INVITATION FOR BID
IFB #13-2924CD
EMERGENCY GENERATOR DISCONNECT AND CHILLER CONNECTIONS AT THE CENTRAL LABORATORY FACILITY

Manatee County, a political subdivision of the State of Florida, (hereinafter "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 ensure that all prospective Bidders have sufficient information and understanding of County's needs, an Information Conference will be held at: **9:00 AM on February 27, 2014** at the **Central Laboratory Facility, 4751 66th Street West, Bradenton, FL 34210**. Attendance is not mandatory, but is highly encouraged.

DEADLINE FOR CLARIFICATION REQUESTS: **3:00 PM on March 5, 2014**
(Reference Bid Article A.05)

TIME AND DATE DUE: **3:00 PM on March 13, 2014**

FOR INFORMATION CONTACT:
Chris Daley-CPPB, Contract Specialist
(941) 749-3048, Fax (941) 749-3034
chris.daley@mymanatee.org
Manatee County Financial Management Department
Purchasing Division

AUTHORIZED FOR RELEASE: Lynn W. Wall

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SECTION A

INFORMATION TO BIDDERS

A.01 OPENING LOCATION

Sealed Bids will be **publicly opened** at the **Manatee County Purchasing Division, 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. Bidder shall be solely and strictly responsible for its timely delivery to the Purchasing Division. Bids delayed by mail, courier, or Bids delayed for any other reason, shall not be considered, shall not be opened at the public opening, and arrangements shall be made for their return at the Bidder's request and expense.

A.02 SEALED & MARKED

Bids shall be submitted in **triplicate, one original (marked Original) and two (2) copies (marked Copy)** of your **signed Bid** shall be submitted in one **sealed** package, clearly marked on the outside **"Sealed Bid #13-2924CD- Emergency Generator Disconnect and Chiller Connections at the Central Laboratory Facility"** along with your company name. For your convenience, a mailing label is provided with this Invitation for Bid package. Or, you may address the package as follows:

Address package to: Manatee County Purchasing Division
1112 Manatee Avenue West, Suite 803
Bradenton, Florida 34205
Sealed Bid # _____, Title _____

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.

A.03 SECURING OF DOCUMENTS

Invitation for Bids (IFB) and related documents are available on http://www.mymanatee.org/purchasing for download in a portable document format (.PDF) file by clicking on "Bids and Proposals" from the Purchasing Division's web page. You may view and print these files using Adobe Reader software. If necessary, you may download a free copy of Adobe Reader from the link provided on the "Bids and Proposals" page.

Additionally, Manatee County collaborates with the Manatee Chamber of Commerce by emailing solicitation opportunities to its members.

Manatee County may also use DemandStar to distribute Bids. On the DemandStar web site, http://www.DemandStar.com, click on the tab titled "My DemandStar" for more information regarding this service. Participation in the DemandStar system is not a requirement for doing business with Manatee County.

Complete copies of the IFB and all related documents are available for public inspection at the Manatee County Purchasing Division, 1112 Manatee Avenue West, Suite 803, Bradenton, FL 34205, or by calling (941) 749-3014. Appointments are encouraged. Documents are available between the hours of 9:00 AM and 4:00 PM Monday through Friday, with the exception of holidays. A complete set of the IFB documents must be used in preparing Bids. County assumes no responsibility for errors and misinterpretations resulting from the use of incomplete sets of Bid Documents.

A.04 MODIFICATION OF IFB DOCUMENTS

If a Bidder wishes to recommend changes to the IFB documents, the Bidder shall furnish, in writing, data and information necessary to aid County in evaluating the request to modify the Specifications. County is not obligated to make any changes to the IFB documents. Unless an Addendum is issued, the IFB documents shall remain unaltered. **Bidders must fully comply with the IFB documents in their entirety.**

A.05 DEADLINE FOR CLARIFICATION REQUESTS

3:00 PM on March 5, 2014 shall be the deadline to submit all inquiries, suggestions, or requests concerning interpretation, clarification or additional information pertaining to this Invitation for Bid to the Manatee County Purchasing Division.

This deadline has been established to maintain fair treatment of all potential Bidders, while maintaining progression of the Project to promote economic stimulus.

A.06 CLARIFICATION & ADDENDA

Each Bidder shall examine all Invitation for Bid 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 this Invitation for Bid shall be made through the Manatee County Purchasing Division. 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, County will post the documents on the Purchasing Division's web page, which can be accessed at http://www.mymanatee.org/purchasing, and then by clicking on "Bids and Proposals". If the original solicitation was broadcast via DemandStar, the addenda will also be broadcast on the DemandStar distribution system to "Planholders" on this web service.

It shall be the **responsibility of each Bidder, prior to submitting their Bid**, to contact the Manatee County Purchasing Division (see contact information on the cover page) to **determine if any Addenda were issued** and to make such Addenda a part of their Bid.

A.07 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 Official or as directed in the Invitation for Bid, pursuant to the Manatee County Code. This prohibition includes the act of carbon copying officers, agents or employees of Manatee County on all correspondence, including email correspondence. This requirement begins with the issuance of an Invitation for Bid, and ends upon execution of Contract or when the invitation has been cancelled. Violators of this prohibition shall be subject to sanctions as provided in the Manatee County Code.

A.08 UNBALANCED BIDDING PROHIBITED

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 County such variation does not appear to be justified, given Bid requirements and industry and market conditions, the Bid will be presumed to be unbalanced. Examples of unbalanced Bids will include:

a. Bids showing omissions, alterations of form, additions not specified, or required conditional or unauthorized alternate Bids.

A.08 UNBALANCED BIDDING PROHIBITED (Continued)

b. 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.

c. Bids where the unit costs offered are in excess of or below reasonable cost analysis values.

In the event County determines that a Bid is presumed unbalanced, 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 its Bid. 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.09 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 Bidder to complete the Work or otherwise creating an appearance of an undercapitalized Bidder.

In the event 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. 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.10 WITHDRAWAL OF OFFERS

Bidders 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 Bid. This request must be received in the office designated for receipt of Bids in the solicitation document prior to the time set for delivery and opening of the Bids. A copy of the request shall be retained and the unopened Bid returned to that Bidder; or

b. After the responses to a solicitation are opened or a selection has been determined, but before a Contract is signed, a Bidder alleging a material mistake of fact may be permitted to withdraw their Bid if:

A.10 WITHDRAWAL OF OFFERS (Continued)

1. the mistake is clearly evident in the solicitation document; or

2. Bidder submits evidence which clearly and convincingly demonstrates that a mistake was made. Request to withdraw a Bid must be in writing and approved by the Purchasing Official.

A.11 IRREVOCABLE OFFER

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

A.12 BID EXPENSES

All expenses for making Bids to County are to be borne by the Bidder.

A.13 RESERVED RIGHTS

County reserves the right to accept or reject any and/or all Bids, to waive irregularities and technicalities, and to request resubmission. Also, 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 County. Any sole response received by the first submission date may or may not be rejected by County depending on available competition and current needs of 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 meets or exceeds the quality of goods and/or services set forth in the IFB documents or otherwise required by 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 Bid requirements, and the tenacity, perseverance, experience, integrity, reliability, capacity, facilities, equipment, and credit which will assure good faith performance.

Also, 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 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.14 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 Contract. Any involvement with the Manatee County Purchasing Division shall be in accordance with the Manatee County Purchasing Ordinance as amended.

A.15 COLLUSION

By submitting a Bid to this Invitation for Bid, the Bidder certifies that it has not divulged, discussed or compared its Bid with any 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. 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 resulting Contract to be entered into; and

e. no person or agency has been employed or retained to solicit or secure the resulting Contract upon an agreement or understanding or a commission, percentage, brokerage, or contingent fee except bona fide employees or established commercial agencies maintained by Bidder for purpose of doing business.

A.16 CODE OF ETHICS

With respect to this Bid, if any Bidder violates, directly or indirectly, the ethics provisions of the Manatee County Purchasing Ordinance and/or Florida criminal or civil laws related to public procurement, including but not limited to Florida Statutes, Chapter 112, Part III, Code of Ethics for Public Officers and Employees, such Bidder will be disqualified from eligibility to perform the Work described in this Invitation for Bid, and may also be disqualified from furnishing future goods or services to, and from submitting any future Bids to supply goods or services to, Manatee County.

A.16 CODE OF ETHICS (Continued)

By submitting a Bid, the Bidder represents to County that all statements made and materials submitted are truthful, with no relevant facts withheld. If a Bidder is determined to have been untruthful in their Bid or any related presentation, such Bidder will be disqualified from eligibility to perform the Work described in this Invitation for Bid, and may also be disqualified from furnishing future goods or services to, and from submitting any future Bids to supply goods or services to, Manatee County.

A.17 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 to provide any goods or services to a public entity; may not submit a Bid with a public entity for the construction or repair of a public building or public work; may not submit Bids 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 Statutes § 287.017 for CATEGORY TWO for a period of thirty-six (36) months following the date of being placed on the convicted list.

In addition, the Manatee County Code prohibits the Award of any resulting Contract to any person or entity who/which has, within the past five (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 ensure compliance with the foregoing, the Code requires all persons or entities desiring to contract with 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 County. 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 form is included (reference Form B of this document) for this purpose.

A.18 BID FORMS

Bids must be submitted on attached provided forms, although additional pages may be attached. **Bidders must fully complete all pages of the Bid Forms. Bid Forms must be executed by an authorized signatory who has the legal authority to make the Bid and bind the company. Bidders must fully comply with all requirements of this IFB in its entirety.** Failure to comply shall result in default of the resulting Contract, whereupon, the defaulting Contractor shall be required to pay for any and all re-procurement costs, damages, and attorney fees as incurred by County.

A.19 LEGAL NAME

Bids shall clearly indicate the legal name, address and telephone number of the Bidder on the Bid Form. Bid Forms 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.

When Bidder is a partnership, the Bid Form shall be signed in the name of the firm and by all partners required under the terms of the partnership agreement. When a corporation is a Bidder, the authorized corporate officers shall sign.

Bidders who are corporations or limited partnerships shall provide a certified copy of their permit to transact business in the State of Florida, preferably along with the Bid Form, or within forty-eight (48) hours after request by County.

When submitting a Bid as a joint venture, it must have filed paper documents with the Division of Profession's Construction Industry Licensing Board prior to submitting a Bid.

A.20 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 prices used in determining Award.

A.21 TAXES

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

A.22 DESCRIPTIVE INFORMATION

Unless otherwise specifically provided in the IFB documents, all equipment, materials and articles provided shall be new and of the most suitable grade for the purpose intended. Unless otherwise specifically provided in the IFB documents, 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.23 AMERICANS WITH DISABILITIES ACT

County does not discriminate upon the basis of any individual's disability status. This non-discrimination policy involves every aspect of 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 cover page of this Bid document at least twenty-four (24) hours in advance of either activity.

A.24 EQUAL EMPLOYMENT OPPORTUNITY CLAUSE

In accordance with the provisions of Title VI of the Civil Rights Act of 1964 and Title 15, Part 8 of the Code of Federal Regulations, County hereby notifies all prospective Bidders that they will affirmatively ensure minority business enterprises will be afforded full opportunity to participate in response to this advertisement and will not be discriminated against on the grounds of race, color or national origin in consideration for Bid Award.

A.25 MBE/DBE

The State of Florida, Office of Supplier Diversity provides the certification process and the database for identifying certified MBE/DBE 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.26 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.27 DISCLOSURE

Upon receipt, all inquiries and responses to inquiries related to this Invitation for Bid become “Public Records”, and shall be subject to public disclosure consistent with Florida Statues, Chapter 119.

Bids become subject to disclosure thirty (30) days after the opening or if a Notice of Intent to Award decision is made earlier than this time as provided by Florida Statutes § 119.071(1)(b). No announcement or review of the Bid shall be conducted at the public opening.

Based on the above, County will receive Bids at the time and date stated, and will make public at the opening the names of the business entities of all that submitted a Bid and any amount presented as a total offer without any verification of the mathematics or the completeness of the Bid.

A.27 DISCLOSURE (Continued)

If County rejects all Bids and concurrently notices its intent to reissue the solicitation, the rejected Bids are exempt from public disclosure until such time as County provides notice of an intended decision concerning the reissued solicitation or until County withdraws the reissued solicitation. A Bid is not exempt for longer than twelve (12) months after the initial notice rejecting all Bids.

Pursuant to Florida Statutes 119.0701, to the extent Successful Bidder is performing services on behalf of County, Successful Bidder must:

a. Keep and maintain public records that ordinarily and necessarily would be required by County in order to perform the service;

b. Provide the public with access to public records on the same terms and conditions that County would provide and at a cost that does not exceed the cost provided in Florida Statutes, Chapter 119, or as otherwise provided by law;

c. Ensure that public records that are exempt or confidential and exempt from public records disclosure requirements are not disclosed except as authorized by law, and;

d. Meet all requirements for retaining public records and transfer, at no cost, to County all public records in possession of Successful Bidder upon termination of the awarded Contract and/or PO and destroy any duplicate public records that are exempt or confidential from public records disclosure requirements. All records stored electronically must be provided to County in a format that is compatible with County's information technology systems.

A.28 LOCAL PREFERENCE

a. 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 employee at that location.

b. Local preference shall not apply to the following categories of Contracts:

   1. 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;

A.28 LOCAL PREFERENCE (Continued)

2. 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.

c. To qualify for local preference under this section, **a local business must certify to County** by completing an "**Affidavit as to Local Business Form"**, which is available for download at www.mymanatee.org/vendor. Click on "Affidavit for Local Business" to access and print the form. Complete, notarize, and mail the notarized original to the following address: Manatee County Purchasing Division, 1112 Manatee Avenue West, Suite 803, Bradenton, FL 34205.

It is the responsibility of the Bidder to ensure accuracy of the Affidavit as to Local Business and notify County of any changes affecting same. Bidder attests that it:

1. Has not within the five (5) 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.

A.29 VENDOR REGISTRATION

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

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 (www.manateechamber.com) by emailing solicitation opportunities to its members.

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.

A.29 VENDOR REGISTRATION (Continued)

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

A link to Vendor Registration is listed on the Purchasing Division's web page under "Register as a Vendor".

Click on "Vendor Registration Form" for on-line input.

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 County to provide timely notifications of Quotation, Bid and Proposal opportunities to your business.

A.30 ePAYABLES

Manatee County and Clerk of the Circuit Court have partnered to offer the ePayables program, which allows payments to be made to vendors via credit cards. The Clerk will issue a unique credit card number to each vendor; the card has a zero balance until payments have been authorized.

After goods are delivered or services rendered, vendors submit invoices to the remit to address on the purchase order according to the current process. When payments are authorized, an email notification is sent to the vendor. The email notification includes the invoice number(s), invoice date(s), and amount of payment. Once the vendor receives the email, the credit card has been authorized to be charged for the amount listed in the email. When the vendor charges the full amount authorized in the email, the card will return to a zero balance until the next payment is authorized.

There is no cost for vendors to participate in this program; however, there may be a charge by the company that processes your credit card transactions.

