AHU SCHEDULE						
Air Handling Unit Data	Tag	AHU-3	AHU-4	AHU-7	AHU-8	AHU-6
	Model No.	XTO-114x144	XTO-114x144	XTO-114x144	XTO-96x96	XTO-96x96
Construction	Outdoor Air Handler	Outdoor Air Handler				
Type	Variable Air Volume	Variable Air Volume				
Location/Service	On Roof	On Roof				
Max. Length (in.)	262	262	190	234	189	
Max. Height (in.)	114	114	96	96	66	
Max. Width (in.)	144	144	96	96	96	
Max. Weight (lbs)	13274	13274	7247	8365	5783	
Function	Supply Fan					
Wheel Type	PL	PL	PL	PL	PL	
Size	49 SWSI	49 SWSI	36 SWSI	36 SWSI	32 SWSI	
E.S.P. (in. w.g.)	1.75	1.75	1.75	1.75	1.75	
T.S.P. (in. w.g.)	3.50	3.50	3.73	3.76	3.65	
Airflow (CFM)	45000	45000	25000	25000	16000	
Max. BHP	41.60	41.60	24.73	24.86	13.53	
RPM	844	844	1205	1207	1213	
Volume Control	VFD	VFD	VFD	VFD	VFD	
Motor HP	50.0	50.0	30.0	30.0	15.0	
Motor Type	ODP Prem. Eff.					
V	460	460	460	460	460	
Hz	60 Hz	60 Hz	60 Hz	60 Hz	60 Hz	
Ph	3	3	3	3	3	
Airflow (CFM)	45000	45000	25000	25000	16000	
OA Airflow (CFM)	7000	7000	4500	4500		
EAT-DB (°F)	77.40	77.40	78.30	78.30	81.90	
EAT-WB (°F)	67.80	67.80	69.00	69.00	72.20	
LAT-DB (°F)	51.51	51.51	51.43	51.43	51.43	
LAT-WB (°F)	51.34	51.34	51.23	51.23	51.17	
TMBH	2253.70	2253.70	1368.90	1368.90	1077.80	
SMBH	1301.50	1301.50	751.80	751.80	548.80	
Max. F.V. (ft/min)	479.00	479.00	504.00	504.00	499.00	
Max. A.P.D. (in. w.g.)	0.64	0.64	0.81	0.81	0.73	
EWT (°F)	44.00	44.00	44.00	44.00	44.00	
LWT (°F)	56.82	56.82	55.92	55.92	55.99	
Flow Rate (gpm)	350.00	350.00	228.60	228.60	179.00	
Max. W.P.D. (ftw.c.)	11.30	11.30	13.70	13.70	14.80	
Min. Rows	8	8	8	8	6	
Voltage	460 / 480	460 / 480	-	460 / 480	460 / 480	
kW	152.0	152.0	0	97.0	80.0	
Control	SCR	SCR	-	None	SCR	
Temp. Rise (°F)	10.79	10.79	-	12.39	15.97	
Amp. Draw	190.78	190.78	-	121.75	100.41	
Airflow (CFM)	45000	45000	25000	25000	16000	
Type	Angle	Angle	Angle	Angle	Angle	
Initial A.P.D. (in. w.g.)	0.12	0.12	0.15	0.15	0.14	
Efficiency	Pleated 30% (MERV 8)					
Max. F.V. (ft/min)	297.80	297.80	340.92	340.92	327.27	
F.A. (sq. ft)	151.11	151.11	73.33	73.33	48.89	
Qty/Size	(40)24x20; (8)16x20	(40)24x20; (8)16x20	(18)24x20; (6)16x20	(18)24x20; (6)16x20	(12)24x20; (4)16x20	
Depth	4"	4"	4"	4"	4"	
Access Type	Side	Side	Side	Side	Side	
Function	PreFilter	PreFilter	PreFilter	PreFilter	PreFilter	
Notes	-	1,2	1,2	1,2	1,2	

- AHU NOTES:
 ① BASIS OF DESIGN IS JCI. ACCEPTABLE MANUFACTURERS INCLUDE CARRIER, DUNHAM BUSH, JCI, MCQUAY AND TRANE.
 ② PROVIDE WITH THE FOLLOWING OPTIONS:
 A) MOTORIZED DAMPERS FOR RETURN AIR AND OUTDOOR AIR DUCT CONNECTIONS. PROVIDE INTEGRAL AIR MONITOR AT INLET OF OUTDOOR AIR DUCT. RETURN AIR AND OUTDOOR AIR DAMPERS SHALL BE PROVIDED AS AN INTEGRAL PART OF THE AHU MANUFACTURER'S FILTER/MIXING BOX. MANUFACTURER TO MODIFY DAMPERS AND OA MONITOR TO ACCOMMODATE ACTUAL OUTDOOR AIRFLOW RATE AS REQUIRED BY SCHEDULE AND CONTROLS.
 B) PROVIDE WITH VFD COMPATIBLE MOTOR, INVERTER DUTY RATED AND LABELED. LOCATE VFD EXTERIOR TO THE UNIT, FACTORY MOUNTED AND WIRED.
 C) PROVIDE WITH ROOF CURB. REFER TO DETAILS FOR CURB ARRANGEMENT. CURB SHALL BE MANUFACTURED SPECIFICALLY FOR EACH RTU.
 D) FACTORY PAINT TO MATCH EXISTING ROOF, COLOR BY ARCHITECT.
 E) CHILLED WATER COIL EPOXY DIP COATING AFTER FABRICATION

AIR COOLED SCROLL CHILLER SCHEDULE			
Chiller Data	Tag	CH-1,-2	CH-3,-4
	Model	YLAA0156HE46	YLAA0175HE46
Quantity	2		
Capacity (Tons)	146.8	175.8	
Total KW	167.5	207.3	
Min. EER	10.5	10.2	
Min. IPLV	15.6	15.3	
Min. Capacity Req'd	146 Tons	175 Tons	
Oper. Weight (lbs)	8039	8956	
Rigging Weight (lbs)	7582	8313	
Refrigerant	R410A	R410A	
Height (in.)	100.2	100.2	
Width (in.)	88.0	88.0	
Length (in.)	232.7	232.7	
Number Of Refrig. Circuits	2	2	
Comp. Type	Scroll	Scroll	
Number Of Comp.	5	6	
Refrig. Circ 1	90	94.0	
Refrig. Circ 2	82	92.0	
Fluid	Water	Water	
EWT (°F)	56.0	56.0	
LWT (°F)	44.0	44.0	
Flow Rate (gpm)	293.3	351.2	
Pressure Drop	10.1	11.3	
Fouling Factor	0.00010	0.00010	
Water Volume	55	77.0	
Pipe Conn. Size	77.0	8.0	
Entering Air (°F)	8.0	95.0	
Altitude	95.0	0	
Airflow Volume	150000	150000	
Circuit 1	6	5	
Circuit 2	4	5	
Volts/PHHZ	460/3/60	460/3/60	
MCA	338.4	380.6	
Max Fuse	400	400	
Lugs Per Phase	2	2	
Wire Range	(2)#3/0 - 250	(2)#3/0 - 250	
Control KVA	0.0	0.0	
Comp. KW	150.7	190.5	
Total Fan KW	16.8	16.8	
Starter Type	Across the Line	Across the Line	
Comp. RLA Circ 1	54.5/54.5/54.5	54.5/54.5/54.5	
Comp. RLA Circ 2	54.5/54.5	54.5/54.5/54.5	
Max Sound Power LWA per ARI 370	94.0	94.0	
63 Hz	100.0	101.0	
125 Hz	96.0	96.0	
250 Hz	93.0	93.0	
500 Hz	92.0	92.0	
1K Hz	88.0	88.0	
2K Hz	85.0	85.0	
4K Hz	81.0	81.0	
8K Hz	77.0	77.0	
Notes	1,2	1,2	

- CHILLER NOTES:
 ① BASIS OF DESIGN IS JCI. ACCEPTABLE MANUFACTURERS INCLUDE DUNHAM BUSH, JCI AND MCQUAY.
 ② PROVIDE WITH THE FOLLOWING:
 A) HIGH AMBIENT OPTION FOR 25°F-125°F OPERATION.
 B) SINGLE POINT POWER CONNECTION THAT FEEDS CHILLER.
 C) TEAO CONDENSER FAN MOTORS.
 D) ACOUSTIC COMPRESSOR BLANKETS.
 E) CONDENSER COIL EPOXY DIP COATING AFTER FABRICATION.
 F) LOW SOUND FANS.
 G) FACTORY MOUNTED/WIRED CONTROL TRANSFORMER.
 H) SUCTION AND DISCHARGE SERVICE VALVES FOR EACH COMPRESSOR.
 I) UNIT MOUNTED NON-FUSED DISCONNECT WITH LOCKABLE HANDLE.
 J) ONE YEAR PARTS, LABOR AND REFRIGERANT WARRANTY.
 K) SPRING VIBRATION ISOLATORS WITH 1" DEFLECTION.
 L) BACNET MSTP CARD AND ANALOG INPUT (0-10 VDC OR 4-20 mA) FOR REMOTE SETPOINT RESET.
 M) LOUVERED CHILLER ENCLOSURES.
 N) PAINT TO MATCH EXISTING ROOF, COLOR BY ARCHITECT.
 O) MIN. GPM FOR CH-1 AND CH-2 SHALL NOT EXCEED 140 GPM.

VFD SCHEDULE								
MARK	-	VFD-3	VFD-4	VFD-7	VFD-8	VFD-6	VFD-1	VFD-2
SIZE	HP	60	60	30	30	15	10	10
MANUFACTURER	-	JCI						
MODEL #	-	AYK550-CM						
ASSOCIATED EQUIPMENT	-	AHU-3	AHU-4	AHU-7	AHU-8	AHU-6	CHWP-1	CHWP-2
OUTPUT CURRENT	AMPS	86	86	44	44	23	16	16
CONTROLS	-	BACNET						
LOCATION	-	②	②	②	②	②	③	③
ELECTRICAL CHARACTERISTICS	V/ø/HZ	480/3/60	480/3/60	480/3/60	480/3/60	480/3/60	480/3/60	480/3/60
NOTES	-	①	①	①	①	①	①	①

- KEYED NOTES:
 ① PROVIDE VFD WITH:
 A) 2 CONTACTOR BYPASS WITH VFD SERVICE DISCONNECT. BYPASS SHALL BE CAPABLE OF OPERATING VFD WITH DRIVE REMOVED.
 B) 5% INPUT LINE REACTOR.
 C) MAIN FUSED DISCONNECT.
 ② LOCATE VFD IN A WEATHER TIGHT ENCLOSURE (NEMA 3R OR EQUAL) EXTERIOR TO THE UNIT, FACTORY MOUNTED AND WIRED.
 ③ LOCATE VFD IN A NEMA 3R ENCLOSURE, MOUNT ON UNISTRUT ON ROOF.