If you are interested in participating in this program, please complete Form D, ePayables Application and return the completed form via email to Ms. Lori Bryan, Supervisor at lori.bryan@manateeclerk.com.

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

END OF SECTION A

SECTION B

BID SUMMARY

B.01 THE WORK

The Work included in this Bid consists of consists of the renovations and additions to the electrical systems for emergency generator and chiller connections at the Manatee County Central Laboratory facility, to include but not limited to:

HVAC, dehumidifiers, limited controls, electrical, power systems, lighting, piping and chilled water piping systems, generator systems, system change outs and operational turnovers, control interface, (see power and systems plan), roof penetrations and curbs, wall penetrations, fire stopping, lift or crane, and miscellaneous work.

The Successful Bidder shall furnish all Shop Drawings, working drawings, labor, materials, equipment, tools, services and incidentals necessary to complete all Work required by these Specifications.

The successful Bidder 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 County.

The Successful Bidder shall furnish and install all materials, equipment and labor which is reasonably and properly inferable and necessary for the proper completion of the Work, whether specifically indicated in the Bid Documents or not.

B.02 EXAMINATION OF BID DOCUMENTS AND SITE(S)

It is the responsibility of each Bidder before submitting a Bid, to (a) examine the Bid Documents thoroughly; (b) visit the site(s) 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 Documents.

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(s) 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 Bid Documents. County will provide each Bidder access to the site(s) to conduct such explorations and tests.

Bidder shall fill all holes, clean up and restore the site(s) 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 are identified in the Bid 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 Bid Documents.

Inspection of the site(s) is **a requirement** to be considered for Award of this Bid. Prior to submitting a Bid, each Bidder shall examine the site(s) and all conditions thereon fully familiarizing themselves with the full scope of the Project. Failure to become familiar with site conditions will in no way relieve the Successful Bidder from the necessity of furnishing any materials or performing any Work that is required to complete the Project in accordance with the plans and Specifications. Bidder shall acknowledge inspection of the Project site(s) on his/her signed, submitted Bid Form.

The informational conference will be held on site with construction site inspection immdetiately following. After the date of the informational conference has passed, any potential Bidder wishing to conduct a site visit shall contact John Rowland at 941-748-4501 ext 5843 for coordination of the site visit.

END OF SECTION B

SECTION C

BASIS OF AWARD & MINIMUM QUALIFICATIONS

C.01 BASIS OF AWARD

Award shall be to the lowest, responsive, responsible Bidder meeting Specifications and having the lowest total offer 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 Bid Documents to County's satisfaction within the prescribed time.

Only one schedule for completion of Work shall be considered. Only one Award shall be made.

NOTE: Inspection of the site is a pre-requisite to be considered for Award of this Bid.

In evaluating Bids, 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, 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 are received, and neither of these Bids are from a local business, the Award shall be determined by a chance drawing, coin toss, or similar tie-breaking method conducted by the Purchasing Division and open to the public.

C.02 MINIMUM QUALIFICATIONS OF BIDDERS

No person who is not certified or registered as a General Contractor or Electrical Contractor pursuant to Florida Statutes, Chapter 489 on the day the Bid is submitted, and who has continuously held that certification or registration for a period of at least three (3) consecutive years immediately prior to the day the Bid is submitted, may be qualified to bid on this Project. In the event that a Bidder is a business organization, including a partnership, corporation, business trust or other legal entity as set forth in Florida Statutes § 489.119(2), then the Bidder shall only be qualified to bid on this Project if: 1) the Bidder (the business organization) is on the day the Bid is submitted, and for at least three (3) consecutive years immediately prior to the day the Bid is submitted has been, in continuous existence, properly licensed and registered as required by Florida law; and 2) the Bidder, on the day the Bid is submitted, has a certified or registered Qualifying Agent, as required by Florida Statutes § 489.119, and that Qualifying Agent has been the same Qualifying Agent of the Bidder for a period of at least three (3) consecutive years immediately prior to the day the Bid is submitted.

END OF SECTION C

SECTION D

GENERAL TERMS & CONDITIONS

D.01 CONTRACT FORMS

The Contract resulting from the acceptance of a Bid shall be in the form of the Contract stated in this Bid (reference Section F of this document).

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 Contract. Within ten (10) days thereafter, Successful Bidder shall sign and deliver the required number of counterparts of the Contract with any other required documents to County. (Note: Contract must be approved in accordance with Chapter 2-26 of the Manatee County Code, and the Administrative Standards and Procedures Manual approved by the County Administrator).

D.02 ASSIGNMENT OF CONTRACT

Contractor shall not assign, transfer, convey, sublet or otherwise dispose of the resulting 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 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.

D.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. Only one Bid shall be considered based on **120 calendar days**. **Only one Award shall be made**.

D.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, County may seek damages. The actual damages for delay will be impossible to determine and in lieu thereof, the Contractor shall pay to County the sum of **$388** as fixed, agreed, and liquidated damages for each calendar day of the delay until the Work is finally accepted by County and the Contractor and his Surety shall be liable for the amount thereof.

D.05 PAYMENT

Contractor may apply for partial payment on monthly estimates, based on the amount of the Work done or completed in compliance with the provisions of the resulting Contract. Contractor shall submit an application, on a standard pay application form provided or approved by 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.

D.05 PAYMENT (Continued)

County will then review said estimate and make any necessary revisions so that the estimate can receive approval for payment. If the Contractor and County do not agree on the approximate estimate of the proportionate value of the Work done for any pay period, the determination of 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, twenty (20) business days if County is its own Engineer of Record (EOR) or twenty-five (25) business days if outside agent approval is required after the pay estimate has been approved by the agent for County.

In accordance with the Prompt Payment Act, Florida Statutes § 218.735(7), a Punch List shall be formulated.

Time allowed for development of Punch List:

a. Awarded Contracts with an estimated cost of less than $10 million will be within thirty (30) calendar days after reaching Substantial Completion.

b. Awarded Contracts with a cost of $10 million dollars or more will be within thirty (30) calendar days OR if extended by Contract, up to sixty (60) calendar days after reaching Substantial Completion.

The Final Completion date of the resulting Contract must be at least thirty (30) days after delivery of the list of items. If the list is not provided to the awarded Contractor by the agreed upon date, the Contract completion time must be extended by the number of days County exceeds the delivery date.

It is the Contractor's responsibility for the care of the materials. 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 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 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 County in writing that the Project is ready for final inspection.

D.05 PAYMENT (Continued)

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 County determines the Project or portion thereof is ready for final inspection, County shall perform same. Upon completion of final inspection, 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 County, the Project has been completed in compliance with the terms of the Contract Documents.

When final acceptance has been made by County, County will make final payment of the resulting Contract amount, plus all approved additions, less approved deductions and previous payments made. The resulting 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 County. The Contractor's responsibility shall then terminate except as otherwise stated.

D.06 CONTRACT CONTINGENCY WORK

This Bid item entails a monetary allowance which is used at County's discretion to handle unexpected conditions as required to satisfactorily complete the Project in accordance with the plans and Specifications. A Field Directive must be issued by an authorized County Representative to authorize use of Contract Contingency funds.

The percentage for Contract Contingency is listed on the Bid Form. Vendor shall enter the amount for Contract Contingency based on the percentage of their Total Base Bid. The total Contract Award will include the Contract Contingency funds.

Appropriate uses of Contract Contingency funds include increases to existing Bid item quantities that do not change the initial Scope of Work, which may be directed by staff; modification items not originally bid which were unforeseen yet necessary during the construction to provide a safe, complete Project and that do not change the initial Scope of Work; and unanticipated conflicts and/or design changes required during construction which are necessary to provide a safe, complete Project and that do not change the initial Scope of Work.

Inappropriate uses of Contract Contingency funds include anything that changes the initial Scope of Work, including the Contract Price and Contract Time, and adding Bid items not previously contemplated that change the initial Scope of Work.

D.07 RETAINAGE

A Retainage of 10% of the total Work in place shall be withheld until 50% complete. After 50% completion, the Retainage shall be reduced to 5% of the total Work in place until Final Completion and acceptance of the Work by County. Upon final acceptance, the remaining Retainage shall be included in the final payment.

D.08 PROGRESS REQUIREMENTS

All Work done under the resulting Contract shall be done with a minimum of inconvenience to the private property owners in the area. The Contractor shall coordinate his Work with private property owners such that existing utility services are maintained and they have access to their property at all times.

D.09 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 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 meet the required standards and to accomplish the purposes and functions of the Project as defined, detailed, and specified herein.

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 County as to any claims or actions for breach of guaranty or breach of warranty that County might have against parties other than the Contractor, and do not constitute exclusive remedies of County against the Contractor.

D.10 MATERIALS AND WORKMANSHIP

All materials and apparatus required for this Work, except as 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.11 PROJECT CLOSE-OUT

Clean construction site and remove any and all excess materials. Correct any damages to property that may have occurred as a result of installation and/or delivery. Repair and patch all surfaces cut for installation. The Contractor shall remedy any deficiencies promptly should County determine any Work is incomplete or defective.

D.11 PROJECT CLOSE-OUT (Continued)

When County determines the Work is acceptable in accordance with this Invitation for Bid, the Contractor shall provide the close out submittals, including but not necessarily limited to the following:

1 set	Certificate of Warranties	
1 set	Manufacturer's Product Literature	(when applicable)
1 set	Project Record Drawings	
1 set	Subcontractor Information	(when applicable)

D.12 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 County harmless from loss on account thereof, including costs and attorney's fees.

D.13 AUTHORIZED PRODUCT REPRESENTATION

The Bidder, 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 County's sole discretion, be deemed a Material Breach of the resulting Contract, and shall constitute grounds for County's immediate termination of the resulting Contract.

D.14 REGULATIONS

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

D.15 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 resulting Contract, 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 resulting Contract, County reserves the right to terminate the resulting Contract and select the next qualified Bidder or re-advertise this procurement in part or in whole. County reserves the right to cancel all or any undelivered or unexecuted portion of the resulting Contract with or without cause.

D.16 INDEMNIFICATION

The Contractor covenants and agrees to indemnify and save harmless 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 Contract 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 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 resulting Award, Contract or Purchase Order shall be deemed to affect the rights, privileges and immunities of County as set forth in Florida Statutes § 768.28.

D.17 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 County for each Bid item from any of the Bidders; and the Bidder shall respond within five (5) 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 Intent to Award is given, request the apparent Successful Bidder to submit an acceptable substitute without an increase in Contract Price or Contract Time.

If apparent Successful Bidder declines to make any such substitution, County may Award the resulting 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 the resulting Contract insofar as it applies to their work, but this shall not relieve the prime Contractor from the full responsibility to County for the proper completion of all Work to be executed under the resulting Contract.

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

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

D.18 MANUALS, SCHEMATICS, HANDBOOKS (IF APPLICABLE)

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 Contractor. Contractor shall furnish two (2) copies of each.

D.19 INSURANCE

The Contractor will not commence Work under the resulting Contract until all insurance under this section and such insurance coverage as might be required by County has been obtained. The Contractor shall obtain, and submit to the Purchasing Division within ten (10) calendar days from the date of Notice of Intent to Award, 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 resulting Contract Documents which are customarily insured under Part One of the standard Workers' Compensation Policy.

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

(Each Accident)	$100,000
(Disease-Policy Limit)	$500,000
(Disease-Each Employee)	$100,000

b. Commercial General Liability

The limits are to be applicable only to Work performed under the resulting 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	$2,000,000
Personal and Advertising Injury	$1,000,000
Each Occurrence	$1,000,000
Fire Damage (Any One Fire)	$Nil
Medical Expense (Any One Person)	$Nil

ADDITIONAL INSURED: Manatee County, a political subdivision of the State of Florida, shall be specifically named as additional insured on the Commercial General Liability Policy.

D.19 INSURANCE (Continued)

c. Business Auto Policy

Each Occurrence Bodily Injury and Property Damage Liability Combined	$300,000
Annual Aggregate (if applicable)	$1,000,000

ADDITIONAL INSURED: Manatee County, a political subdivision of the State of Florida, shall be specifically named as additional insured on the Business Auto Policy.

d. Property Insurance

If the resulting 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).

e. Installation Floater

If the resulting 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).

f. Certificates of Insurance and Copies of Policies

Certificates of Insurance in triplicate evidencing the insurance coverage specified herein shall be filed with the Purchasing Official 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 and title of the Project. All insurance policies required herein shall be issued by companies that are authorized to do business under the laws of the State of Florida and hold an A.M. Best rating of A- or better. Insurance, as specified herein, shall remain in force and effect for the duration of the Project including any warranty periods.

g. Complete Policies: The entire and complete insurance policies required herein shall be provided to County on request.

Nothing herein shall in any manner create any liability of 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 County or to any Workers, Suppliers, material men or employees in relation to the resulting Contract.

D.19 INSURANCE (Continued)

h. By way of its submission of a Bid hereto, Bidder:

1. Represents that Bidder maintains, and will maintain during the term of any Contract arising from this solicitation, insurance coverage from responsible companies duly authorized to do business in the State of Florida and deemed acceptable to County, as set forth in this solicitation; and

2. Agrees that, insurance should not be cancelled without thirty (30) days notice to County and must be endorsed to provide same. Failure of Bidder to obtain and maintain proper amounts of insurance at all times as called for herein shall constitute a Material Breach of the resulting Contract, which may result in immediate termination.

i. Certification Requirements – In order for the certificate of insurance to be accepted it **must** comply with the following:

1. The certificate holder shall be:
Manatee County Board of Commissioners,
A political subdivision of the State of Florida
P.O. Box 1000
Bradenton, FL 34206-1000
IFB# 13-2924CD, Emergency Generator Disconnect and Chiler Connections at the Central Laboratory Facility

2. Certificate shall be mailed to:
Manatee County Purchasing Division
1112 Manatee Avenue West, Suite 803
Bradenton, FL 34205
Attn: Chris Daley, CPPB, Contract Specialist

D.20 BID BOND/CERTIFIED CHECK

By submitting a Bid 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 ten (10) calendar days after Notice of Intent to Award**. The Bidder further agrees that failure to execute and deliver said form of Contract **within ten (10) calendar 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. 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 County enters into a Contract with a Bidder, or if County rejects any and/or all Bids, accompanying bond will be promptly returned.

D.21 PERFORMANCE AND PAYMENT BONDS

The Successful Bidder shall furnish Surety bonds using the Public Construction Bond form prescribed in Florida Statutes § 255.05, which is provided herein, 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. Failure to provide the required bonds on the prescribed form may result in Successful Bidder being deemed nonresponsive. Bonds must be in the form prescribed in Florida Statutes § 255.05, and must not contain notice, demand or other terms and conditions, including informal pre-claim meetings, not provided for in Florida Statutes § 255.05.