1 MECHANICAL SCHEDULES
 NO SCALE

NO.	DATE	BY	REVISIONS

ELECTRIC DUCT HEATER SCHEDULE

MARK	-	EDH-1-1	EDH-1-2	EDH-1-3	EDH-1-4	EDH-1-5	EDH-1-6	EDH-1-8	EDH-1-10	EDH-1-11	EDH-1-12	EDH-1-13	EDH-1-14	EDH-1-15	EDH-1-16	EDH-1-17	EDH-1-18	EDH-1-19	EDH-1-20	EDH-1-21	EDH-1-22	EDH-1-23
MANUFACTURER	-	WARREN																				
MODEL #	-	CBK																				
CAPACITY	KW	10	4	9	6	13.5	9	3	1.5	27	15	15	15	35	15	15	6	15	15	6	15	1
ELECTRICAL CHARACTERISTICS	V/ø/HZ	480/3/60	277/1/60	480/3/60	480/3/60	480/3/60	480/3/60	277/1/60	277/1/60	480/3/60	480/3/60	480/3/60	480/3/60	480/3/60	480/3/60	480/3/60	480/3/60	480/3/60	480/3/60	480/3/60	480/3/60	277/1/60
CONTROLS	-	SCR																				
SIZE	IN.XIN.	24X12	12X8	16X12	16X12	20X16	16X12	12X6	12X6	30X20	20X16	20X20	20X16	30X16	24X16	20X16	12X12	20X16	20X16	12X12	20X16	8X6

NOTES:

- A) MECHANICAL TO PROVIDE AND INSTALL. CONTROLS TO PROVIDE INTEGRATE INTO BMS.
- B) FIELD VERIFY EXISTING DUCT DIMENSIONS AND ELECTRICAL CHARACTERISTICS/CAPACITIES PRIOR TO ORDERING DUCT HEATERS.
- C) PROVIDE ALL HEATERS WITH DOOR INTERLOCKING FUSED DISCONNECT.

ZONE DAMPER SCHEDULE

MARK	-	ZD-1-11	ZD-1-12	ZD-1-13	ZD-1-14	ZD-1-15	ZD-1-16	ZD-1-17	ZD-1-18	ZD-1-19	ZD-1-20	ZD-1-21	ZD-1-22
MANUFACTURER	-	RUSKIN											
MODEL #	-	CD35											
SIZE	IN.XIN.	30X20	20X16	20X20	20X16	30X16	24X16	20X16	12X12	20X16	20X16	12X12	20X16

NOTES:

- A) FIELD VERIFY EXISTING DUCT DIMENSIONS PRIOR TO ORDERING ZONE DAMPERS.
- B) AHU CONTROL DAMPERS ARE NOT SHOWN IN THE ABOVE SCHEDULE, BUT ARE REQUIRED.
- C) PROVIDE WITH ACTUATOR FOR DAMPER MODULATION. REFER TO CONTROL DRAWINGS FOR SEQUENCING.

DX S/S SCHEDULE

AIR HANDLING UNIT		
MARK	-	AHU-5
MANUFACTURER	-	TRANE
MODEL	-	4TEC3F48B
TOTAL COOLING CAPACITY	BTUH	46,500
SENSIBLE CAPACITY	BTUH	34,400
SUPPLY AIR QUANTITY	CFM	1600
OUTSIDE AIR QUANTITY	CFM	0
MOTOR SIZE	HP	1/2
ELECTRICAL	V/ø/HZ	208/1/60
S.E.E.R.	-	13
ENTERING AIR TEMP. DB/WB	°F/°F	75/64
LEAVING AIR TEMP. DB/WB	°F/°F	55/54
EXT. STATIC PRESSURE	IN. W.G.	0.5
FILTER	-	1" DISP.
WEIGHT	LBS	151
ELECTRIC HEAT	KW	0
MINIMUM CIRCUIT AMPACITY	AMPS	3.4
MAX OVERCURRENT PROTECTION	AMPS	15
CONDENSING UNIT		
MARK	-	CU-5
MANUFACTURER	-	TRANE
MODEL	-	4TTA3048A4
OUTDOOR TEMPERATURE	°F	95
ELECTRICAL CHARACTERISTICS	V/ø/HZ	480/3/60
MINIMUM CIRCUIT AMPACITY	AMPS	9
MAX OVERCURRENT PROTECTION	AMPS	15
NOTES:	-	①②

KEYED NOTES:

- ① PROVIDE WITH NECESSARY CONTROLS TO CONNECT TO MAIN BUILDING MANAGEMENT SYSTEM AND ROOM TEMPERATURE SENSOR. PROVIDE WITH AUXILIARY DRAIN PAN WHICH EXTENDS 6" BEYOND PERIMETER OF UNIT ALL AROUND, INCLUDE FLOAT SWITCH TO SHUT DOWN UPON RISE OF WATER LEVEL.
- ② LOW AMBIENT AND SEACOAST KITS.

DESIGN CONDITIONS

SUMMER
 OUTSIDE - 91.0°F/80.0°F DRY BULB/WET BULB
 INSIDE - 76°F/55%RH

WINTER
 OUTSIDE - 36°F
 INSIDE - 68°F

MAU SCHEDULE

MARK	-	MAU-1
MANUFACTURER	-	GREENHECK
MODEL #	-	RSF-180
FLOW	CFM	8500
STATIC PRESSURE	IN. W.G.	0.75
MOTOR HP	-	5
LOCATION	-	ON ROOF
ELECTRICAL CHARACTERISTICS	V/ø/HZ	480/3/60
NOTES	-	①②

KEYED NOTES:

- ① PROVIDE MAU WITH:
 A) FACTORY PREFABRICATED 12" ROOF CURB
 B) INSECT SCREEN
 C) CLEANABLE INTAKE FILTERS
- ② MAU TO SHUT DOWN IF A) HOOD ANSUL SYSTEM IS ACTIVATED OR B) FAS IS IN ALARM.

FAN SCHEDULE

MARK	-	EF-7A
MANUFACTURER	-	GREENHECK
MODEL #	-	HGB-180HP
SERVICE	-	EXHAUST
AIRFLOW	CFM	1250
EXTERNAL STATIC	IN. H ₂ O	0.5
FAN DRIVE	-	BELT
MAX. FAN SPEED	RPM	769
MAX. GENERATED NOISE	SONES	8.5
MOTOR	HP	1/4
LOCATION	-	ON ROOF
ELECTRICAL CHARACTERISTICS	V/ø/HZ	110/1/60
NOTES	-	①②③④

KEYED NOTES:

- ① PROVIDE FLEXIBLE CONNECTORS AT ALL DUCT CONNECTIONS TO FAN.
- ② PROVIDE FAN WITH GRAVITY BACKDRAFT DAMPER. REFER TO STANDARD MECHANICAL DETAILS FOR FURTHER DETAILS.
- ③ PROVIDE WITH FACTORY PREFABRICATED ROOF CURB.
- ④ PROVIDE WITH COMBINATION STARTER/DISCONNECT. MOUNTED BY MECHANICAL, WIRED BY ELECTRICAL.

VENTILATION SCHEDULE

UNIT NUMBER	NUMBER OF PEOPLE	PEOPLE OUTDOOR CFM	TOTAL AREA SFT	AREA OUTDOOR CFM	UNCORRECTED OA INTAKE	VENTILATION EFFICIENCY	CORRECTED OA INTAKE	EXHAUST AIR	PRESSURIZATION	TOTAL DESIGN OA VALUE
AHU-1	6	0	1800	450 EXHAUST	0	1.0	0	450	-270	180
AHU-2	0	0	500	30	30	1.0	30	0	400	400
AHU-2A	0	0	500	30	30	1.0	30	0	180	180
AHU-3	2000	15000	20000	1200	16200	1.0	7000*	4500	2500	7000
AHU-4	2000	15000	20000	1200	16200	1.0	7000*	5150	1850	7000
AHU-5	7	35	1600	96	131	0.8	164	0	165	165
AHU-6	0	0	6300	0	0	1.0	0	6500	500	7000
AHU-7	700	3500	16500	990	4490	1.0	4490	1300	3200	4500
AHU-8	100	500	13500	1620	2120	1.0	2120	7500	-3000	4500
AHU-9	7	35	2200	132	167	0.8	209	0	210	210

NOTES:

CALCULATIONS BASED ON ASHRAE 62.1-2004.

*EQUATION 6-9 (T=3V/VBZ) HAS BEEN USED TO AVERAGE CONDITIONS OVER A TIME PERIOD AND ADJUST THE VENTILATION RATE.

SEAL

REVISIONS

BY

DATE

NO.

GLOBAL MEP & FIRE ENGINEERING, INC.
 8450 LINGER LODGE ROAD BRADENTON, FL 34202
 PHONE: 941-758-2551 FAX: 941-739-6983
 info@globalmepfl.com CA# 6237



MANATEE CONVENTION CENTER
 MANATEE COUNTY, FL

DESCRIPTION:

DATE: 01/10/11

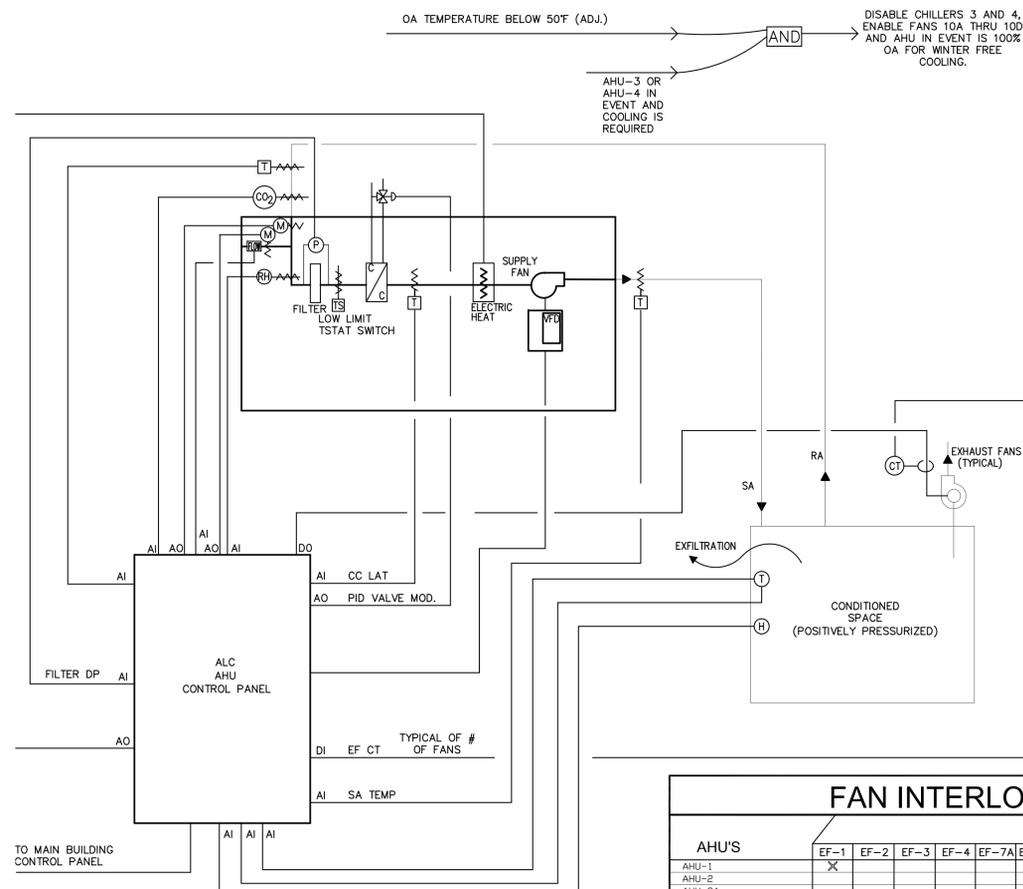
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GLOBAL JOB NO. 3372-10