Surety of such bonds shall be in an amount equal to 100% of the Contract Award issued by a duly authorized and nationally recognized Surety company, authorized to do business in the State of Florida, satisfactory to this County. Surety shall be rated as “A-” or better as to general policy holders rating and Class V or higher rating as to financial size category and the amount required shall not exceed 5% of the reported policy holders’ surplus, all as reported in the most current Best Key Rating Guide, published by A.M. Best Company, Inc. of 75 Fulton Street, New York, New York, 10038. The attorney-in-fact who signs the bonds must file with the bonds, a certificate and effective dated copy of power-of-attorney. Performance and Payment Bonds shall be issued to Manatee County, a political subdivision of the State of Florida, within ten (10) calendar days after Notice of Intent to Award.

In addition, pursuant to Florida Statutes § 255.05(1)(b), prior to commencing Work, the Contractor shall be responsible and bear all costs associated to record the Performance and Payment Bond with the Manatee County Clerk of the Circuit Court. A certified copy of said recording shall be furnished to the Purchasing Division upon filing. Pursuant to Florida Statutes § 255.05(1)(b), County will make no payment to the Contractor until the Contractor has complied with this paragraph.

Furnishing Performance and Payment Bonds shall be requisite to execution of a Contract with 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 the Successful Bidder to execute such Contract and to supply the required bonds shall be just cause for cancellation of the Award. County may then contract with another acceptable Bidder or re-advertise this Invitation for Bid. If another Bidder is accepted, and notice given within ninety (90) days after the opening of the Bids, this acceptance shall bind the Bidder as though they were originally the Successful Bidder.

Failure of County at any time to require performance by the Contractor of any provisions set out in the resulting Contract will in no way affect the right of County, thereafter, to enforce those provisions.

When activity occurs within the resulting Contract that increases the amount of the Contract by either an approved Administrative Contract Adjustment (ACA) or an approved Change Order, a recorded Bond Rider shall be provided before the additional Work can proceed. All premiums shall be paid by the Contractor.

D.22 NO DAMAGES FOR DELAY

No claim for damages or any claim other than for an extension of time shall be made or asserted against 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 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 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 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 extent specifically provided above.

D.23 NO INTEREST

Any monies not paid by 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 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.

D.24 CONSTRUCTION OF CONTRACT

The resulting 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.

D.25 BE GREEN

All Contractors 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.

END OF SECTION D

SECTION E

GENERAL CONDITIONS

ARTICLE 1. DEFINITIONS

Whenever used in the Contract 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 Bid Documents.

Administrative Contract Adjustment (ACA) – A minor change to a Contract, which is less than 10% of the Contract Price or less than 20% of the Contract Time, and does not require Board approval. (Reference Resolution R-07-189)

Application for Payment - The form accepted by the 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 in accordance with Chapter 2-26 of the Manatee County Code.

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

Bid Bond – An insurance agreement, accompanied by a monetary commitment, by which a third party (the Surety) accepts liability and guarantees that the Bidder will not withdraw the Bid.

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

Bid Documents - Consists of the Invitation for Bid, which includes but is not limited to the Bid Form, drawings, technical Specifications, terms and conditions, and the proposed Contract Documents (including all Addenda issued prior to receipt of Bids); and becomes a part of the resulting Contract.

Bid Summary – Specifications or scope of Work that specifically describes the Work to be done for this Project.

Bond Rider – A Bond Rider increases the Performance Bond coverage to ensure responsibility of the Contractor in executing the Work for the County in consideration of the increased value resulting from an approved change in the Contract amount.

Change Order - A document recommended by the 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 Contract.

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

Contract Contingency - A monetary allowance used at the County's discretion, which is part of the total sum of the Contract that allows for minor changes in the Contract that do not change the initial Scope of Work, including Contract Price and Contract Time.

Contract Documents - The Contract, Invitation for Bid in its entirety, Public Construction Bond Form and Insurance Certificate(s), Drawings/Plans, Addenda (which pertain to the Bid Documents), Contractor's Bid Form (including documentation accompanying the Bid and any post-Bid documentation submitted prior to the Notice of Award), and Reports, together with all written Change Orders and other documents amending, modifying or supplementing the Contract Documents issued on or after the Effective Date of the Contract.

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

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 a Contract.

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).

Drawings - The drawings which show the character and Scope of Work to be performed and which have been prepared or approved by Engineer and are referred to in the Bid and Contract Documents.

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

Engineer – Licensed professional who is responsible for the preparation, signing, dating, sealing and issuing of any engineering document(s) for any engineering service or Work.

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.

Field Directive - A written order issued by an authorized County Representative which approves changes in the Work, but does not involve a change in the initial Scope of Work, including the Contract Price and the Contract Time. A Field Directive must be issued by an authorized County Representative to authorize use of Contract Contingency funds.

Final Completion – The Work (including items defined on the Punch List) has been completed, accepted in writing by the County, approved as-builts have been received, and is ready for final payment.

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.

Information (Pre-Bid) Conference – A meeting held by the Purchasing Division with potential Bidders, prior to the opening of the solicitation, for the purpose of answering questions, clarifying ambiguities, and responding to general issues in order to establish a common basis for understanding all of the requirements of the solicitation; may result in the issuance of an Addendum.

Material Breach – A substantial failure in the performance of the Contract, as to give the affected party the right to remedies available in the Contract.

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 Chapter 2-26 of the Manatee County Code.

Notice of Intent to Award - The written notice to the apparent Successful Bidder stating Award has been recommended with final Award to be authorized by the Purchasing Official or Board of County Commissioners, as appropriate.

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.

Payment Bond – An instrument, issued by a Surety that guarantees that Subcontractors will be paid for labor expended on the Contract.

Performance Bond – An instrument executed subsequent to Award by the successful Contractor that protects the County from loss due to Contractor’s inability to complete the Contract as agreed.

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 time 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 Manatee County who is assigned to the project or any part thereof.

Punch List – A list of minor deficiencies or additional Work that does not prohibit achieving Substantial Completion yet must be completed before Final Completion of the Contract can be achieved.

Retainage – A certain percentage, identified in the solicitation document, is withheld from payment due to the Contractor until the Work is fully completed and accepted by County.

Schedule of Values – In the case of a total, lump sum Bid, unit prices shall be established for this Contract by the submission of a Schedule of Values. In the case of an itemized Bid, unit prices are the prices bid. The Contractor shall submit a Schedule of Values within ten (10) days of Notice to Proceed date. The schedule shall include quantities and prices of items equaling the Total Offer and will subdivide the Work into components in sufficient detail to serve as the basis for progress payments during construction. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work. Upon request of the County, the Contractor shall support the values with data which will substantiate their correctness.

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.

Special Provisions: As required to define Work or procedures not covered in the standard Specifications, and as necessary to supplement or modify items in the standard Specifications.

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 stage in the progress of the Work (or a specified portion thereof) is sufficiently complete in accordance with the Contract Documents so the Work (or a specified portion thereof) can be utilized for the intended purpose.

Successful Bidder - The lowest, responsible and responsive Bidder to whom an Award is made.

Supplier - A manufacturer, fabricator, Supplier, distributor, material man or vendor.

Surety – A pledge or guarantee by an insurance company, bank, individual or corporation on behalf of the Bidder which protects against default or failure of the principal to satisfy the contractual obligations.

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 Contract 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 itself may not change the Contract Price or 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.

Written Amendment - A Written Amendment of the Contract Documents, signed by County and Contractor on or after the Effective Date of the Contract and normally dealing with the non-engineering or non-technical rather than strictly Work related aspects of the Contract Documents.

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 accordance with the remainder of the 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 Contract. 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 its 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 Contract 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 Manatee County.

Should a conflict exist within the Contract Documents, the precedence in order of authority is as follows: 1) Bid Summary, 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 in the Contract Documents. 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 Written Amendment

3.3.2 A Change Order

3.3.3 An Administrative Contract Adjustment (ACA)

3.3.4 A Work Directive Change

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 Contract Contingency 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 seventy-two (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.

4.9.4 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 Contract, 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 or Slack 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 Contract, 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, sequence, technique or 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 Contract 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 Contact 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. COUNTY'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 after the Work has been accepted by the County. Payment shall be made no more than twenty (20) business days if County is its own Engineer of Record or twenty-five (25) business days if outside agent approval is required after the pay estimate has been approved by the agent for 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 Contract 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 twenty-one (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 the 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 15% 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 Contract; 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 (3) 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, and 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 and indirect 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 (3) 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 or removed and all direct, indirect and consequential costs of such removal and replacement will be paid by Contractor.

ARTICLE 10. SUSPENSION OR TERMINATION OF WORK

10.1 County reserves the right to suspend the Work, or any portion thereof, at any time without cause for a period not to exceed 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.

10.1.1 If Work is suspended by County for a period that exceeds ninety (90) days; or if Work is suspended by an order of court or other public authority; or if County fails to pay Contractor, then Contractor may, upon seven (7) days written notice to County, terminate the Contract and recover payment for all Work executed.

10.1.2 In lieu of terminating the Contract, if the Engineer has failed to act on any Application for 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 have been received.

10.2 County reserves the right, after giving seven (7) days written notice, to terminate this Contract if:

10.2.1 Contractor persistently fails to perform the Work in accordance with the Contract Documents;

10.2.2 Contractor disregards laws or regulations of any public body having jurisdiction;

10.2.3 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 bankruptcy or insolvency;

10.2.4 Contractor has a petition filed against them under any chapter of the Bankruptcy Code or similar relief under any other federal or state law;

10.3 County may 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 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.

10.3.1 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.

10.3.2 If the direct, indirect and consequential 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 this Contract.

10.4 In the event sufficient budgeted funds are not available for a new fiscal year, County shall notify Contractor of such occurrence and Contract shall terminate on the last day of the current fiscal year without penalty or expense to County.

10.5 Failure of Contractor to comply with any of the provisions of this Contract shall be considered a Material Breach of Contract and shall be cause for immediate termination of Contract at the discretion of County.

10.6 In addition to all other legal remedies available to County, County reserves the right to terminate and obtain from another source, any commodities or services which have not been delivered within the Contract Time as stated in the Contract Documents.

ARTICLE 11. CONTRACT CLAIMS & DISPUTES

11.1 Except as otherwise provided herein, any dispute arising under this Contract shall be decided by the Purchasing Official in accordance with Section 2-26-63 of the Manatee County Code subject to an administrative hearing process provided in 2-26-64. The decision of the Board of County Commissioners in accordance with Section 2-26-64 of the Manatee County Code shall be the final and conclusive County decision subject to exclusive judicial review in the circuit court by a petition for certiorari.

ARTICLE 12. RESIDENT PROJECT REPRESENTATIVE - DUTIES, RESPONSIBILITIES

12.1 The Resident Project Representative is the Engineer’s Agent, who will act as directed by and under the supervision of the Engineer, and who will confer with County regarding his actions. Resident Project Representative's dealing in matters pertaining to the on-site Work shall, in general, be only with the County 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 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 and notify those expected to attend in advance. Attend meetings and maintain and circulate copies of minutes thereof.

12.2.3 Serve as County's liaison with Contractor, working principally through Contractor's superintendent and assist him in understanding the intent of the Contract Documents. As requested by Contractor, 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 Engineer of their availability for examination.

12.2.5 Advise 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.

12.2.6 Conduct on-site observations of the Work in progress to assist 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 whenever he or she 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 Contractor 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.

12.2.10 Transmit to Contractor, 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.

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, 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.

12.2.14 Record names, addresses and telephone numbers of all Contractors, Subcontractors and major Suppliers of materials and equipment.

12.2.15 Furnish 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 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 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 for his review prior to final acceptance of the Work.

12.2.20 Before 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 and/or Engineer and Contractor and prepare a Punch List of items to be completed or corrected. Reference Florida Statutes § 218.735(7).

12.2.22 Verify that all items on final list have been completed or corrected and make recommendations to County concerning acceptance.

12.3 Except upon written instructions of 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 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 comply with the provisions of Fla.Stat. § 446.011.

NOTE: The form of all submittals, notices, Change Orders and other documents permitted or required to be used or transmitted under the Contract shall be determined by the County. Standard County forms shall be utilized.

END OF SECTION E

SECTION F

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

This CONTRACT is made and entered into by and between the COUNTY OF MANATEE, a political subdivision of the State of Florida, hereinafter referred to as "COUNTY" and **XXXXXXXXXXXX**, hereinafter referred to as "CONTRACTOR," duly authorized to transact business in the State of Florida, with offices located at **XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX**.

ARTICLE 1. WORK

CONTRACTOR shall furnish all labor, materials, supplies, and other items required to complete the Work for **IFB #13-2924CD- Emergency Generator Disconnect and Chiller Connections at the Central Laboratory Facility** in strict accordance with Contract Documents and any duly authorized subsequent Addenda thereto, all of which are made a part hereof.

ARTICLE 2. COMPENSATION

As compensation to CONTRACTOR, COUNTY shall pay and CONTRACTOR will accept as full consideration for the performance of all Work required by **IFB #13-2924CD- Emergency Generator Disconnect and Chiller Connections at the Central Laboratory Facility**, subject to additions and deductions as provided therein, the sum of **$xxxxx.xx** based on a completion time of **120** calendar days.

ARTICLE 3. LIQUIDATED DAMAGES

Time is of the essence in this CONTRACT. As of the date of this CONTRACT, the damages that will be suffered by COUNTY in the event of CONTRACTOR'S failure to timely complete the Work are impossible to determine. In lieu thereof, it is agreed that if CONTRACTOR fails to achieve Final Completion of the Work within 120 calendar days of issuance of the Notice to Proceed (accounting, however, for any extensions of time granted pursuant to approved Change Orders), CONTRACTOR shall pay to COUNTY,

as liquidated damages (and not as a penalty), the sum of $388 per calendar day for each day beyond 120 days until CONTRACTOR achieves Final Completion. COUNTY shall have the option of withholding said liquidated damages from any pay application(s) thereafter submitted by CONTRACTOR. Alternatively, CONTRACTOR shall immediately pay said sums to COUNTY upon COUNTY'S demand for same.

ARTICLE 4. ENGINEER

The COUNTY of MANATEE, Property Management Department, is responsible as COUNTY and ATP Engineering South, P.L. as "ENGINEER", designed this Project and is responsible for technical/engineering reviews and decisions. The ENGINEER is a member of COUNTY'S Project Management team which is collectively responsible for ensuring the Work is completed in accordance with the Contract Documents.

All communications involving this Project will be addressed to: John Rowland, Construction Coordinator, Property Management Department and to the Engineer of Record, John Camden, P.E, ATP Engineering South, P.L. All invoicing will be addressed to the attention of: Angela Honts (address noted below) with invoice copies sent to John Camden, P.E. (address noted below).

Manatee County Property Management Dept.
IFB# 13-2924CD
Attention: John Rowland
Construction Coordinator
1112 Manatee Avenue West, Suite 862
Bradenton, Florida 34205
Phone (941) 745-4501 ext. 5843

ATP Engineering South, P.L.
IFB# 13-2924CD
Attn: John Camden, P.E.
Engineer
5227 Office Park Blvd.
Bradenton, Florida 34203
Phone (941) 751-6485

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

ARTICLE 5. CONTRACTOR'S REPRESENTATIONS

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

5.1 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.