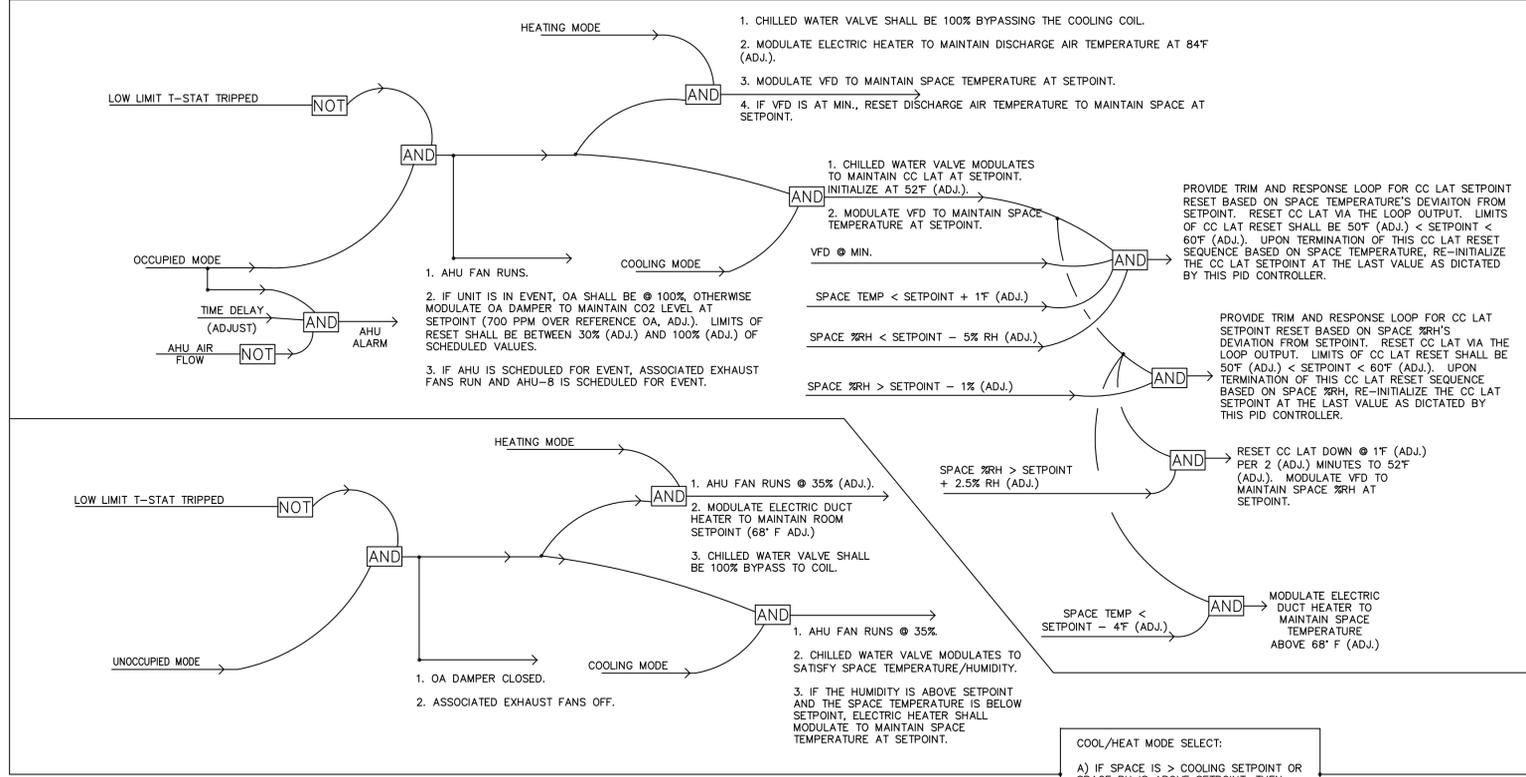
Drawn/Checked By: MAS/MAS

SHEET NO. M4.1

JERRY N. ZOLLER
 ARCHITECT / PLANNER
 914 14th STREET W. BRADENTON, FL. 34205 phone 748-4465



AHU-3,-4 CONTROL SCHEMATIC

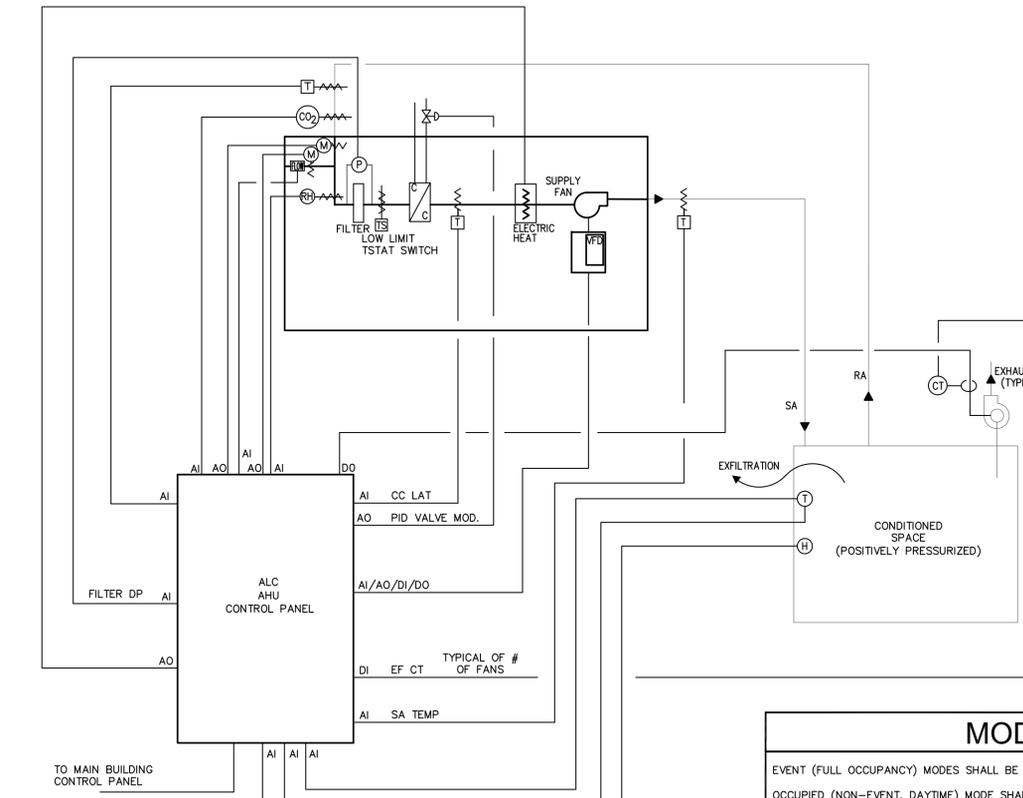


AHU-3,-4 LOGIC DIAGRAM

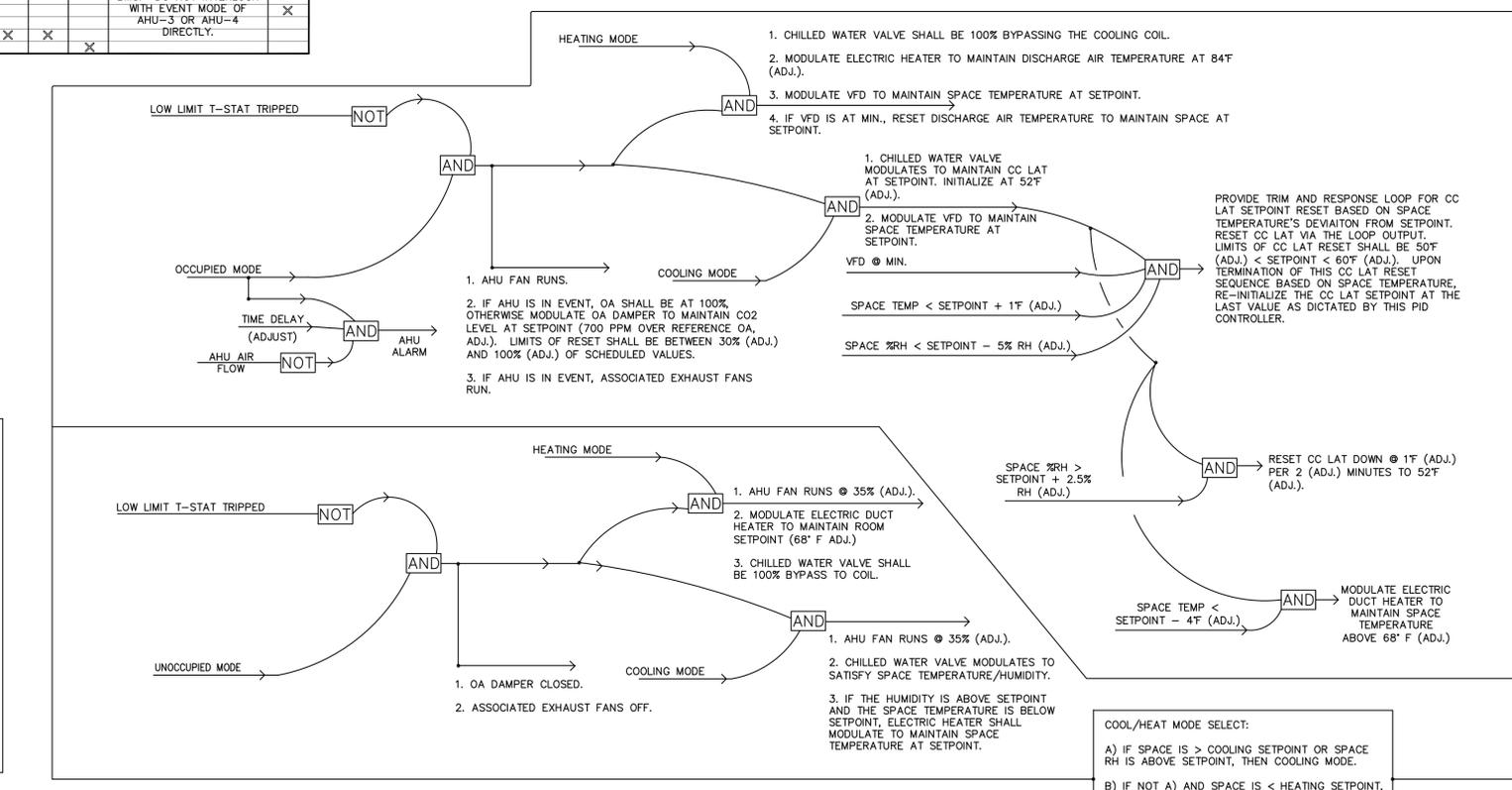
AHU'S	FANS										KH		
	EF-1	EF-2	EF-3	EF-4	EF-7A	EF-7B	EF-8A	EF-8B	EF-9	EF-10A		EF-10B	EF-10C
AHU-1	X												
AHU-2													
AHU-2A													
AHU-3			X										
AHU-4				X									
AHU-5													
AHU-6													
AHU-7					X	X							
AHU-8							X	X					
AHU-9									X				

FANS 10A THRU 10D SHALL BE ENABLED VIA SOFTWARE FOR WINTER TIME FREE COOLING VIA BMS. DO NOT INTERLOCK WITH EVENT MODE OF AHU-3 OR AHU-4 DIRECTLY.