5.2 CONTRACTOR has studied carefully all drawings of the physical conditions upon which CONTRACTOR is entitled to rely.

5.3 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.

5.4 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 CONTRACTOR will be done at CONTRACTOR'S expense.

5.5 CONTRACTOR has correlated the results of all such observations, examinations, investigations, explorations, tests, reports and studies with the terms and conditions of the Bid.

5.6 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 COUNTY is acceptable to CONTRACTOR.

5.7 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 COUNTY.

ARTICLE 6. CONTRACT DOCUMENTS

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

6.1 This CONTRACT and Bid Document **IFB #13-2494CD**

6.2 Invitation for Bid #13-2494CD, in its entirety

6.3 Public Construction Bond Form and Insurance Certificate(s)

6.4 Drawings/Plans (not attached)

6.5 Addendum number x to x inclusive

6.6 CONTRACTOR'S Bid Form

6.7 Reports

6.8 The following, which may be delivered or issued after the Effective Date of the CONTRACT and are not attached hereto: all written Change Orders and other documents amending, modifying, or supplementing the Contract Documents.

6.9 The documents listed in paragraphs above are attached to this CONTRACT (except as noted otherwise above). There are no Contract Documents other than those listed above in this Article 6.

ARTICLE 7. DISPUTE RESOLUTION

Disputes shall be resolved as follows: good faith negotiations by the designated agents of the parties and if not resolved by such designated agents, CONTRACTOR shall submit its claim, with the basis for the dispute, in writing to the Manatee County Purchasing Official for a determination and handling in accordance with the provisions of Chapter 2-26 of the Manatee County Code.

ARTICLE 8. NO WAIVER

8.1 The failure of CONTRACTOR or COUNTY to insist on the strict performance of the terms and conditions hereof shall not constitute or be construed as a waiver or relinquishment of either party's right to thereafter enforce the same in accordance with this CONTRACT in the event of a continuing or subsequent default on the part of CONTRACTOR or COUNTY.

8.2 Nothing herein shall be interpreted as a waiver of COUNTY of its rights, including the limitations of the limited waiver of sovereign immunity, as set forth in Florida Statute 768.28, or any other statute, and COUNTY expressly reserves these rights to the full extent allowed by law.

ARTICLE 9. NO THIRD-PARTY BENEFICIARIES

This CONTRACT is solely for the benefit of the parties hereto, and no right, privilege, or cause of action shall by reason hereof accrue upon, to, or for the benefit of any third party. Nothing in this CONTRACT is intended or shall be construed to confer upon or give any person, corporation, partnership, trust, private entity, agency, or any other governmental entity any right, privilege, remedy, or claim under or by reason of this CONTRACT or any provisions or conditions hereof.

ARTICLE 10. GOVERNING LAW, JURISDICTION AND VENUE

10.1 This CONTRACT and the construction and enforceability thereof shall be interpreted under the laws of the State of Florida.

10.2 CONTRACTOR consents and agrees that all legal proceedings related to the subject matter of this CONTRACT shall be governed by the laws of and maintained in courts sitting with the State of Florida.

10.3 CONTRACTOR consents and agrees that jurisdiction for such proceedings shall lie exclusively with such court and venue in Manatee County, Florida, or if in Federal Court, the Middle District of Florida, Tampa Division.

10.4 In the event of any litigation arising under the terms of this CONTRACT, each party shall be responsible for their own attorney's fees, including appellate fees, regardless of the outcome of the litigation.

ARTICLE 11. FORCE MAJEURE

Neither party shall be considered in default of performance of such obligations hereunder to the extent that performance of such obligations or any of them is delayed or prevented by Force Majeure. Force Majeure shall include, but not be limited to hostility, revolution, civil commotion, strike, epidemic, fire, flood, wind, earthquake, hurricane, or other disruptive event of nature, act of terrorism, explosion, lack of or failure of transportation or bridge/roadway facilities, any law, proclamation, regulation, ordinance or other act of government, or any act of God or any cause whether of the same or different nature, existing or future; provided that the cause, whether or not enumerated in this Article, is beyond the control and without the fault or negligence of the party seeking relief under this Article.

ARTICLE 12. MISCELLANEOUS

12.1 Terms used in this CONTRACT are defined in Article 1 of Section E, General Conditions.

12.2 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.

12.3 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.

12.4 By accepting Award of this CONTRACT, CONTRACTOR, which shall include its directors, officers and employees, represents that it presently has no interest in and shall acquire no interest in any business or activity which would conflict in any manner with the performance of duties or services required hereunder.

CONTRACT

IFB #13-2494CD

IN WITNESS WHEREOF, the parties hereto have caused this CONTRACT **13-2494CD** to be duly executed by their authorized representatives.

CONTRACTOR

By: _____

_____
Print Name & Title of Signer

Date: _____

COUNTY OF MANATEE, FLORIDA

By: _____
Melissa M. Wendel, CPPO
Purchasing Official

Date: _____

BID FORM

(Submit in triplicate)

For: IFB #13-2924CD- Emergency Generator Disconnect and Chiller Connections at the Central Laboratory Facility

Total Offer: _____
Based on a completion time of 120 calendar days

One schedule for completion of the Work shall be considered. Only one Award shall be made.

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 Bid package, in its entirety.

We understand that the Invitation for Bid package, in its entirety, including but not limited to, all Specifications, terms, and conditions shall be made a part of any resulting 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 County, and agrees to forfeit his/her Bid Bond.

Communications concerning this Bid shall be addressed as follows: **(Complete all fields)**

Bidder's Name: _____

Mailing Address: _____

Telephone: ( ) _____ Fax: ( ) _____

Email Address: _____

I, _____ attest that I have read, understand, and agree to the Local Preference policy of Manatee County.

I, _____ on [date(s)] _____ **attest that I have visited the Project site(s) to familiarize myself with the full Scope of Work required for the Bid.**

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

Authorized Signature(s): _____

Name and Title of Above Signer(s): _____

Date: _____

BID FORM

(Submit in Triplicate)

EMERGENCY GENERATOR DISCONNECT AND CHILLER CONNECTIONS AT THE CENTRAL LABORATORY FACILITY

Bid Based on Completion Time of 120 Calendar Days

ITEM NO.	DESCRIPTION	EST. QTY.	U/M	UNIT PRICE	EXTENDED PRICE
1	**Mobilization**	1	LS	$	$
2	**Provision and Installation of Generator Switch**	1	LS		
3	**Provision and Installation of Mechanical and Electrical Equiopment for the Emergency Chiller Connections**	1	LS	$	$
4	**Provision and Installation of the IT Room Air Conditioner**	1	LS	$	$
	TOTAL BASE BID- Based on Completion Time of 120 Calendar Days				$
5	**CONTRACT CONTINGENCY WORK (USED ONLY WITH COUNTY APPROVAL)**		10% OF TOTAL BASE BID		$
	TOTAL OFFER with Contract Contingency- Based on Completion Time of 120 Calendar Days				$

Bidder Name: _____

Authorized Signature: _____

MAILING LABEL

Cut along the outside border and affix this label to your sealed Bid envelope to identify it as a “Sealed Bid”. Be sure to include the name of the company submitting the Bid and the Bid due date and time where requested.

MAILING LABEL TO AFFIX TO OUTSIDE OF SEALED BID PACKAGE:

SEALED BID - DO NOT OPEN

CONTRACTOR: _____

SEALED BID NO: 13-2924CD

BID TITLE: Emergency Generator Disconnect and Chiller Connections at the Central Laboratory Facility

DUE DATE/TIME: _____ @ _____

FORM A

CONTRACTOR'S QUESTIONNAIRE

(Submit in Triplicate)

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

THIS QUESTIONNAIRE MUST BE COMPLETED AND SUBMITTED WITH YOUR BID

1. Contact Information:

   License #: _____

   License Issued to: _____

   Date License Received (MM/DD/YR): _____

   Company Name: _____

   Physical Address: _____

   City: _____ State of Incorporation: _____ Zip Code: _____

   Phone Number: ( ) _____ Fax Number: ( ) _____

   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. Bidder is authorized to do business in the State of Florida: ☐ Yes ☐ No

   For how many years? _____

5. Your organization has been in business (under this firm's name) as a

   _____

   Is this firm in bankruptcy? _____

   BIDDER: _____

6. Attach a list of projects where this specific type of Work was performed.

7. Describe and give the date and County of the last three government or private work of similar scope you've completed which are similar in cost, type, size, and nature as this Project. Include contact name and phone number. Provide the budget, actual cost, size and summary of work for each project. Attach additional pages as necessary. (Note: If listing a Manatee County reference, contact person should not be directly associated with this Project.

_____

_____

_____

8. 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.

_____

_____

_____

9. Have you ever failed to complete projects awarded to you? Or failed to complete projects within Contract Time? If so, state when, where (contact name, address, phone number) and why.

_____

_____

_____

10. Have you ever been debarred or prohibited from providing a Bid to a governmental entity? If yes, name the entity and describe the circumstances:

_____

_____

_____

BIDDER: _____

11. Will you subcontract any part of this Work? If so, describe which major portion(s):

_____

_____

_____

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

_____

_____

_____

13. What equipment do you own to accomplish this Work? (A listing may be attached)

_____

_____

_____

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

_____

_____

_____

15. List the following in connection with the Surety which is providing the bond(s):

Surety's Name: _____

Address: _____

_____

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

Agent's Name: _____

Address: _____

_____

Phone: _____

Email: _____

BIDDER: _____

FORM B

PUBLIC CONTRACTING AND ENVIRONMENTAL CRIMES CERTIFICATION

SWORN STATEMENT PURSUANT TO ARTICLE V,
MANATEE COUNTY PURCHASING ORDINANCE

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 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 Contract, or shall receive a grant of County monies unless such person or entity has submitted a written certification to 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 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 an 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.

(Continued)

Any person or entity who claims that this Article is inapplicable to him/her/it because a conviction or judgment has been reversed by a court of competent jurisdiction shall prove the same with documentation satisfactory to County's Purchasing Official. Upon presentation of such satisfactory proof, the person or entity shall be allowed to contract with 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 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 _____, 20_____ 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.

FORM C

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**. 13-2924CD**
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 County 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: _____

R. B. "Chips" Shore

CLERK OF THE CIRCUIT COURT AND COMPTROLLER OF MANATEE COUNTY

1115 Manatee Avenue West, Bradenton, Florida 34205 - Phone (941) 749-1800 – Fax (941) 741-4082
P.O. Box 25400, Bradenton, Florida 34206 - www.manateeclerk.com

E PAYABLES APPLICATION

Company name_____

Contact person_____

Phone number_____

Email Address_____

FINANCE USE ONLY

Open orders: YES or NO
PEID _____
CREATE DATE _____
CONFIRMED WITH _____
Name and phone number

IFAS _____

BANK _____

INITIALS_____

Return completed form to:
Via email to:
lori.bryan@manateeclerk.com
Via fax to: (941) 741-4011
Via mail:
PO Box 1000
Bradenton, Fl 34206

Revised: June 26, 2013

Construction Document Specifications

For

Manatee County
66th Street Laboratory Facility
Chiller Connections, Generator Connections and
Data Room A/C
Manatee County Government Utility Department
Bradenton, Florida

Issue Date: CD Set May 20, 2013

Specification Date: August 13,2013

ATP ENGINEERING SOUTH, P.L.
5227 Office Park Blvd.
Bradenton, FL 34203
941-751-6485
FL# 8908
Contact Person: John D. Camden, P.E.
FL# 53458

Set#_____

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Sheet Schedule:
Project: Manatee County
Chiller Connections, Generator Connections and Data Room A/C

Sheet	Description
Cover Sheet	Cover Sheet
E1.0-A	ELECTRICAL LEGEND, SYMBOLS & GENERAL NOTES
E2.0-A	ELECTRICAL PLANS
E5.0-A	ELECTRICAL ONE-LINE AND PANELBOARDS
E6.0-A	ELECTRICAL DETAILS
M1.0-A	MECHANICAL LEGEND, SYMBOLS & GENERAL NOTES
M2.0-A	MECHANICAL EXISTING FLOOR PLAN
M3.0-A	MECHANICAL SCHEDULES
M4.0-A	MECHANICAL DETAILS

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01310	013100	Project Management and Coordination……	1-6
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(NOT USED)

DIVISION 3 – CONCRETE
(NOT USED)

DIVISION 4 – MASONRY
(NOT USED)

DIVISION 5 – METALS
(NOT USED)

DIVISION 6 – CARPENTRY
(NOT USED)

DIVISION 7 – THERMAL AND MOISTURE PROTECTION
(NOT USED)

DIVISION 8 – OPENINGS
(NOT USED)

Division CSI(2004) Section Title Pages

DIVISION 9 – FINISHES
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DIVISION 10 – SPECIALTIES (NOT USED)

DIVISION 11 – EQUIPMENT (NOT USED)

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SECTION 01100 – SUMMARY – 011100

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK COVERED BY CONSTRUCTION SPECIFICATIONS

A. Project Identification: Project consists of renovations and additions to the Manatee County Waste Water Treatment Laboratory Facility.

1. Project Location: 4751 66th St. W., Bradenton, FL 34210
2. Owner: Manatee County Government
3. Project Manager: Mr. David Thompson, 1112 Manatee Ave. W., Bradenton, FL 34206.

B. Engineer Identification: The Construction Specifications, dated May 20, 2013, were prepared by ATP Engineering South, 5227 Office Park Blvd., Bradenton, FL 34203. All project documents shall be transmitted and distributed by the Manatee County Purchasing Department.

C. Identification: The Construction Specifications dated May 20,2013 were prepared for the project by ATP Engineering South.

The intent of the Construction Specifications is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Construction Specifications are complementary, and what is required by the one shall be as binding as if required by all. Performance by the Contractor shall be required only to the extent consistent with the Construction Specifications and reasonably inferable from them as being necessary to produce the intended results. Dimensions shall be figures rather than determined by scale or rule. In the event of a conflict or inconsistency among the Construction Specifications, or between the Construction Specifications and applicable codes, the Contractor shall provide the greatest quantity, largest degree of safety, highest quality or most stringent material or work.

D. Work Covered by Construction Specifications:

The Work consists of renovations and additions. The Work consists of renovations and additions to the HVAC, electrical systems, and gas piping for the generator.

1. The HVAC, Electrical, and Plumbing Work shall include: HVAC, dehumidifiers, limited controls, electrical, power systems, lighting, piping and chilled water

piping systems, generator systems, system change outs and operational turnovers, control interface, (see power and systems plan), roof penetrations and curbs, wall penetrations, fire stopping, lift or crane, and miscellaneous work. This portion shall be completed in accordance with plans and specifications by ATP Engineering South, dated August 13, 2013.

2. Construction materials and processes are to be performed to have minimum impact on the environment, using recycled materials to the greatest extent practicable, recycling construction waste material where possible and disposing of non-recyclable waste in an environmentally friendly manner.