FAN INTERLOCK MATRIX



AHU-8 CONTROL SCHEMATIC



AHU-8 LOGIC DIAGRAM

MODE SCHEDULES	
EVENT (FULL OCCUPANCY) MODES SHALL BE AS SCHEDULED VIA THE BMS.	
OCCUPIED (NON-EVENT, DAYTIME) MODE SHALL BE WEEKDAYS, 7:30 TO 5:30 (ADJ.).	
UN-OCCUPIED MODE SHALL BE IF AHU IS NOT SCHEDULED FOR EVENT OR OCCUPIED.	

1 MECHANICAL CONTROLS
NO SCALE

SEAL

NO.	DATE	BY	REVISIONS

GLOBAL MEP & FIRE ENGINEERING, INC.
8450 LINGER LODGE ROAD BRADENTON, FL 34202
PHONE: 941-758-2551 FAX: 941-739-6983
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914 14th STREET W. BRADENTON, FL. 34205 phone 748-4465

MANATEE CONVENTION CENTER
MANATEE COUNTY, FL

MECHANICAL CONTROLS

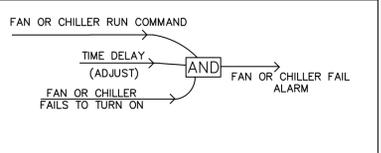
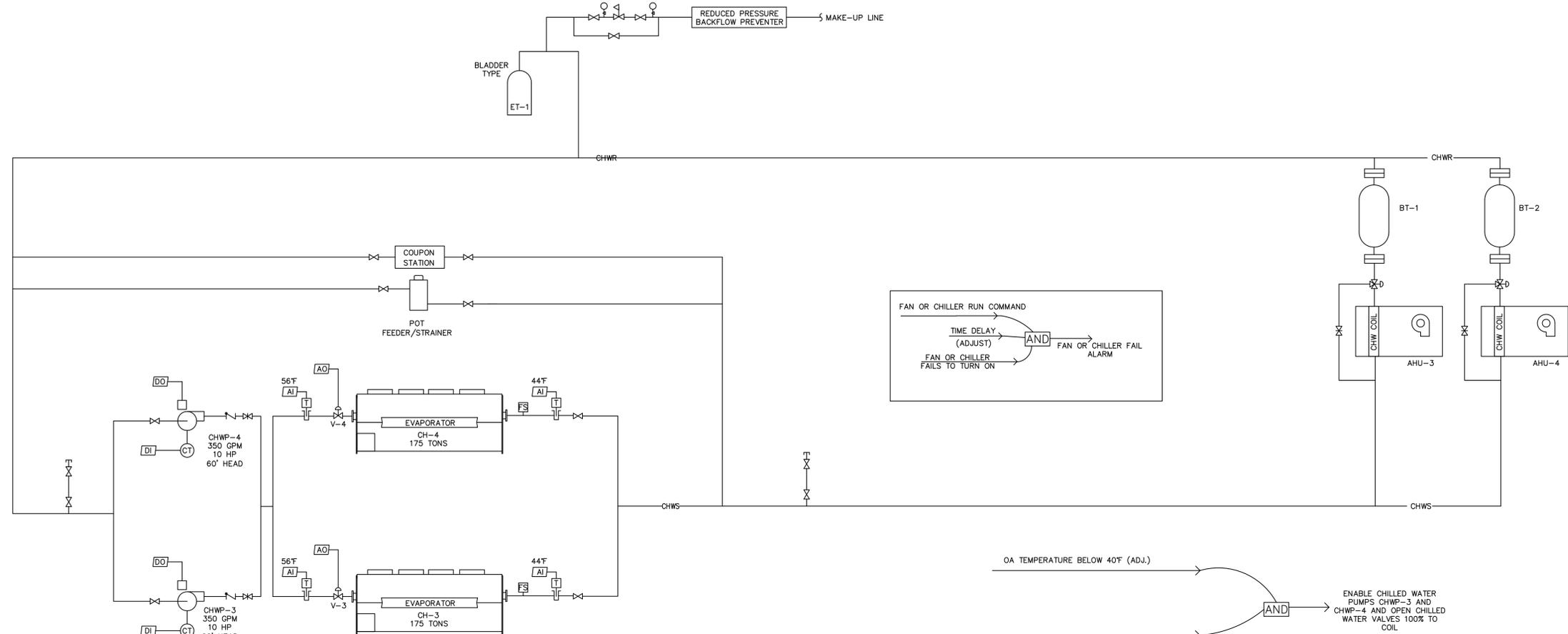
DATE: 01/10/11

SCALE: AS NOTED

GLOBAL JOB NO. 3372-10

Drawn/Checked By: MAS/MAS

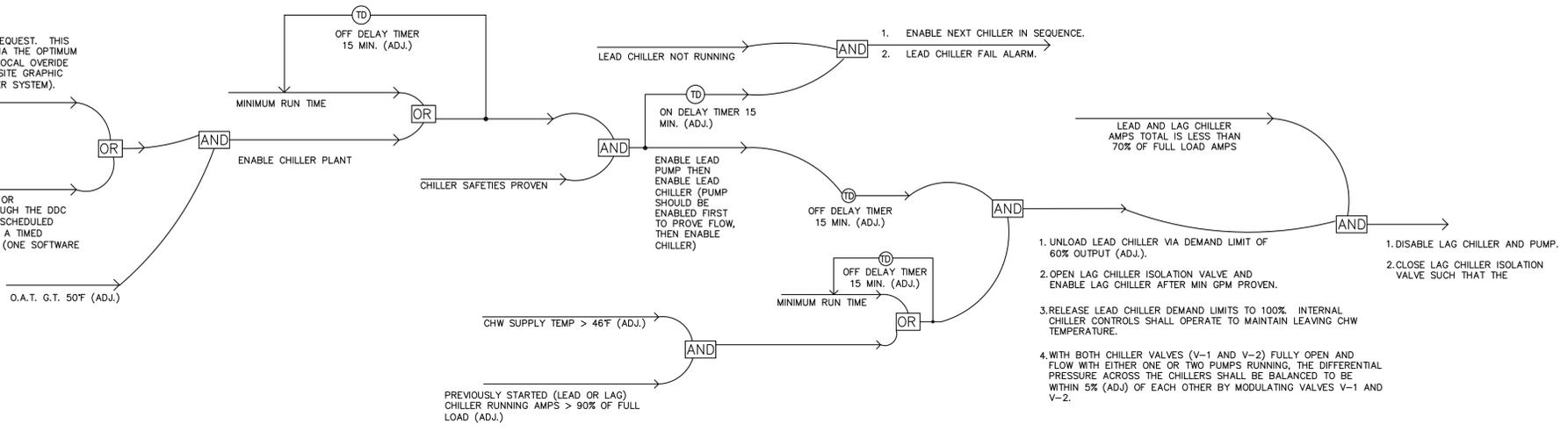
SHEET NO. M5.0



PUMP/CHILLER SEQUENCE SCHEDULE	
1. LEAD PUMP :	PUMP CHWP-3
2. LAG PUMP :	PUMP CHWP-4
1. LEAD CHILLER :	CHILLER CH-3
2. LAG CHILLER :	CHILLER CH-4
NOTES:	
1. LEAD/LAG SHALL ALTERNATE THEIR ORDER OF SEQUENCE WEEKLY.	
2. IF LEAD FAILS, START LAG AND SEND ALARM TO BAS.	

AHU "OCCUPIED" COOLING OR DEHUMIDIFICATION REQUEST. THIS SHALL BE THROUGH THE DDC CONTROL SYSTEM VIA THE OPTIMUM START/STOP, SCHEDULED START/STOP, A TIMED LOCAL OVERRIDE BUTTON OR A TIMED OVERRIDE ON THE OVERALL SITE GRAPHIC SCREEN (ONE SOFTWARE SWITCH PER AIR-HANDLER SYSTEM).

AT LEAST 2 (ADJ.) AHU'S "UNOCCUPIED" COOLING OR DEHUMIDIFICATION REQUEST. THIS SHALL BE THROUGH THE DDC CONTROL SYSTEM VIA THE OPTIMUM START/STOP, SCHEDULED START/STOP, A TIMED LOCAL OVERRIDE BUTTON OR A TIMED OVERRIDE ON THE OVERALL SITE GRAPHIC SCREEN (ONE SOFTWARE SWITCH PER AIR-HANDLER SYSTEM).