E. Bidder Qualifications:

a. Bidder shall be a Florida Licensed contractor (Electrical, General) with subcontractors having the minimum of 3 years of experience of renovations of similar type facilities. References shall be supplied to the purchasing department with the bid documents. Contractors shall meet all purchasing requirement for bonding, insurance, and security access for this facility. All individuals shall be cleared with the County prior to access to the facility.

F. Project will be constructed under a general construction contract.

1.3 SPECIFICATION FORMATS AND CONVENTIONS

A. Specification Format: The Specifications are organized into Divisions and Sections using the 16/ 48 -division format and CSI/CSC's "Master Format" numbering system.

1. Section Identification: The Specifications use section numbers and titles to help cross-referencing in the Construction Specifications. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of sections in the Construction Specifications.

B. 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. Abbreviated Language: Language used in the Specifications and other Construction Specifications is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred, as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Construction Specifications indicates.
2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may

be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.

a. 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.

b. The word “comparable” shall mean of same quality and performance and not change any items within the design or construction of the project. If the system or component changes the electrical, structural, mechanical, fire, or architectural, the unit is not comparable.

1.4.1 USE OF PREMISES- Refer to Division 1 Section 01500 for any additional information.

A. General: During the construction period, the Contractor shall limit his use of premises for construction operations to within the construction limits indicated or established by the Owner/ County. Any required work noted outside those limits of construction shall be coordinated with the Owner for safety and security prevention.

B. Use of the Site: Limit the use of the premises to work in areas indicated. Confine operations to areas within the contract limits indicated. Do not disturb portions of the site beyond areas in which work is indicated. Confine Construction operations to the designated floors and areas during weekdays under normal business hours as dictated by the Owner’s Representative.

C. All personnel shall be cleared with the County facility personnel to the project site area.

D. Driveways, walkways, and entrances: Keep driveways, loading areas, and entrances serving premises clear and available to the Owner, Owner’s Employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

1. Schedule deliveries to minimize use of driveways and entrances by construction operations. Hours and Notification of delivery of product: Deliveries shall be scheduled with the Project Manager, they may occur during regular scheduled hours.

2. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site.

3. Locate Contractor parking and staging areas as directed by the Owner’s Representative and personnel.

4. Hours of Operations for Contractors as specified by the Project Manager: 8:00 A.M. to 5:00 P.M., Monday through Friday, excluding County Holidays.

E. Condition of existing Building: Maintain portions of the existing building affected by construction operations. Repair damage caused by construction operations.

F. Contractor may use restroom facilities in the existing building.

G. Contractor may use existing electrical power outlets at no charge.

1.5 Coordination with Occupants:

A. Full Owner Occupancy: Owner will occupy site and existing building during the entire construction period. Cooperate with the Owner's Representative during the construction operations to minimize conflicts and facilitate Owner usage. Perform the work so not to interfere with the Owner's day-to-day operations. Maintain existing exits.

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 with out written permission from the Owner's Representative.

2. Notify the Owner's Representative not less than 72 hours in advance of activities that will affect the Owner's Operations.

3. The Contractor shall provide construction waste collection service. Contractor shall not use the Owner's waste receptacles for construction waste.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01100

SECTION 01150 - REMODELING PROCEDURES - 020500

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Remove designated building equipment and fixtures per the design plans.

B. Remove designated partitions and components per the design plans.

C. Cap and identify utilities per the plans, as necessary.

1.3 PROTECTION

A. Conduct demolition to minimize interference with adjacent building areas. Maintain protected egress and access at all times.

B. Prevent movement or settlement of structures. Provide and place bracing or shoring and be responsible for safety and support of structure. Assume liability for such movement, settlement, damage, or injury.

C. Cease operations and notify the Project Manager and Engineer immediately, if safety of structure appears to be endangered. Take precautions to support structure properly. Do not resume operations until safety is restored.

D. Provide, erect and maintain temporary barriers and security devices.

PART 2 - PRODUCTS (Not Used)

2.1 MATERIALS (Not Applicable)

PART 3 - EXECUTION

3.1 PREPARATION

A. Erect weatherproof closures for exterior openings.

B. Protect existing items which are not indicated to be altered.

C. Locate guard rails in stairwells and around open shafts to protect workers. Post clearly visible warning signs.

3.2 DEMOLITION

A. Demolish in an orderly and careful manner as required to accommodate new work, including that required for connection to the existing building.

B. Except where noted otherwise, immediately remove demolished materials from site.

C. Remove materials to be reinstalled or retained in a manner to prevent damage. Store and protect.

D. Repair all demolition performed in excess of that required, at no cost to the Owner.

E. Remove and promptly dispose of contaminated, vermin infested or dangerous materials encountered.

F. Remove demolished materials, tools and equipment from site as work progresses. Upon completion of work, leave site in a condition acceptable to the Architect.

3.3 RENOVATION

A. Make new work fit to existing work. Where a new wall is attached to an existing wall, paint the entire wall with new paint.

B. Match new materials and systems with existing materials unless the existing materials are being removed.

END OF SECTION

SECTION 01152
REQUESTS FOR PAYMENT

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

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.

1.02 FORMAT AND DATA REQUIRED

A. Submit payment requests in the form provided by the Owner with itemized data typed in accordance with the Bid Form.
B. Provide construction photographs in accordance with Contract Documents.

1.03 SUBSTANTIATING DATA FOR PROGRESS PAYMENTS

A. When the Owner or the Architect/ Engineer requires substantiating data, Contractor shall submit suitable information with a cover letter.
B. Submit one copy of data and cover letter for each copy of application.

1.04 PREPARATION OF APPLICATION FOR FINAL PAYMENT

A. Fill in application form as specified for progress payments.

1.05 SUBMITTAL PROCEDURE

A. Submit applications for payment at the times stipulated in the Agreement.

B. Number: Three (3) copies of each application; all signed and certified by the Contractor.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 01153
CHANGE ORDER PROCEDURES
PART 1 GENERAL

1.01 DEFINITION

A. Change Order: Major change in contract scope or time that must be approved by the Board.

B. Administrative Contract Adjustment: Minor change order under 10% of project cost or 20% time, does not have to be Board approved.

C. Field Directive: Change to contract quantity that does not require a change of scope or time extension.

1.02 REQUIREMENTS INCLUDED

A. The Contractor shall promptly implement change order procedures:

1. Provide full written data required to evaluate changes.
2. Maintain detailed records of work done on a time and material/force account basis.
3. Provide full documentation to Engineer or County Representative on request.

B. The Contractor shall designate a member of the Contractor's organization who:

1 . Is authorized to accept changes to the Work.
2. Is responsible for informing others in the Contractor's employ of the authorized changes into the Work.

C. The Board of County Commissioners executes all Change Orders.

1.03 PRELIMINARY PROCEDURES

A. Project Manager may initiate changes by submitting a Request to Contractor. Request will include:

1. Detailed description of the change, products, costs and location of the change in the Project.
2. Supplementary or revised Drawings and Specifications.
3. The projected time extension for making the change.
4. A specified period of time during which the requested price will be considered valid.
5. Such request is for information only and is not an instruction to execute the changes, nor to stop work in progress.

B. Contractor may initiate changes by submitting a written notice to the Project Manager, containing:
1. Description of the proposed changes.
2. Statement of the reason for making the changes.
3. Statement of the effect on the Contract Sum and the Contract Time.
4. Statement of the effect on the work of separate contractors.
5. Documentation supporting any change in Contract Sum or Contract Time, as appropriate.

1.04 FIELD DIRECTIVE

A. In lieu of a Change Order, the Project Manager may issue a Field directive for the Contractor to proceed with additional work within the original intent of the Project.

B. Field directive will describe changes in the work, with attachments of backup information to define details of the change.

C. Contractor must sign and date the Field directive to indicate agreement with the terms therein.

1.05 DOCUMENTATION OF PROPOSALS AND CLAIMS

A. Support each quotation for a lump sum proposal and for each unit price; which has not previously been established, with sufficient substantiating data to allow the Engineer/Owner to evaluate the quotation.

B. On request, provide additional data to support time and cost computations:
1. Labor required.
2. Equipment required.
3. Products required.
    a. Recommended source of purchase and unit cost.
    b. Quantities required.
4. Taxes, insurance and bonds.
5. Credit for work deleted from Contract, similarly documented.
6. Overhead and profit.
7. Justification for any change in Contract Time.

C. Support each claim for additional costs and for work done on a time-and-material/force account basis, with documentation as required for a lump-sum proposal plus additional information.

1. Name of the Owner's authorized agent who ordered the work and date of the order.
2. Date and time work was performed and by whom.
3. Time record, summary of hours work and hourly rates paid.
4. Receipts and invoices for:
a. Equipment used, listing dates and time of use.
b. Products used, listing of quantities.
c. Subcontracts.

1.06 PREPARATION OF CHANGE ORDERS

A. Project Manager will prepare each Change Order.

B. Change Order will describe changes in the Work, both additions and deletions, with attachments as necessary to define details of the change.

C. Change Order will provide an accounting of the adjustment in the Contract Sum and in the Contract Time.

1.07 LUMP SUM/FIXED PRICE CHANGE ORDER

A. Project Manager initiates the form, including a description of the changes involved and attachments based upon documents and proposals submitted by the Contractor,or requests from the Owner, or both.

B. Once the form has been completed, a ll copies should be sent to Contractor for approval. After approval by Contractor, all copies should be sent to Owner for approval. The Owner will distribute executed copies after approval by the Board of County Commissioners.

1.08 UNIT PRICE CHANGE ORDER

A. Contents of Change Orders will be based on, either:
1. Owner's definition of the scope of the required changes.
2. Contractor's Proposal for a change, as approved by the Owner.
3. Survey of completed work.

B. The amounts of the unit prices to be:
1. Those stated in the Agreement.
2. Those mutually agreed upon between Owner and Contractor.

1.09 TIME AND MATERIAL/FORCE ACCOUNT CHANGE ORDER/CONSTRUCTION CHANGE AUTHORIZATION

A. At completion of the change, Contractor shall submit itemized accounting and supporting data as provided in the Article "Documentation of Proposals and Claims" of this Section.

B. Architect/Engineer will determine the allowable cost of such work, as provided in General Conditions and Supplementary Conditions.

C.Architect/ Engineer will sign and date the Change Order to establish the change in Contract Sum and in Contract Time.

D. Owner and Contractor will sign and date the Change Order to indicate their agreement therewith.

1.10 CORRELATION WITH CONTRACTOR'S SUBMITTALS

A. Periodically revise Schedule of Values and Application for Payment forms to record each change as a separate item of work, and to record the adjusted Contract Sum.

B. Periodically revise the Construction Schedule to reflect each change in Contract Time. Revise sub schedules to show changes for other items of work affected by the changes.

C. Upon completion of work under a Change Order, enter pertinent changes in Record Documents.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01290 – PAYMENT PROCEDURES -012000

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Sections include the following:
   1. Division 1 Section "Change Order Procedures" for administrative procedures for handling changes to the Contract.
   2. Division 1 Section "Construction Progress Documentation" for administrative requirements governing preparation and submittal of Contractor's Construction Schedule and Submittals Schedule.

1.3 DEFINITIONS

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

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.

   1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:

      a. Application for Payment forms with Continuation Sheets.
      b. Submittals Schedule.

   2. Submit the Schedule of Values to Engineer and Project Manager at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.

B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the Schedule of Values:

   a. Project name and location.
   b. Name of Architect/ Engineer.
   c. Engineer's or Architect's project number.
   d. Contractor's name and address.
   e. Date of submittal.

2. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:

   a. Related Specification Section or Division.
   b. Description of the Work.
   c. Name of subcontractor.
   d. Name of manufacturer or fabricator.
   e. Name of supplier.
   f. Change Orders (numbers) that affect value.
   g. Dollar value.

      1) Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate.
4. Round amounts to nearest whole dollar, total shall equal the Contract Sum.
5. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

   a. Differentiate between items stored on-site and items stored off-site. Include evidence of insurance or bonded warehousing if required.

6. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
7. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

   a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.

8. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.

1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.

C. Payment Application Forms: Use AIA Document G702 and AIA Document G703 Continuation Sheets as form for Applications for Payment.

D. Transmittal: Submit 3 signed and notarized original copies of each Application for Payment to Architect/Engineer and Project Manager by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

E. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from every entity who is lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.

1. Submit partial waivers on each item for amount requested, before deduction for retainage, on each item.
2. When an application shows completion of an item, submit final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Waiver Delays: Submit each Application for Payment with Contractor's waiver of mechanic's lien for construction period covered by the application.

   a. Submit final Application for Payment with or preceded by final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.

5. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.

F. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.

2. Schedule of Values.
3. Contractor's Construction Schedule (preliminary if not final).
4. Products list.
5. Schedule of unit prices.
6. Submittals Schedule (preliminary if not final).
7. List of Contractor's staff assignments.
8. List of Contractor's principal consultants.
9. Copies of building permits.
10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
11. Initial progress report.
12. Report of preconstruction conference.
13. Certificates of insurance and insurance policies.
14. Performance and payment bonds.
15. Data needed to acquire Owner's insurance.

G. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

H. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
6. AIA Document G707, "Consent of Surety to Final Payment."
7. Evidence that claims have been settled.
8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.

I. Separate Pricing and Lump Sum Payments
Separate pricing and lump sum payments shall follow the following payment schedule below and meet the required specifications, meet the requirements of the Engineer’s plans, and must be accepted by the Owner’s Representative and the Engineer.

SCOPE:
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. All contract prices included in the Bid Form section will be full compensation for all shop drawings, working

drawings, labor, materials, tools, equipment and incidentals necessary to complete the construction as shown on the Drawings and/or as specified in the Contract Documents to be performed under this Contract. 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 shown and/or specified to be performed under this Contract.

GENERAL
All contract lump sum prices included in the Bid Proposal section will be full compensation for all labor, equipment, and incidental to construct the Manatee County Waste Water Treatment Laboratory at 66th Street as specified in the Contract Documents under this contract.

WORK OUTSIDE AUTHORIZED LIMITS
No payment will be made for work constructed outside the authorized limits of work.

LUMP SUM PAYMENT
Where payment for items are shown to be paid for on a lump sum basis, no separate payment will be made for any item of work required to complete the lump sum items.

Lump sum contracts shall be complete, tested and fully operable prior to request for final payment. Contractor may be required to provide a break-down of the lump sum totals.

Payment shall be made for the items listed on the Bid Form on the basis of the work actually performed, completed, and accepted by the Engineer. Such work
includes but is not limited to the furnishing of all necessary labor, materials, equipment, transportation, clean up, restoration of disturbed areas, all other appurtenances to complete the construction and installation of the work as shown on the drawings, as described in the specifications, and as directed by the Architect/Engineer. Measurement and Payment for Lump Sum bid items will be based on a percentage of completion, as approved by the Owner and recommended by the Engineer, on a monthly basis for the Lump Sum bid items listed on the Bid Form of the Contract Documents. Partial payments will be based on the breakdown of the Bid Item in accordance with the Schedule of Values submitted by the Contractor and approved by the Engineer. Payment shall also include full compensation for project photographs, as-built record drawings, project signs, rubbish and spoil removal, repair, replacement or relocation of all signs, walls, and any and all other items required to complete the project in accordance with Contract Documents.