HIGH ROOF FLOW DIAGRAM

SEAL	
NO.	DATE
BY	REVISIONS

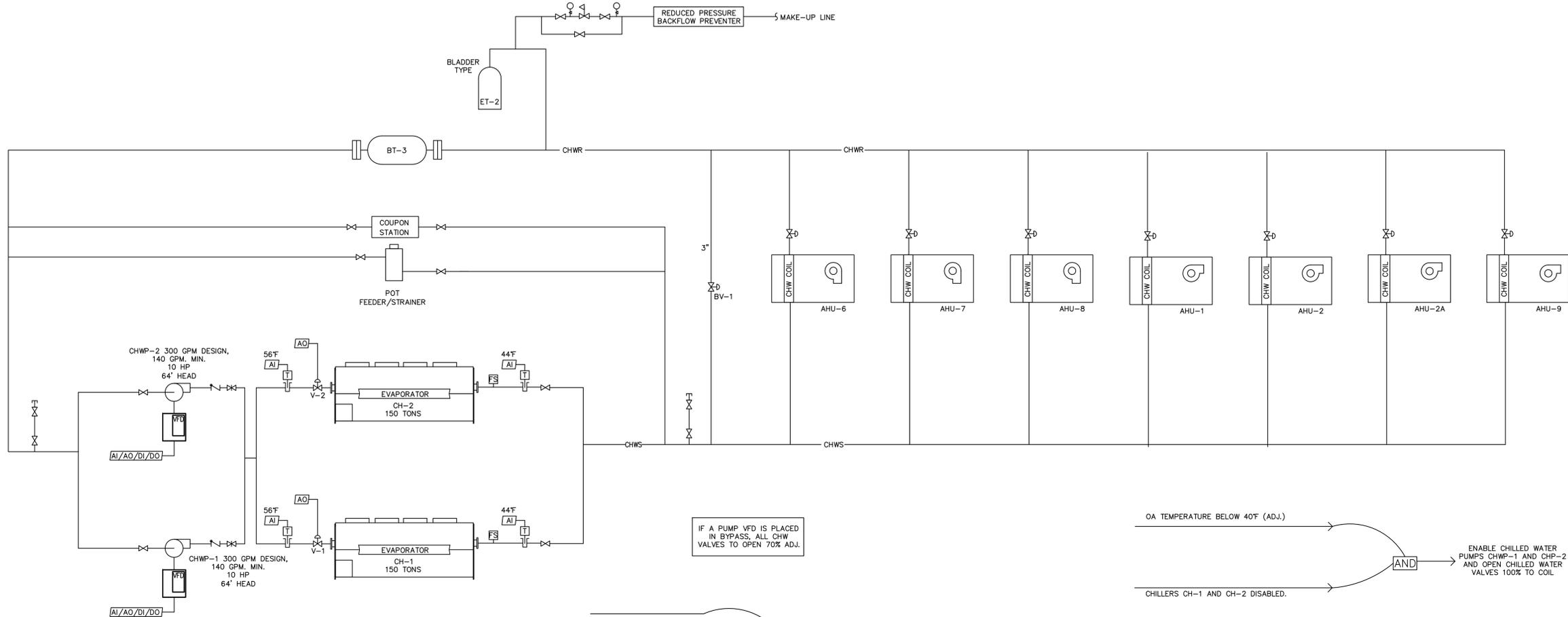
GLOBAL MEP & FIRE ENGINEERING, INC.
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MANATEE CONVENTION CENTER
MANATEE COUNTY, FL

MECHANICAL CONTROLS

DATE:	01/10/11
SCALE:	AS NOTED
GLOBAL JOB NO.	3372-10
Drawn/Checked By:	MAS/MAS
SHEET NO.	M5.2



PUMP/CHILLER SEQUENCE SCHEDULE

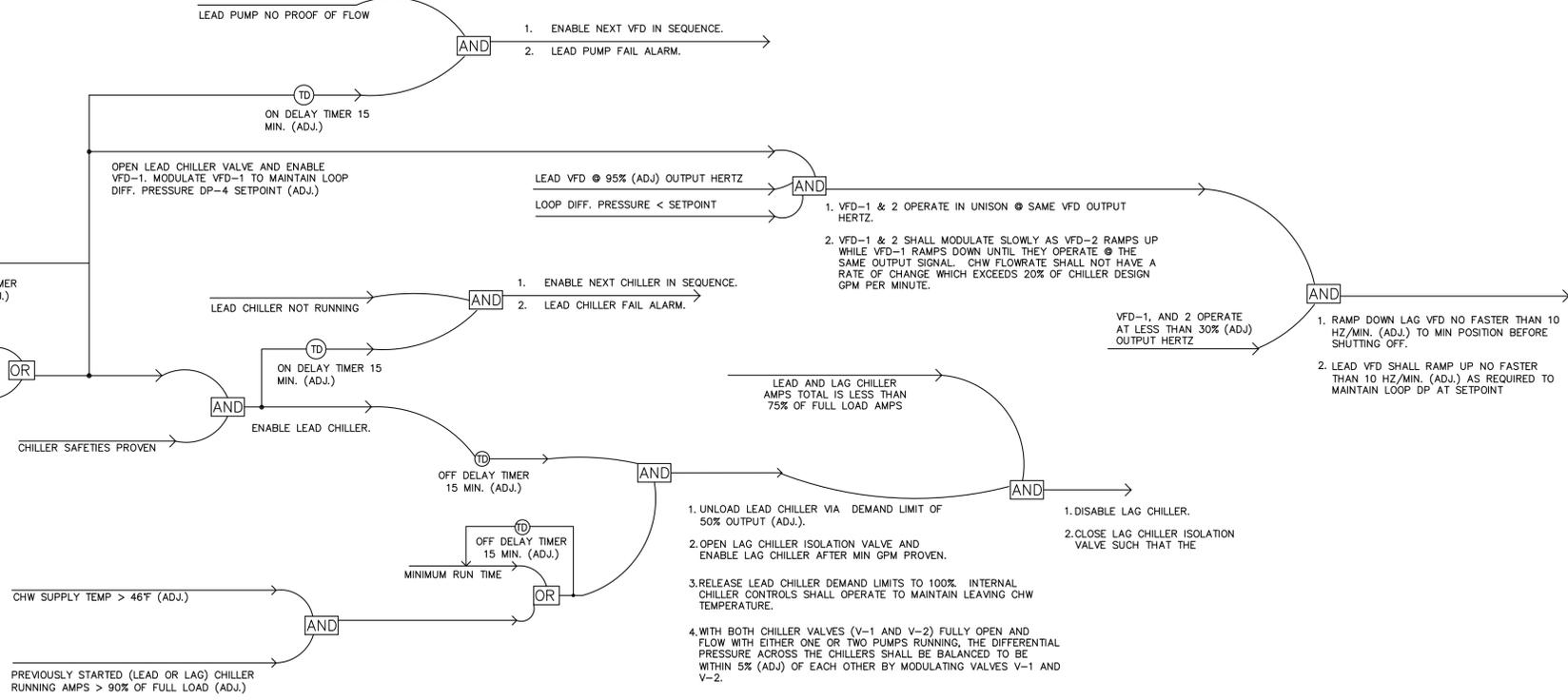
- LEAD PUMP : PUMP CHWP-1
- LAG PUMP : PUMP CHWP-2
- LEAD CHILLER : CHILLER CH-1
- LAG CHILLER : CHILLER CH-2

NOTES:

- LEAD/LAG SHALL ALTERNATE THEIR ORDER OF SEQUENCE WEEKLY.
- IF LEAD FAILS, START LAG AND SEND ALARM TO BAS.

AHU "OCCUPIED" COOLING OR DEHUMIDIFICATION REQUEST. THIS SHALL BE THROUGH THE DDC CONTROL SYSTEM VIA THE OPTIMUM START/STOP, SCHEDULED START/STOP, A TIMED LOCAL OVERRIDE BUTTON OR A TIMED OVERRIDE ON THE OVERALL SITE GRAPHIC SCREEN (ONE SOFTWARE SWITCH PER AIR-HANDLER SYSTEM).

AT LEAST 2 (ADJ.) AHU'S "UNOCCUPIED" COOLING OR DEHUMIDIFICATION REQUEST. THIS SHALL BE THROUGH THE DDC CONTROL SYSTEM VIA THE OPTIMUM START/STOP, SCHEDULED START/STOP, A TIMED LOCAL OVERRIDE BUTTON OR A TIMED OVERRIDE ON THE OVERALL SITE GRAPHIC SCREEN (ONE SOFTWARE SWITCH PER AIR-HANDLER SYSTEM).



LOW ROOF FLOW DIAGRAM

SEAL

NO.	DATE	BY	REVISIONS

GLOBAL MEP & FIRE ENGINEERING, INC.
8450 LINGER LODGE ROAD BRADENTON, FL 34202
PHONE: 941-758-2551 FAX: 941-739-6383
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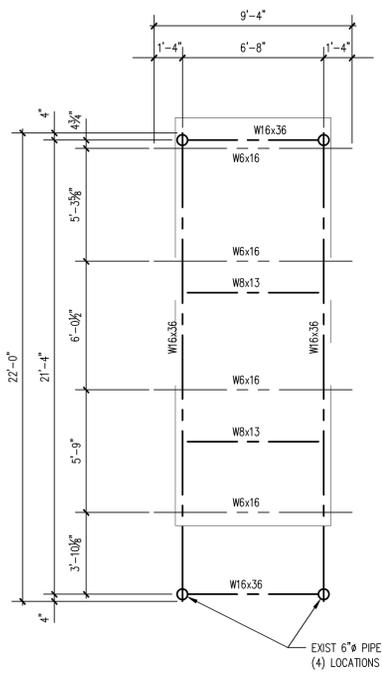
AIA
P.A.