No separate payment will be made for the following items and the cost of such work shall be included in the applicable pay items of work. Final payments shall not be requested by the Contractor or made by the Owner until as-built (record) drawings have been submitted and approved by the Architect/Engineer.
1. Shop Drawings, Working Drawings.
2. Cleanup and miscellaneous work.
3. Testing and placing system in operation.
4. Any material and equipment required to be installed and utilized for the tests.
5. Pipe, structures, pavement replacement, asphalt and shell driveways and/or appurtenances included within the limits of lump sum work, unless otherwise shown.
6. Maintaining the existing quality of service during construction.
7. Appurtenant work as required for a complete and operable system.
8. As-built Record Drawings.

J. Bid Items:

Item 1 – Mobilization

Measurement and payment for the Mobilization Bid Item shall include full compensation for the required 100 percent (100%) Performance Bond, 100 Percent (100%) Payment Bond, all required insurance for the project, and any permits not already obtained by the County. This may include those operations necessary for the movement of personnel, equipment, supplies, and incidentals to the project site and for the establishment of temporary offices, safety equipment and first aid supplies, and sanitary and other facilities/utilities. The mobilization pay item also includes demobilization of all equipment, personnel, supplies and incidentals from the project site upon final completion. Payment for mobilization shall not exceed 10 percent (10%) of the total Contract cost unless the Contractor can prove to the County that his actual mobilization cost exceeds 10 percent (10%). The basis of payment for all work associated with Mobilization shall be paid for under the Lump Sum Pay Item and in accordance with the following schedule:

Percent of Total Contract Amount Earned	Allowable Percent of the Lump Sum Price for Mobilization
5	25
10	50
25	75
100	100

Item 2 – Provision and Installation of Generator Switch

Measurement and payment for this Bid Item shall include full compensation for all required work included to complete this portion of this project, the provision and installation of the generator switch which could be broken down into an MTS with breakers and docking station with all required wiring and conduits. This system could be a simple “trystar” double throw docking station – the transfer switch and docking station are built into one system. 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. All work covered for Item is included in Sheets E1.0-A, E2.0-A, E5.0-A, and E6.0-A. Before final payment is completed the Switch shall be inspected and accepted by the Engineer and the County.

Item 3 – Provision and Installation of Mechanical and Electrical Equipment for the Emergency Chiller Connections

Measurement and payment for this Bid Item shall include full compensation for all required work included to complete this portion of this project, the provision and installation of the valves, piping, and all wiring, conduits, and disconnects. 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. All work covered for Item is included in Sheets E1.0-A, E2.0-A, E5.0-A, E6.0-A, M1.0-A, M2.0-A, M3.0-A, M4.0-A. Before final payment is completed the connections shall be inspected and accepted by the Engineer and the County.

Item 4 – Provision and Installation of the IT Room Air Conditioner

Measurement and payment for this Bid Item shall include full compensation for all required work included to complete this portion of this project, the provision and installation of the IT Room fan coil units, piping, thermostats, electrical (wiring, disconnects, junction boxes, and conduit), condenser units, and pads. 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. All work covered for Item is included in Sheets E1.0-A, E2.0-A, E5.0-A, E6.0-A, M1.0-A, M2.0-A, M3.0-A, M4.0-A. Before final payment is completed the Air Conditioner shall be inspected and accepted by the Engineer and the County.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01290

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SECTION 01310 - PROJECT MANAGEMENT AND COORDINATION -013100

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. General project coordination procedures.
2. Coordination Drawings.
3. Administrative and supervisory personnel.
4. Project meetings.

B. Related Sections: The following Sections contain requirements that relate to this Section:
1. Division 1 Section "Construction Progress Documentation" for preparing and submitting the Contractor's Construction Schedule.
2. Division 1 Section "Execution Requirements" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
3. Division 1 Section "Closeout Procedures" for coordinating Contract closeout.

1.3 COORDINATION

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

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. If necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's Construction Schedule.
2. Preparation of the Schedule of Values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.

D, County Project Manager : The County Project Manager(denoted in all specifications as Project Manager) shall review all items on schedule and perform the interface activities with the end users, Scheduled outages, equipment replacements, construction demolition in public access areas, and review all contract items for final approval.

1.4 SUBMITTALS

A. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.

1. Indicate relationship of components shown on separate Shop Drawings.
2. Indicate required installation sequences.
3. Refer to Division 15 Section "Basic Mechanical Materials and Methods" and Division 16 Section "Basic Electrical Materials and Methods" for specific Coordination Drawing requirements for mechanical and electrical installations.

B. Staff Names: Within 15 days of starting construction operations, submit a list of principal staff 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 and office telephone numbers. 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 by each temporary telephone.

1.5 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

A. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.

1. Include special personnel required for coordination of operations with other contractors.

1.6 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner, Project Manager, and Engineer of scheduled meeting dates and times.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Engineer, within 3 days of the meeting.

B. Preconstruction Conference: Schedule a preconstruction conference before starting construction, at a time convenient to Owner and Engineer, but no later than 15 days after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.

1. Attendees: Authorized representatives of Owner, County Project Manager, Engineer, and their consultants; Contractor and its superintendent; major subcontractors; manufacturers; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Discuss items of significance that could affect progress, including the following:

    a. Tentative construction schedule.
    b. Phasing.
    c. Critical work sequencing.
    d. Designation of responsible personnel.
    e. Procedures for processing field decisions and Change Orders.
    f. Procedures for processing Applications for Payment.
    g. Distribution of the Contract Documents.
    h. Submittal procedures.
    i. Preparation of Record Documents.
    j. Use of the premises.
    k. Responsibility for temporary facilities and controls.
    l. Parking availability.
    m. Office, work, and storage areas.
    n. Equipment deliveries and priorities.
    o. First aid.
    p. Security.
    q. Progress cleaning.
    r. Working hours.

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 of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

    a. Contract Documents.
    b. Options.
    c. Related Change Orders.
    d. Purchases.
    e. Deliveries.
    f. Submittals.
    g. Review of mockups.
    h. Possible conflicts.
    i. Compatibility problems.
    j. Time schedules.
    k. Weather limitations.
    l. Manufacturer's written recommendations.
    m. Warranty requirements.
    n. Compatibility of materials.
    o. Acceptability of substrates.
    p. Temporary facilities and controls.
    q. Space and access limitations.
    r. Regulations of authorities having jurisdiction.
    s. Testing and inspecting requirements.
    t. Required performance results.
    u. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements.
4. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Progress Meetings: Conduct progress meetings at regular intervals. Coordinate dates of meetings with preparation of payment requests.

1. Attendees: In addition to representatives of Owner, County Project Manager, 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 conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. 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.

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) Status of recycling and waste disposal.
5) Deliveries.
6) Off-site fabrication.
7) Access.
8) Site utilization.
9) Temporary facilities and controls.
10) Work hours.
11) Hazards and risks.
12) Progress cleaning.
13) Quality and work standards.
14) Change Orders.
15) Documentation of information for payment requests.

3. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.

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.

4. Coordination Meetings: Conduct 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.

a. Safety meetings : The contractor shall provide to the Owner’s representative/ County Project Manager a copy of in-house written safety policies. Copies of weekly safety meetings shall be retained on site for periodic review.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01310

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SECTION 01330 - SUBMITTAL PROCEDURES -013300

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other miscellaneous submittals.

B. Related Sections include the following:

1. Division 1 Section "Payment Procedures" for submitting Applications for Payment.
2. Division 1 Section "Project Management and Coordination" for submitting Coordination Drawings.
3. Division 1 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's Construction Schedule and the Submittals Schedule.
4. Division 1 Section "Quality Requirements" for submitting test and inspection reports and Delegated-Design Submittals.
5. Division 1 Section "Closeout Procedures" for submitting warranties Project Record Documents and operation and maintenance manuals.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information that requires Engineer's responsive action.

B. Informational Submittals: Written information that does not require Engineer's approval. Submittals may be rejected for not complying with requirements.

1.4 SUBMITTAL PROCEDURES

A. 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. 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.

B. Submittals Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities.

C. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal.

1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. Engineer will advise Contractor when a submittal being processed must be delayed for coordination.
2. Concurrent Review: Where concurrent review of submittals by Engineer's consultants, Owner, or other parties is required, allow 21 days for initial review of each submittal.

3. If intermediate submittal is necessary, process it in same manner as initial submittal.
4. Allow 15 days for processing each resubmittal.
5. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.

D. Identification: Place a permanent label or title block on each submittal for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 4 by 5 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 on label for processing and recording action taken:

    a. Project name.
    b. Date.
    c. Name and address of Archtiect/ Engineer.
    d. Name and address of Contractor.
    e. Name and address of subcontractor.
    f. Name and address of supplier.
    g. Name of manufacturer.
    h. Unique identifier, including revision number.
    i. Number and title of appropriate Specification Section.
    j. Drawing number and detail references, as appropriate.
    k. Other necessary identification.

E. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals.

F. Additional Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions of the Contract Documents, initial submittal may serve as final submittal.
   1. Additional copies submitted for maintenance manuals will not be marked with action taken and will be returned.

G. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Engineer/ Architect will discard submittals received from sources other than Contractor.

   1. 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 of the Contract Documents, including minor variations and limitations. Include the same label information as the related submittal.
   2. Include Contractor's certification stating that information submitted complies with requirements of the Contract Documents.
   3. Transmittal Form: Use AIA Document G810.
   4. 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. Submittal and transmittal distribution record.
      i. Remarks.
      j. Signature of transmitter.

H. 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.

I. Use for Construction: Use only final submittals with mark indicating action taken by Architect/Engineer in connection with construction.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment. Please note substitutions or comparable products are reviewed in accordance with Div 1 criteria and may be rejected.

1. If information must be specially prepared for submittal because standard printed 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 written recommendations.
    b. Manufacturer's product specifications.
    c. Manufacturer's installation instructions.
    d. Standard color charts.
    e. Manufacturer's catalog cuts.
    f. Wiring diagrams showing factory-installed wiring.
    g. Printed performance curves.
    h. Operational range diagrams..
    i. Standard product operating and maintenance manuals.
    j. Compliance with recognized trade association standards.
    k. Compliance with recognized testing agency standards.
    l. Application of testing agency labels and seals.
    m. Notation of coordination requirements.
    n. Compliance with environmental requirements or standards.
    o. Compliance with sustainable construction practices requirements or standards.
    p. Compliance with VOC requirements.

4. Number of Copies: Submit copies of each submittal, as follows:

    a. Submittal: Submit the number of copies the contractor requires plus one copy which will be retained by the Engineer; plus two additional copies where required for maintenance manuals. Engineer will return the submittals marked with action taken and corrections and modifications required.

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: Include the following information, as applicable:

    a. Dimensions.
    b. Identification of products.
    c. Fabrication and installation drawings.
    d. Roughing-in and setting diagrams.
    e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
    f. Shopwork manufacturing instructions.
    g. Templates and patterns.
    h. Schedules.
    i. Design calculations.
    j. Compliance with specified standards.
    k. Notation of coordination requirements.
    l. Notation of dimensions established by field measurement.

2. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
3. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 36 by 24 inches . Emailed adobe PDF's are not allowed.
4. Number of Copies: Submit copies of each submittal, as follows:

    a. Initial Submittal: Submit one correctable, translucent, reproducible print and one blue- or black-line print. Architect will return the reproducible print.
    b. Final Submittal: Submit one correctable, translucent, reproducible print and three blue- or black-line prints, unless prints are required for operation and maintenance manuals. Submit five prints where prints are required for operation and maintenance manuals. Architect will retain two prints; remainder will be returned. Mark up and retain one returned print as a Project Record Drawing.

D. Coordination Drawings: Comply with requirements in Division 1 Section "Project Management and Coordination."

E. Samples: Prepare physical units of materials or products, including the following:

1. Comply with requirements in Division 1 Section "Quality Requirements" for mockups.
2. 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.
3. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from the same material to be used for the Work, cured and finished in manner specified, and physically identical with the 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.
4. Preparation: Mount, display, or package Samples in manner specified to facilitate review of qualities indicated. Prepare Samples to match Architect's sample where so indicated. Attach label on unexposed side that includes the following:

    a. Generic description of Sample.
    b. Product name or name of manufacturer.
    c. Sample source.

5. Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, provide the following:

    a. Size limitations.
    b. Compliance with recognized standards.
    c. Availability.
    d. Delivery time.

6. Submit Samples for review of kind, color, pattern, and texture for a final check of these characteristics with other elements and for a comparison of these characteristics between final submittal and actual component as delivered and installed.

    a. If variation in color, pattern, texture, or other characteristic is inherent in the product represented by a Sample, submit at least three sets of paired units that show approximate limits of the variations.
    b. Refer to individual Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.

7. Number of Samples for Initial Selection: Submit one full set of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
8. Number of Samples for Verification: Submit three sets of Samples. Architect will retain one Sample set; remainder will be returned. Mark up and retain one returned Sample set as a Project Record Sample.

    a. Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.

9. 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.

F. Product Schedule or List: 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.
    2. Number and name of room or space.
    3. Location within room or space.

G. Delegated-Design Submittal: Comply with requirements in Division 1 Section "Quality Requirements."

H. Contractor's Construction Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation" for Project Manager’s action.

I. Submittals Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation."

J. Application for Payment: Comply with requirements in Division 1 Section "Payment Procedures."

K. Schedule of Values: Comply with requirements in Division 1 Section "Payment Procedures."

L. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.

2.2 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by other Specification Sections.

1. Number of Copies: Submit two copies of each submittal, unless otherwise indicated. Engineer will not return copies.
2. Certificates and Certifications: Provide a notarized statement that includes signature of Contractor, testing agency, or design professional responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of the company.
3. Test and Inspection Reports: Comply with requirements in Division 1 Section "Quality Requirements."

B. Contractor's Construction Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation."

C. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

D. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements.

E. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.

F. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements and, where required, is authorized for this specific Project.

G. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements. Include evidence of manufacturing experience where required.

H. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements.

I. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.

J. Preconstruction Test Reports: Prepare 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.

K. Compatibility Test Reports: Prepare 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.

L. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, 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.

M. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements. 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.

N. Research/Evaluation Reports: Prepare 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.

O. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements in Division 1 Section "Closeout Procedures."

P. Design Data: Prepare 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.

Q. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:

1. Preparation of substrates.
2. Required substrate tolerances.
3. Sequence of installation or erection.
4. Required installation tolerances.
5. Required adjustments.
6. Recommendations for cleaning and protection.

R. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

S. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

T. Construction Photographs: Comply with requirements in Division 1 Section "Construction Photographs."

U. Material Safety Data Sheets: Submit information directly to Contracting Officer. If submitted to Project Manager, Engineer will not review this information but will return it with no action taken. Comply with requirements in Division 1 Section "Safety Requirements."

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Review each submittal and check for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Engineer.