MANATEE CONVENTION CENTER
MANATEE COUNTY, FL

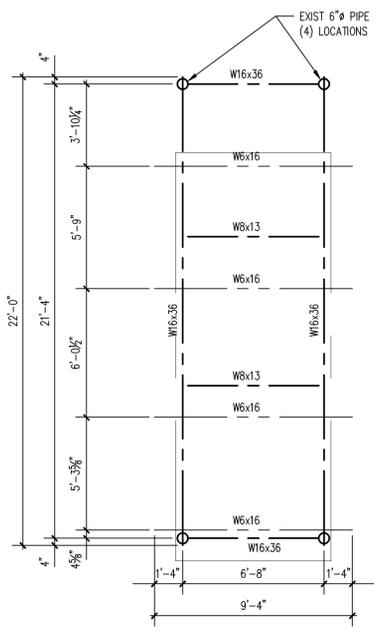
MECHANICAL CONTROLS

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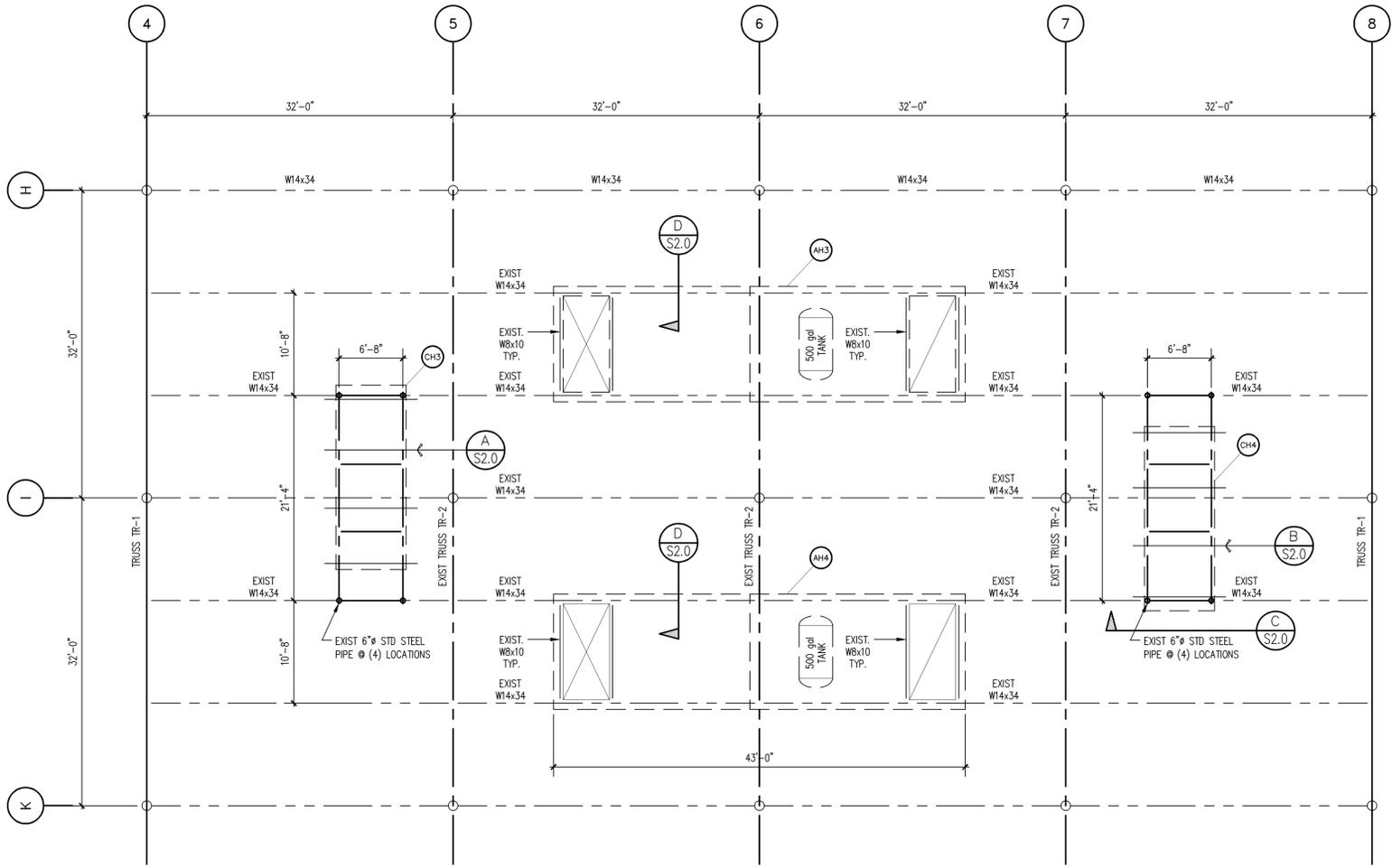
DATE:	01/10/11
SCALE:	AS NOTED
GLOBAL JOB NO.	3372-10
Drawn/Checked By:	MAS/MAS
SHEET NO.	M5.3



CHILLER #3 SUPPORT FRAME
SCALE: 1/4" = 1'-0"

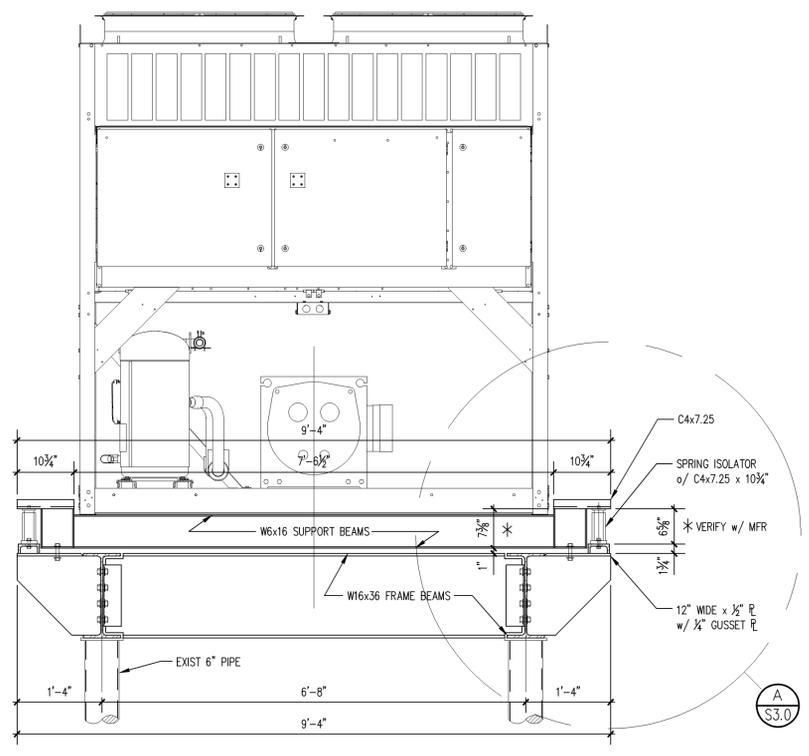


CHILLER #4 SUPPORT FRAME
SCALE: 1/4" = 1'-0"

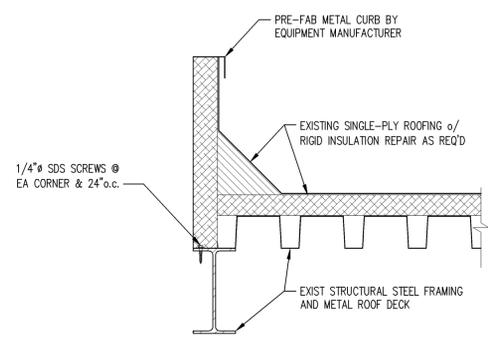


PARTIAL UPPER ROOF FRAMING PLAN
SCALE: 1/8" = 1'-0"

- PLAN NOTES:
1. VERIFY ALL DIMENSIONS, ELEVATIONS, AND EXISTING CONDITIONS PRIOR TO ORDERING NEW EQUIPMENT AND FABRICATION OF SUPPORT STRUCTURE. NOTIFY ENGINEER OF ANY DISCREPANCIES BEFORE COMMENCING WITH WORK.
 2. REFER TO PLANS AND SPECIFICATIONS BY GLOBAL MEP & FIRE ENGINEERING FOR DETAILS OF REPLACEMENT HVAC EQUIPMENT. ANY SUBSTITUTIONS WILL REQUIRE A REVIEW AND APPROVAL BY THE STRUCTURAL ENGINEER.
 3. DO NOT STORE ANY MATERIALS ON THE ROOF.
 4. ALL DIMENSIONS ARE TO CENTERLINES OF COLUMNS AND BEAMS U.N.O.
 5. EXISTING FLAT ROOF CONSISTS OF SINGLE PLY MEMBRANE AND 2" RIGID INSULATION OVER 3" METAL ROOF DECK AND STRUCTURAL STEEL BEAMS.
 6. REFER TO STRUCTURAL NOTES ON SHEET S3.0 FOR ADDITIONAL INFORMATION.

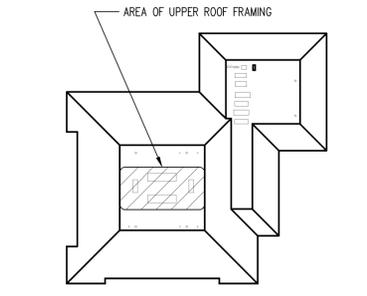


CHILLER #3 & 4 FRAME DETAIL
SCALE: 3/4" = 1'-0"



CURB MOUNT DETAIL
SCALE: 1 1/2" = 1'-0"

EQUIPMENT LEGEND			
MARK	DESCRIPTION	COMMENTS	WEIGHT
AH3	AIR HANDLER #3	NEW AHU & CURB w/ 500 GALLON STORAGE TANK	12,400# + 6,000#
AH4	AIR HANDLER #4	NEW AHU & CURB w/ 500 GALLON STORAGE TANK	12,400# + 6,000#
AH6	AIR HANDLER #6	NEW AHU & CURB	5,200#
AH7	AIR HANDLER #7	NEW AHU & CURB	8,400#
AH8	AIR HANDLER #7	NEW AHU & CURB	8,400#
CH1	CHILLER #1	NEW 150 TON CHILLER & SUPPORT FRAME	8,050#
CH2	CHILLER #2	NEW 150 TON CHILLER & SUPPORT FRAME	8,050#
CH3	CHILLER #3	NEW 170 TON CHILLER & SUPPORT FRAME	9,000#
CH4	CHILLER #4	NEW 170 TON CHILLER & SUPPORT FRAME	9,000#
MA	MAKE-UP AIR	NEW MUA UNIT & CURB	2,000#
ST	STORAGE TANK	NEW 850 GALLON STORAGE TANK & CURB	8,200#



KEY PLAN
SCALE: 1" = 128'

SEAL	CLENN W. WARBURTON PROFESSIONAL ENGINEER #4603	1/3/2011
REVISIONS		
NO.	DATE	BY

ZNS ENGINEERING
ENGINEERS | PLANNERS | SURVEYORS
LANDSCAPE ARCHITECTS | ENVIRONMENTAL CONSULTANTS
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914 14th STREET W. BRADENTON, FL. 34205 phone 748-4465

MANATEE CONVENTION CENTER
HVAC REPLACEMENT

STRUCTURAL FRAMING MODIFICATIONS

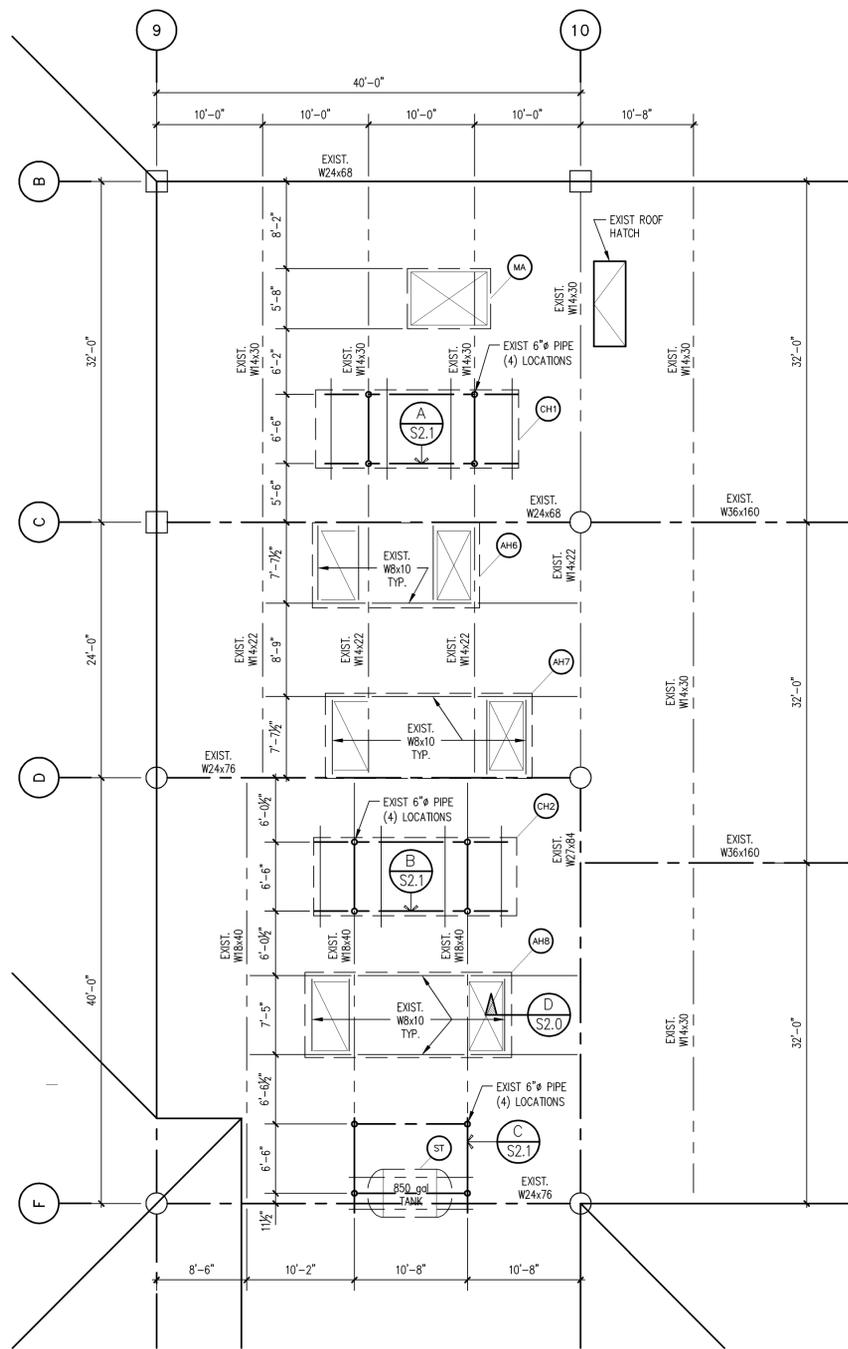
DATE: 1/10/2010

SCALE: AS NOTED

ZNS JOB NO. 00-42563

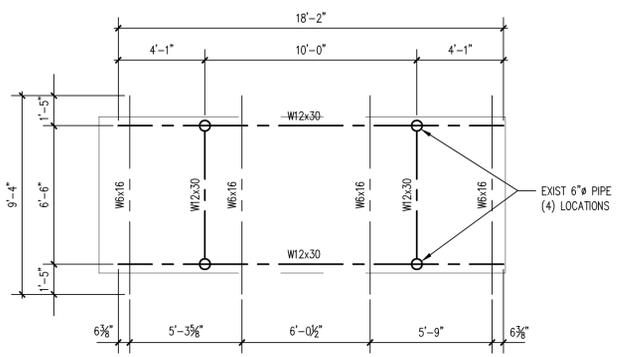
Drawn/Checked By: GWV

SHEET NO. S2.0

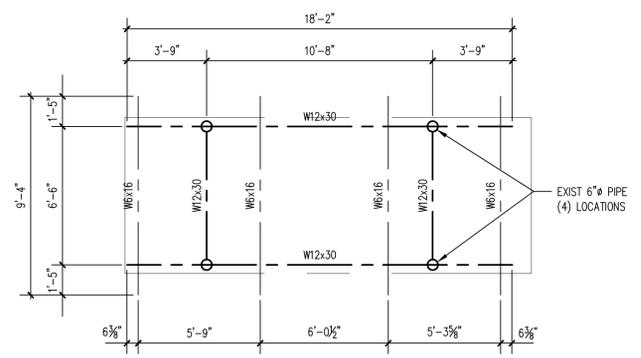


PARTIAL LOWER ROOF FRAMING PLAN
SCALE: 1/8" = 1'-0"

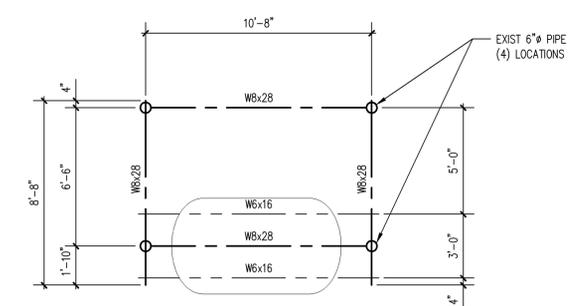
- PLAN NOTES:
1. VERIFY ALL DIMENSIONS, ELEVATIONS, AND EXISTING CONDITIONS PRIOR TO ORDERING NEW EQUIPMENT AND FABRICATION OF SUPPORT STRUCTURE. NOTIFY ENGINEER OF ANY DISCREPANCIES BEFORE COMMENCING WITH WORK.
 2. REFER TO PLANS AND SPECIFICATIONS BY GLOBAL MEP & FIRE ENGINEERING FOR DETAILS OF REPLACEMENT HVAC EQUIPMENT. ANY SUBSTITUTIONS WILL REQUIRE A REVIEW AND APPROVAL BY THE STRUCTURAL ENGINEER.
 3. DO NOT STORE ANY MATERIALS ON THE ROOF.
 4. ALL DIMENSIONS ARE TO CENTERLINES OF COLUMNS AND BEAMS U.N.O.
 5. EXISTING FLAT ROOF CONSISTS OF SINGLE PLY MEMBRANE AND 2" RIGID INSULATION OVER 3" METAL ROOF DECK AND STRUCTURAL STEEL BEAMS.
 6. REFER TO STRUCTURAL NOTES ON SHEET S3.0 FOR ADDITIONAL INFORMATION.



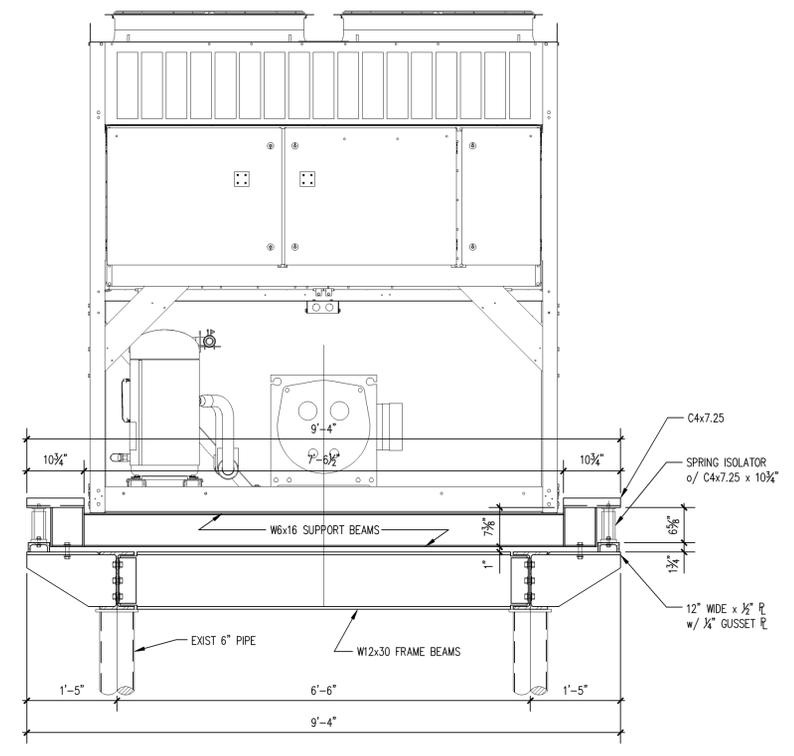
CHILLER #1 SUPPORT FRAME
SCALE: 1/4" = 1'-0"



CHILLER #2 SUPPORT FRAME
SCALE: 1/4" = 1'-0"

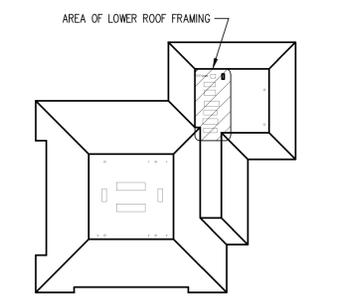


WATER TANK SUPPORT FRAME
SCALE: 1/4" = 1'-0"



CHILLER #1 & 2 FRAME DETAIL
SCALE: 3/4" = 1'-0"

EQUIPMENT LEGEND			
MARK	DESCRIPTION	COMMENTS	WEIGHT
AH3	AIR HANDLER #3	NEW AHU & CURB w/ 500 GALLON STORAGE TANK	12,400# + 6,000#
AH4	AIR HANDLER #4	NEW AHU & CURB w/ 500 GALLON STORAGE TANK	12,400# + 6,000#
AH6	AIR HANDLER #6	NEW AHU & CURB	5,200#
AH7	AIR HANDLER #7	NEW AHU & CURB	8,400#
AH8	AIR HANDLER #7	NEW AHU & CURB	8,400#
CH1	CHILLER #1	NEW 150 TON CHILLER & SUPPORT FRAME	8,050#
CH2	CHILLER #2	NEW 150 TON CHILLER & SUPPORT FRAME	8,050#
CH3	CHILLER #3	NEW 170 TON CHILLER & SUPPORT FRAME	9,000#
CH4	CHILLER #4	NEW 170 TON CHILLER & SUPPORT FRAME	9,000#
MA	MAKE-UP AIR	NEW MUA UNIT & CURB	2,000#
ST	STORAGE TANK	NEW 850 GALLON STORAGE TANK & CURB	8,200#



KEY PLAN
SCALE: 1" = 128'

SEAL	CLARENCE W. HARBURTON PROFESSIONAL ENGINEER #4603	1/3/2011
REVISIONS		
DATE	BY	
NO.		

ZNS ENGINEERING
ENGINEERS | PLANNERS | SURVEYORS
LANDSCAPE ARCHITECTS | ENVIRONMENTAL CONSULTANTS
2010 AVENUE OF THE ARTS, SUITE 1000, MIAMI, FL 33136 (305) 571-9888

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ARCHITECT / PLANNER
914 14th STREET W. BRADENTON, FL. 34205 phone 748-4465

MANATEE CONVENTION CENTER
HVAC REPLACEMENT

STRUCTURAL FRAMING MODIFICATIONS

DATE:	1/10/2010
SCALE:	AS NOTED
ZNS JOB NO.	00-42563
Drawn/Checked By:	GW
SHEET NO.	S2.1

STRUCTURAL NOTES

GENERAL NOTES:
 STRUCTURAL DRAWINGS SHALL BE USED IN CONJUNCTION WITH JOB SPECIFICATIONS AND ARCHITECTURAL, MECHANICAL, ELECTRICAL, PLUMBING, AND SITE DRAWINGS. CONSULT THESE DRAWINGS FOR SLEEVES, DEPRESSIONS, AND OTHER DETAILS NOT SHOWN ON STRUCTURAL DRAWINGS. ALL DIMENSIONS AND CONDITIONS MUST BE VERIFIED IN THE FIELD. ANY DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER BEFORE PROCEEDING WITH THE AFFECTED PART OF THE WORK. THE STRUCTURE IS DESIGNED TO BE SELF SUPPORTING AND STABLE AFTER THE BUILDING IS COMPLETE. IT IS THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE ERECTION PROCEDURES AND SEQUENCE TO INSURE SAFETY OF THE BUILDING AND ITS COMPONENTS DURING ERECTION. THIS INCLUDES THE ADDITION OF NECESSARY SHORING, SHEETING, TEMPORARY BRACING, GUYS OR TIE-DOWNS.

DESIGN LOADS:
 THE STRUCTURAL SYSTEMS FOR THIS BUILDING RETROFIT HAVE BEEN DESIGNED IN ACCORDANCE WITH THE 2007 FLORIDA BUILDING CODE (FBC) & LATEST SUPPLEMENTS. SUPERIMPOSED LOADS HAVE BEEN UTILIZED AS FOLLOWS:

ROOF:
 LIVE LOAD - 20 psf.
 DEAD LOAD - 18 ps
WIND:
 130 MPH BASIC WIND SPEED (ASCE 7-05).
 EXPOSURE "B", IMPORTANCE FACTOR (I) = 1.0

SHOP DRAWING REVIEW:
 SHOP DRAWINGS WILL BE REVIEWED FOR GENERAL COMPLIANCE WITH THE DESIGN INTENT OF THE CONTRACT DOCUMENTS ONLY. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY COMPLIANCE WITH THE CONTRACT DOCUMENTS AS TO QUANTITY, LENGTH, ELEVATIONS, DIMENSIONS, ETC. IN ALL INSTANCES THE CONTRACT DOCUMENTS WILL GOVERN OVER THE SHOP DRAWINGS UNLESS OTHERWISE SPECIFIED IN WRITING BY THE ENGINEER. ALL SHOP DRAWINGS SHALL BE REVIEWED BY THE CONTRACTOR PRIOR TO SUBMITTAL TO THE ARCHITECT/ENGINEER. DRAWINGS SUBMITTED WITHOUT REVIEW WILL BE RETURNED UNCHECKED.

EXISTING BUILDING STRUCTURE:
 EXISTING ROOF FRAMING MEMBERS ARE BASED ON ORIGINAL CONSTRUCTION PLANS DATED JULY 15, 1983 BY Ellerbe AND "AS-BUILT" SHOP DRAWINGS BY STEEL, INC.

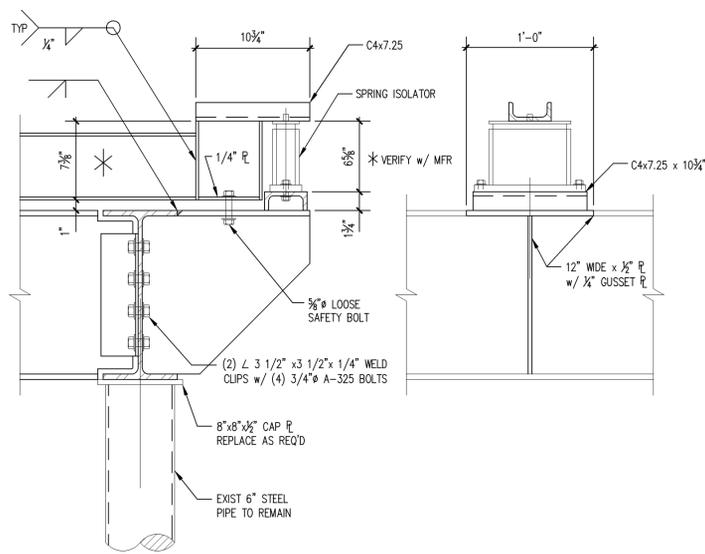
PENETRATIONS:
 NO PENETRATIONS SHALL BE MADE IN ANY STRUCTURAL MEMBERS OTHER THAN THOSE LOCATED ON THESE DRAWINGS WITHOUT PREVIOUS APPROVAL OF THE ENGINEER.

STRUCTURAL STEEL:
 SHALL CONFORM TO ASTM A36 or A992 & THE "SPECIFICATION FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS" BY THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION, INC. ALL SHOP CONNECTIONS TO BE WELDED (UTILIZING E70XX ELECTRODES) AND FIELD CONNECTIONS TO BE BOLTED, UNLESS NOTED OTHERWISE. STEEL TO RECEIVE ONE SHOP COAT AND ONE FIELD TOUCH UP COAT OF APPROVED PAINT, EXCEPT WHERE GALVANIZING IS INDICATED ON THE DRAWINGS.

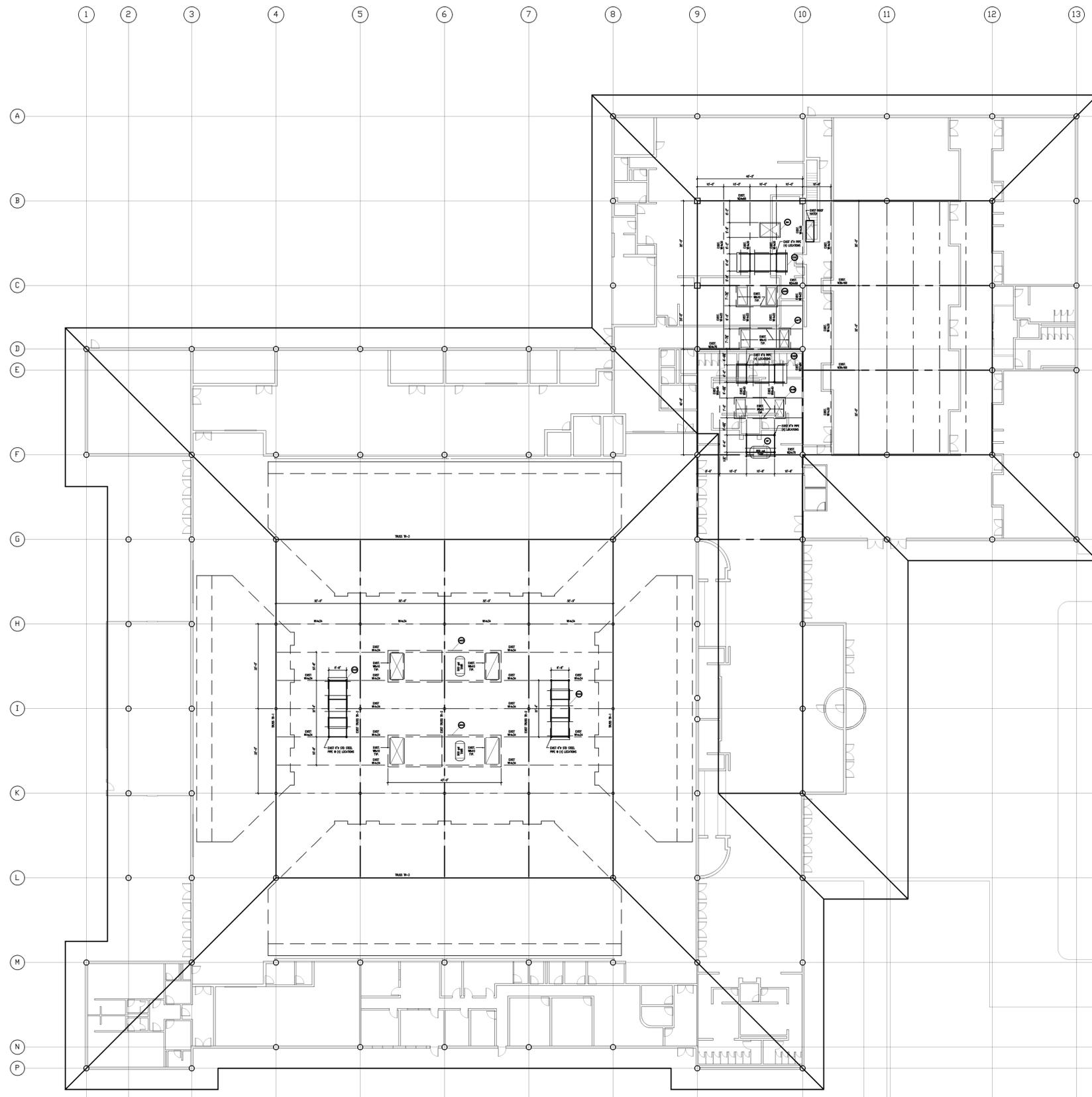
STRUCTURAL TUBING SHALL CONFORM TO ASTM A-500, GRADE B, F_y=46 ksi.
 STRUCTURAL PIPE SHALL CONFORM TO ASTM A-53 GRADE B, TYPE E OR S, F_y=35 ksi
 ALL BOLTED CONNECTIONS SHALL CONSIST OF MINIMUM 3/4" INCH DIAMETER ASTM A-325 HIGH STRENGTH BOLTS. BEAM CONNECTIONS SHALL BE DESIGNED BY THE FABRICATOR FOR THE REACTIONS SHOWN ON THE PLANS. IF NOT SHOWN, THE FABRICATOR SHALL DESIGN THE BEAM CONNECTIONS TO SUPPORT AN END REACTION OF W/2 KIPS FROM THE TABLES IN PART 2 "ALLOWABLE UNIFORM LOADS IN KIPS FOR BEAMS LATERALLY SUPPORTED" OF THE MANUAL OF STEEL CONSTRUCTION (9TH EDITION), BUT CONNECTIONS SHALL NOT HAVE LESS THAN 2 ROWS OF BOLTS. ANCHOR BOLTS SHALL CONFORM TO ASTM A-307 OR A-36 (THREADED ROD).

SUPPLIER SHALL SUBMIT SHOP DRAWINGS AND CALCULATIONS FOR REVIEW BY THE STRUCTURAL ENGINEER PRIOR TO FABRICATION. SHOP DRAWING SUBMITTAL SHALL INCLUDE LAYOUT, COMPONENT DESIGNATION, BRIDGING, AND PERTINENT SECTIONS AND DETAILS. SUBMITTALS SHALL BEAR THE SIGNATURE AND IMPRESSED SEAL OF A FLORIDA REGISTERED PROFESSIONAL ENGINEER.

MACHINE BOLTS:
 SHALL BE A-325 HOT DIPPED GALVANIZED WITH GALVANIZED WASHERS TYPICAL U.N.O.



A ISOLATOR MOUNT DETAIL
 SCALE: 1 1/2" = 1'-0"



ROOF/FLOOR PLAN
 SCALE: 3/64" = 1'-0"

SEAL	NO.	DATE	BY	REVISIONS
CLENN W. WARBURTON PROFESSIONAL ENGINEER #4603				
1/3/2011				

ZNS ENGINEERING
 ENGINEERS | PLANNERS | SURVEYORS
 LANDSCAPE ARCHITECTS | ENVIRONMENTAL CONSULTANTS
 201 S.W. 14th Street, Suite 1000 | Ft. Lauderdale, FL 33304 | (954) 571-3318

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 ARCHITECT / PLANNER
 914 14th STREET W. BRADENTON, FL. 34205 phone 748-4465

MANATEE CONVENTION CENTER
 HVAC REPLACEMENT

STRUCTURAL FRAMING MODIFICATIONS

DATE:	1/10/2010
SCALE:	AS NOTED
ZNS JOB NO.	00-42563
Drawn/Checked By:	GW
SHEET NO.	S3.0