B. 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. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:

1. Submittals will be marked “Approved,” “Approved as Noted,” “Revise as Noted and Resubmit,” “Rejected/Resubmit as Specified,” “No Action Required,” “Reviewed.” Those marked “Revise as Noted and Resubmit” or “Rejected/Resubmit as Specified” and returned for correction shall be corrected and resubmitted. Upon receiving submittal marked “Approved” or “Approved as Noted” from the Architect/Engineer, the Contractor shall have sufficient sets of prints made from them for distribution.

   a. Do not use, or allow others to use, submittals marked “Revise as Noted and Resubmit” or “Rejected/Resubmit as Specified” at the Project Site or elsewhere where work is in progress..

C. Informational Submittals: Architect / Engineer will review each submittal and will not return it, or will reject and return it if it does not comply with requirements. Architect/ Engineer will forward each submittal to appropriate party.

D. Submittals not required by the Contract Documents will not be reviewed and may be discarded.

END OF SECTION 01330

SECTION 01400 - QUALITY REQUIREMENTS -014000

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for quality assurance and quality control.

B. Owner will hire and pay for independent laboratory services.

C. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's quality-control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-control services required by the Architect, Engineer, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

D. Related Sections include the following:
1. Division 1 Section "Construction Progress Documentation" for developing a schedule of required tests and inspections.
2. Division 1 Section "Cutting and Patching" for repair and restoration of construction disturbed by testing and inspecting activities.
3. Divisions 2 through 16 Sections for specific test and inspection requirements.

1.3 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and ensure that proposed construction complies with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that completed construction complies with

requirements. Services do not include contract enforcement activities performed by Architect.

C. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

1.4 DELEGATED DESIGN

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Engineer..

1.5 SUBMITTALS

A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

C. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1. Specification Section number and title.
2. Description of test and inspection.
3. Identification of applicable standards.
4. Identification of test and inspection methods.
5. Number of tests and inspections required.
6. Time schedule or time span for tests and inspections.
7. Entity responsible for performing tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

D. Reports: Prepare and submit certified written reports that include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.

6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Ambient conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

E. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

B. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

C. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

D. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.

F. Testing Agency Qualifications: An agency with the experience and capability to conduct testing and inspecting indicated, as documented by ASTM E 548, and that specializes in types of tests and inspections to be performed.

1.7 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of the types of testing and inspecting they are engaged to perform.
2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.

B. Contractor Responsibilities: Unless otherwise indicated, provide quality-control services specified and required by authorities having jurisdiction.

1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

   a. Contractor shall not employ the same entity engaged by Owner, unless agreed to in writing by Owner.

2. Notify testing agencies at least [24] <Insert number> hours in advance of time when Work that requires testing or inspecting will be performed.
3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing.

D. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that revised or replaced Work that failed to comply with requirements established by the Contract Documents.

E. Testing Agency Responsibilities: Cooperate with Project Manager, Engineer, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Project Manager, Engineer, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
3. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
4. Do not release, revoke, alter, or increase requirements of the Contract Documents or approve or accept any portion of the Work.
5. Do not perform any duties of Contractor.

F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field-curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Sections of these Specifications. Restore patched areas and extend restoration into adjoining areas in a manner that eliminates evidence of patching.
2. Comply with the Contract Document requirements for Division 1 Section "Cutting and Patching."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01400

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SECTION 01420 – REFERENCES -014200

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": The term "approved," when used in conjunction with Engineer's action on Contractor's submittals, applications, and requests, is limited to Engineer’s duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean directed by Engineer, requested by Engineer, and similar phrases.

D. "Indicated": The term "indicated" refers to graphic representations, notes, or schedules on Drawings; or to other paragraphs or schedules in Specifications and similar requirements in the Contract Documents. Terms such as "shown," "noted," "scheduled," and "specified" are used to help the user locate the reference.

E. "Regulations": The term "regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": The term "furnish" means to supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": The term "install" describes operations at Project site including unloading, temporary storage, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide": The term "provide" means to furnish and install, complete and ready for the intended use.

I. "Installer": An installer is Contractor or another entity engaged by Contractor, as an employee, subcontractor, or contractor of lower tier, to perform a particular construction operation, including installation, erection, application, and similar operations.

J. The term "experienced," when used with the term "installer," means having successfully completed a minimum of five previous projects similar in size and scope to

this Project; being familiar with the special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.

K. "Project site" is the space available for performing construction activities, either exclusively or in conjunction with others performing other work as part of Project. The extent of Project site is shown on the Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of the date of the Contract Documents, unless otherwise indicated.

C. Conflicting Requirements: Where compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.

1. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements. Refer uncertainties to Architect for a decision before proceeding.

D. Copies of Standards: Each entity engaged in construction on Project must be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from the publication source and make them available on request.

E. Abbreviations and Names: Abbreviations and acronyms are frequently used in the Specifications and other Contract Documents to represent the name of a trade association, standards-developing organization, authorities having jurisdiction, or other entity in the context of referencing a standard or publication. Where abbreviations and

acronyms are used in the Specifications or other Contract Documents, they mean the recognized name of these entities. Refer to Gale Research's "Encyclopedia of Associations" or Columbia Books' "National Trade & Professional Associations of the U.S.," which are available in most libraries.

Reference publications are cited in other sections of the specifications along with identification of their sponsoring organizations. The addresses of the sponsoring organizations are listed below, and if the source of the publications is different from the address of the sponsoring organization, that information is also provided.

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Fax: 248-848-3701
Internet: http://www.aci-int.org

AIR CONDITIONING AND REFRIGERATION INSTITUTE (ARI)
4301 North Fairfax Dr., Suite 425
ATTN: Pubs Dept.
Arlington, VA 22203
Ph: 703-524-8800
Fax: 703-528-3816
E-mail: ari@dgsys.com
Internet: http://www.ari.org

AIR CONDITIONING CONTRACTORS OF AMERICA (ACCA)
1712 New Hampshire Avenue, NW
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FAX: 202-232-8545

AIR DIFFUSION COUNCIL (ADC)
104 So. Michigan Ave., No. 1500
Chicago, IL 60603
Ph: 312-201-0101
Fax: 312-201-0214

AIR MOVEMENT AND CONTROL ASSOCIATION INTERNATIONAL (AMCA)
30 W. University Dr.
Arlington Heights, IL 60004-1893
Ph: 847-394-0150
Fax: 847-253-0088

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Washington, DC 20006
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Fax: 202-862-5164
Internet: http://www.aluminum.org

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Fax: 847-303-5774
Internet: http://www.aamanet.org

(AASHTO)
AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
444 N. Capital St., NW, Suite 249
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Ph: 800-231-3475 or 202-624-5800
Fax: 800-525-5562 or 202-624-5806
Internet: http://www.aashto.org

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222 West Las Colinas Blvd., Suite 641
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Ph: 972-506-7616
Fax: 972-506-7682
Internet: http://www.concrete-pipe.org
e-mail: info@concrete-pipe.org

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Internet: http://www.api.org

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Landover, MD 20785
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Fax: 301-459-8077

AMERICAN SOCIETY FOR NONDESTRUCTIVE TESTING (ASNT)
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Internet: http://www.ashrae.org

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Ph: 440-835-3040
Fax: 440-835-3488
E-mail: asse@ix.netcom.com

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Internet: http://www.amweld.org

AMERICAN WOOD-PRESERVERS' ASSOCIATION (AWPA)
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Fax: 817-326-6306

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Internet: http://www.aami.org

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Internet: http://www.aeic.org
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West Conshohocken, PA 19428-2959
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Arlington, VA 22202-4102
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CONSUMER PRODUCT SAFETY COMMISSION (CPSC)
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Cleveland, Ohio 44131-5575
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Fax: 216-642-3463

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1300 Sumner Avenue
Cleveland, OH 44115-2851
Ph: 216-241-7333
Fax: 216-241-0105
Internet: http://www.dasma.com
e-mail: dasma@taol.com

DOOR AND HARDWARE INSTITUTE (DHI)
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Chantily, VA 20151-2232
Ph: 703-222-2010
Fax: 703-222-2410
Internet: http://www.dhi.org
E-mail: techdept@dhi.org

DUCTILE IRON PIPE RESEARCH ASSOCIATION (DIPRA)
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Birmingham, AL 35244-1856
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Fax: 205-402-8730
Internet: http://www.dipra.org

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2500 Wilson Blvd.
Arlington, VA 22201-3834

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01420

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SECTION 01500 - TEMPORARY FACILITIES AND CONTROLS -015000

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes requirements for temporary facilities and controls, including temporary utilities, support facilities, and security and protection facilities. Coordinate all temporary, security, and support facilities and use with Project Manager prior to start of any work.

B. Temporary utilities include, but are not limited to, the following:

1. Sewers and drainage.
2. Water service and distribution.
3. Sanitary facilities.
4. Heating and cooling facilities.
5. Ventilation.
6. Electric power service.
7. Lighting.
8. Telephone service.

C. Support facilities include, but are not limited to, the following:

1. Dewatering facilities and drains.
2. Project identification and temporary signs.
3. Waste disposal facilities.
4. Field offices.
5. Storage and fabrication sheds.
6. Lifts and hoists.
7. Temporary stairs.
8. Construction aids and miscellaneous services and facilities.
9. Cranes, scaffolding, and support structures.

D. Security and protection facilities include, but are not limited to, the following:

1. Environmental protection.
2. Stormwater control.
3. Pest control.
4. Site enclosure fence.
5. Security enclosure and lockup.
6. Barricades, warning signs, and lights.

7. Temporary enclosures.
8. Fire protection.

E. Related Sections include the following:
1. Division 1 Section "Submittal Procedures" for procedures for submitting copies of implementation and termination schedule and utility reports.
2. Division 1 Section "Execution Requirements" for progress cleaning requirements.
3. Divisions 2 through 16 for temporary heat, ventilation, and humidity requirements for products in those Sections.

1.3 USE CHARGES

A. Water Service: Use water from Owner's existing water system without metering and without payment of use charges.

B. Electric Power Service: Use electric power from Owner's existing system without metering and without payment of use charges.

1.4 QUALITY ASSURANCE

A. Standards: Comply with ANSI A10.6, NECA's "Temporary Electrical Facilities," and NFPA 241.

1. Trade Jurisdictions: Assigned responsibilities for installation and operation of temporary utilities are not intended to interfere with trade regulations and union jurisdictions.
2. 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.

1.5 PROJECT CONDITIONS

A. Conditions of Use: The following conditions apply to use of temporary services and facilities by all parties engaged in the Work:

1. Keep temporary services and facilities clean and neat.
2. Relocate temporary services and facilities as required by progress of the Work.
3. Coordinate use of the facilities with the Project Manager prior to the start of the project work.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide new materials. Undamaged, previously used materials in serviceable condition may be used if approved by Architect. Provide materials suitable for use intended.

B. Portable Chain-Link Fencing: Minimum 2-inch (50-mm) 9-gage, galvanized steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top and bottom rails. Provide [concrete] [galvanized steel] bases for supporting posts.

C. Paint: Comply with requirements in Division 9 Section "Painting."

D. Tarpaulins: Fire-resistive labeled with flame-spread rating of 15 or less.

E. Water: Potable.

2.2 EQUIPMENT

A. General: Provide equipment suitable for use intended.

B. Field Offices: Prefabricated with lockable entrances, operable windows, and serviceable finishes; heated and air conditioned; on foundations adequate for normal loading.

C. Fire Extinguishers: Hand carried, portable, UL rated. Provide class and extinguishing agent as indicated or a combination of extinguishers of NFPA-recommended classes for exposures.

1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

D. Self-Contained Toilet Units: Single-occupant units of chemical, aerated recirculation, or combustion type; vented; fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.

E. Heating Equipment: Unless Owner authorizes use of permanent heating system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating Units: Listed and labeled, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use for type of fuel being consumed.

F. Electrical Outlets: Properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-V plugs into higher-voltage outlets; equipped with ground-fault circuit interrupters, reset button, and pilot light.

G. Power Distribution System Circuits: Where permitted and overhead and exposed for surveillance, wiring circuits, not exceeding 125-V ac, 20-A rating, and lighting circuits may be nonmetallic sheathed cable.

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.

B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. 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. Sewers and Drainage:

1. Filter out excessive soil, construction debris, chemicals, oils, and similar contaminants that might clog sewers or pollute waterways before discharge.
2. Provide temporary filter beds, settlement tanks, separators, and similar devices to purify effluent to levels acceptable to authorities having jurisdiction.

B. Water Service: Use of Owner's existing water service 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.

1. Provide rubber hoses as necessary to serve Project site.

C. Sanitary Facilities: Provide temporary toilets. Comply with regulations and health codes for type, number, location, operation, and maintenance of fixtures and facilities.

1. Disposable Supplies: Provide toilet tissue and similar disposable materials for each facility. Maintain adequate supply. Provide covered waste containers for disposal of used material.
2. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy.

D. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment from that specified that will not have a harmful effect on completed installations or elements being installed.

E. 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 from that specified 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.

F. Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include transformers, overload-protected disconnecting means, automatic ground-fault interrupters, and main distribution switchgear.

G. Electric Power Service: Use of Owner's existing electric power service will be permitted, as long as equipment is maintained in a condition acceptable to Owner.

H. Electric Distribution: Provide receptacle outlets adequate for connection of power tools and equipment.

1. Provide waterproof connectors to connect separate lengths of electrical power cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.
2. Provide warning signs at power outlets other than 110 to 120 V.

I. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

J. Telephone Service: Provide temporary telephone service throughout construction period for common-use facilities used by all personnel engaged in construction activities. Install separate telephone line for each field office and first-aid station.

1. Provide additional telephone lines for the following:

a. In field office with more than two occupants, install a telephone for each additional occupant or pair of occupants.
b. Provide a dedicated telephone line for each facsimile machine and computer with modem in each field office.
c. In Architect’s field office provide a dedicated telephone line for telephone, facsimile machine and computer with modem.

2. At each telephone, post a list of important telephone numbers.

a. Police and fire departments.
b. Ambulance service.
c. Contractor's home office.
d. Architect's office.
e. Engineers' offices.
f. Owner's office.
g. Principal subcontractors' field and home offices.

3. Provide an answering machine or voice-mail service on superintendent's telephone.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Locate field offices, storage sheds, sanitary facilities, and other temporary construction and support facilities for easy access.
2. Provide incombustible construction for offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines. Comply with NFPA 241.
3. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Dewatering Facilities and Drains: 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 property nor endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

C. Project Identification and Temporary Signs: Prepare Project identification and other signs in sizes indicated. Install signs where indicated to inform public and persons seeking entrance to Project. Do not permit installation of unauthorized signs.

1. Engage an experienced sign painter to apply graphics for Project identification signs. Comply with details indicated.
2. Prepare temporary signs to provide directional information to construction personnel and visitors.
3. Construct signs of exterior-type Grade B-B high-density concrete form overlay plywood in sizes and thicknesses indicated. Support on posts or framing of preservative-treated wood or steel.
4. Paint sign panel and applied graphics with exterior-grade alkyd gloss enamel over exterior primer.

D. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Containerize and clearly label hazardous, dangerous, or unsanitary waste materials separately from other waste. Comply with Division 1 Section "Execution Requirements" for progress cleaning requirements.

1. If required by authorities having jurisdiction, provide separate containers, clearly labeled, for each type of waste material to be deposited.

E. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment involved, including temporary utility services. Sheds may be open shelters or fully enclosed spaces within building or elsewhere on-site.

1. Construct framing, sheathing, and siding using fire-retardant-treated lumber and plywood.

2. Paint exposed lumber and plywood with exterior-grade acrylic-latex emulsion over exterior primer.

F. Lifts and Hoists: Provide facilities for hoisting materials and personnel. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

G. Existing Stair Usage: Use of Owner's existing stairs will be permitted, as long as 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, despite such protection, stairs become damaged, restore damaged areas so no evidence remains of correction work.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects. Avoid using tools and equipment that produce harmful noise. Restrict use of noisemaking tools and equipment to hours that will minimize complaints from persons or firms near Project site.

1. Erosion Control: Provide synthetic thermoplastic fibers, woven or nonwoven, 4 oz/sq. yd., breaking load in either machine or cross-machine direction, having capability of passing ground water without transporting soil placed around the fabric. Place filter fabric fence around the site.

B. Stormwater Control: Provide earthen embankments and similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of stormwater from heavy rains.

C. Site Enclosure Fence: Before construction operations begin, install portable chain-link enclosure fence with lockable entrance gates. Locate where indicated, or enclose entire Project site or portion determined sufficient to accommodate construction operations. Install in a manner that will prevent people, dogs, and other animals from easily entering site except by entrance gates.

1. Provide gates in sizes and at locations necessary to accommodate delivery vehicles and other construction operations.

D. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erecting structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and public of possible hazard. Where appropriate and needed, provide lighting, including flashing red or amber lights.

1. For safety barriers, sidewalk bridges, and similar uses, provide minimum 5/8-inch- (16-mm-) thick exterior plywood.

E. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is not complete, provide insulated temporary enclosures. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
2. Vertical Openings: Close openings of 25 sq. ft. (2.3 sq. m) or less with plywood or similar materials.
3. Horizontal Openings: Close openings in floor or roof decks and horizontal surfaces with load-bearing, wood-framed construction.
4. Install tarpaulins securely using fire-retardant-treated wood framing and other materials.
5. Where temporary wood or plywood enclosure exceeds 100 sq. ft. (9.2 sq. m) in area, use fire-retardant-treated material for framing and main sheathing.

F. Temporary Fire Protection: Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.

1. Provide fire extinguishers, installed on walls on mounting brackets, visible and accessible from space being served, with sign mounted above.

   a. Field Offices: Class A stored-pressure water-type extinguishers.
   b. Other Locations: Class ABC dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for exposures.
   c. Locate fire extinguishers where convenient and effective for their intended purpose; provide not less than one extinguisher on each floor at or near each usable stairwell.

2. Store combustible materials in containers in fire-safe locations.
3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for firefighting. Prohibit smoking in hazardous fire-exposure areas.
4. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition.
5. Develop and supervise an overall fire-prevention and first-aid fire-protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

3.5 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. Protect from damage caused by freezing temperatures and similar elements.

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.
2. Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.

C. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are the property of Contractor. Owner reserves right to take possession of Project identification signs.
2. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements in Division 1 Section "Closeout Procedures."

END OF SECTION 01500

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SECTION 01600 - PRODUCT REQUIREMENTS -016000

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

B. Related Sections include the following:
   1. Division 1 Section "References" for applicable industry standards for products specified.
   2. Division 1 Section "Closeout Procedures" for submitting warranties for contract closeout.
   3. Divisions 2 through 16 Sections for specific requirements for warranties on products and installations specified to be warranted.

1.3 DEFINITIONS

A. Products: Items purchased 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, except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.
   3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, 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. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," 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 other named manufacturers.

D. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.

E. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

1.4 SUBMITTALS

A. Product List: Submit a list, in tabular from, showing specified products. Include generic names of products required. Include manufacturer's name and proprietary product names for each product.

1. Coordinate product list with Contractor's Construction Schedule and the Submittals Schedule.
2. Form: Tabulate information for each product under the following column headings:

    a. Specification Section number and title.
    b. Generic name used in the Contract Documents.
    c. Proprietary name, model number, and similar designations.
    d. Manufacturer's name and address.
    e. Supplier's name and address.
    f. Installer's name and address.
    g. Projected delivery date or time span of delivery period.
    h. Identification of items that require early submittal approval for scheduled delivery date.

3. Completed List: Within 30 days after date of commencement of the Work, submit 3 copies of completed product list. Include a written explanation for omissions of data and for variations from Contract requirements.
4. Engineer's Action: Engineer will respond in writing to Contractor within 15 days of receipt of completed product list. Engineer's response will include a list of unacceptable product selections and a brief explanation of reasons for this action. Engineer’s response, or lack of response, does not constitute a waiver of requirement that products comply with the Contract Documents.

B. 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 material or product cannot be provided.
   b. VOC content, recycled content and additional sustainable product requirements specified.
   c. 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.
   d. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
   e. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
   f. Samples, where applicable or requested.
   g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
   h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
   i. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
   j. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
   k. Cost information, including a proposal of change, if any, in the Contract Sum.
   l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
   m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
   n. If the substitution requires additional or changes in electrical, mechanical, structural, plumbing, fire protection, and or architectural elements, the contractor is responsible for all modifications at their cost.

3. Engineer's Action: If necessary, Engineer will request additional information or documentation for evaluation within one week of receipt of a request for substitution. Engineer will notify Contractor through Construction Manager of acceptance or rejection of proposed substitution within 15 days of receipt of

request, or 7 days of receipt of additional information or documentation, whichever is later.

a. Form of Acceptance: Change Order.
b. Use product specified if Architect cannot make a decision on use of a proposed substitution within time allocated.

C. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 1 Section "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

A. Provide products with energy efficient designs and with materials complying with environmental protection considerations.

B. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options. Comparable or equal products shall be evaluated as substitutions.

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. Comply with manufacturer's written instructions.

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 ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
5. Store products to allow for inspection and measurement of quantity or counting of units.
6. Store materials in a manner that will not endanger Project structure.
7. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
8. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
9. Protect stored products from damage.

B. Storage: Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents. The minimum length of warranty on the project is comprehensive 3 years – all parts, labor, and travel shall be included in the 3 year warranty.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: Forms are included with the Specifications. Prepare a written document using appropriate form properly executed.
3. Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Division 1 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT OPTIONS

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged, and unless otherwise indicated, that are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
7. Or Equal: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved," comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures: Procedures for product selection include the following:

1. Product: Where Specification paragraphs or subparagraphs titled "Product" name a single product and manufacturer, provide the product named.

    a. Substitutions may be considered, unless otherwise indicated.

2. Manufacturer/Source: Where Specification paragraphs or subparagraphs titled "Manufacturer" or "Source" name single manufacturers or sources, provide a product by the manufacturer or from the source named that complies with requirements.

    a. Substitutions may be considered, unless otherwise indicated.

3. Products: Where Specification paragraphs or subparagraphs titled "Products" introduce a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.

    a. Substitutions may be considered, unless otherwise indicated.

4. Manufacturers: Where Specification paragraphs or subparagraphs titled "Manufacturers" introduce a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.

    a. Substitutions may be considered, unless otherwise indicated.

5. Basis-of-Design Products: Where Specification paragraphs or subparagraphs titled "Basis-of-Design Products" are included and also introduce or refer to a list of manufacturers' names, provide either the specified 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 provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.

    a. Substitutions may be considered, unless otherwise indicated.

6. Visual Matching Specification: Where Specifications require matching an established Sample, select a product (and manufacturer) that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches satisfactorily.

    a. If no product available within specified category matches satisfactorily and complies with other specified requirements, comply with provisions of the Contract Documents on "substitutions" for selection of a matching product.

7. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product (and manufacturer) that complies with other specified requirements.

    a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from manufacturer's product line that does not include premium items.

b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from manufacturer's product line that includes both standard and premium items.

8. Allowances: Refer to individual Specification Sections and "Allowance" provisions in Division 1 for allowances that control product selection and for procedures required for processing such selections.

2.2 PRODUCT SUBSTITUTIONS

A. Timing: Engineer will consider requests for substitution if received within 30 days after commencement of the Work. Requests received after that time may be considered or rejected at discretion of Engineer.

B. 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:

1. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Engineer for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
2. Requested substitution does not require extensive revisions to the Contract Documents.
3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
4. Substitution request is fully documented and properly submitted.
5. Requested substitution will not adversely affect Contractor's Construction Schedule.
6. Requested substitution has received necessary approvals of authorities having jurisdiction.
7. Requested substitution is compatible with other portions of the Work.
8. Requested substitution has been coordinated with other portions of the Work.
9. Requested substitution provides specified warranty.
10. 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.

2.3 COMPARABLE PRODUCTS

A. Where products or manufacturers are specified by name, submit the following, in addition to other required submittals, to obtain approval of an unnamed product:

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

PART 3 - EXECUTION (Not Used)

END OF SECTION 01600

SECTION 01731 - CUTTING AND PATCHING -017329

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes procedural requirements for cutting and patching.

B. Related Sections include the following:
   1. Divisions 2 through 16 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

      a. Requirements in this Section apply to mechanical and electrical installations. Refer to Divisions 15 and 16 Sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.

1.3 DEFINITIONS

A. Cutting: Removal of existing 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 Existing 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. Utilities: List utilities that cutting and patching procedures will disturb or affect. List utilities that will be relocated and those that will be temporarily out of service. Indicate how long service 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. Architect'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.

C. Miscellaneous Elements: Do not cut and patch the following 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.

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 Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

1. If possible, retain original Installer or fabricator to cut and patch exposed Work listed below. If it is impossible to engage original Installer or fabricator, engage another recognized, experienced, and specialized firm.

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 of these Specifications.

B. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing 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 existing 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 existing 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 existing 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 Services: Where existing services are required to be removed, relocated, or abandoned, bypass such services before cutting to minimize interruption of services 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 existing 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 existing 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. Protect and preserve all existing utilities; Call 811 prior to digging.

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. Existing 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 of these Specifications.

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.
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 existing 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 existing 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.

END OF SECTION 01731

SECTION 01732 - SELECTIVE DEMOLITION - 024313

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Demolition and removal of selected portions of a building or structure.
2. Repair procedures for selective demolition operations.
3. Coordinate all work with the Project Manager prior to start of work. The facility is occupied at all times. Weekend and nite work may be required to establish areas of work due to noise and dirt generation in the spaces. Area isolation and temporary facilities shall be required to prevent migration of any dust or dirt moving into the computer room areas in operation. Traffic control may be required due to access to the site by Owner employees. .

B. Related Sections include the following:

1. Division 1 Section "Summary" for use of the premises and phasing requirements.
2. Division 1 Section "Temporary Facilities and Controls" for temporary construction and environmental-protection measures for selective demolition operations.
3. Division 1 Section "Cutting and Patching" for cutting and patching procedures for selective demolition operations.
4. Division 15 Sections for demolishing, cutting, patching, or relocating mechanical items.
5. Division 16 Sections for demolishing, cutting, patching, or relocating electrical items.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Detach items from existing construction and deliver them to Owner ready for reuse, if required.

C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, demolished materials shall become Contractor's property and shall be removed from Project site.

B. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered during selective demolition remain Owner's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Owner.

1. Coordinate with Owner's Project Manager, who will establish special procedures for removal and salvage.

1.5 SUBMITTALS

A. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

B. Proposed Dust-Control and Noise-Control Measures: Submit statement or drawing that indicates the measures proposed for use, proposed locations, and proposed time frame for their operation. Identify options if proposed measures are later determined to be inadequate.

C. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
2. Interruption of utility services.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Use of elevator and stairs.
5. Locations of temporary partitions and means of egress.
6. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

D. Inventory: After selective demolition is complete, submit a list of items that have been removed and salvaged.

E. Predemolition Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be

misconstrued as damage caused by selective demolition operations. Submit before Work begins.

1.6 QUALITY ASSURANCE

A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.

B. Professional Engineer Qualifications: Comply with Division 1 Section "Quality Requirements."

C. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

D. Standards: Comply with ANSI A10.6 and NFPA 241.

E. Predemolition Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

F. Predemolition Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to selective demolition including, but not limited to, the following:

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.
3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.

1.7 PROJECT CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.

B. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.

1. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from authorities having jurisdiction.

C. Owner assumes no responsibility for condition of areas to be selectively demolished.

1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. Hazardous materials will be removed by Owner before start of the Work.
2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Engineer and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. Storage or sale of removed items or materials on-site will not be permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

1.8 WARRANTY

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

1. If possible, retain original Installer or fabricator to patch the exposed Work listed below that is damaged during selective demolition. If it is impossible to engage original Installer or fabricator, engage another recognized experienced and specialized firm.

a. Processed concrete finishes.
b. Matched-veneer woodwork.
c. Preformed metal panels.
d. Roofing.
e. Firestopping.
f. Stucco and ornamental plaster.
g. Aggregate wall coating.
h. Wall covering.
i. HVAC enclosures, cabinets, or covers.
j. Drywall panels
k. Accoustical tile
l. Computer floor systems

PART 2 - PRODUCTS

2.1 REPAIR MATERIALS

A. Use repair materials identical to existing materials.

1. If identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
2. Use materials whose installed performance equals or surpasses that of existing materials.

B. Comply with material and installation requirements specified in individual Specification Sections.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

E. Engage a professional engineer to survey condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective demolition operations.

F. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY AND BUILDING SERVICES

A. Existing Utilities: Maintain services indicated to remain and protect them against damage during selective demolition operations.

B. Do not interrupt existing utilities and building services serving occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and to authorities having jurisdiction.

1. Provide at least 72 hours' notice to Owner if shutdown of service is required during changeover.

C. Utility and Building Services Requirements: Locate, identify, disconnect, and seal or cap off indicated utilities serving areas to be selectively demolished.

1. Owner will arrange to shut off indicated utilities/building service when requested by Contractor.
2. Arrange to shut off indicated utilities with utility companies and facility personnel.
3. If utility services are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary utilities that bypass area of selective demolition and that maintain continuity of service to other parts of building.
4. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.

D. Utility/ Building Service Requirements: Refer to Division 15 and 16 Sections for shutting off, disconnecting, removing, and sealing or capping utilities. Do not start selective demolition work until utility building service disconnecting and sealing have been completed and verified in writing.

3.3 PREPARATION

A. Dangerous Materials: Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations.

B. Pest Control: Employ a certified, licensed exterminator to treat building and to control rodents and vermin before and during selective demolition operations.

C. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
2. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
3. Protect existing site improvements, appurtenances, and landscaping to remain.
4. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.

D. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.

E. Temporary Enclosures: Provide temporary enclosures for protection of existing building and construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is not complete, provide insulated temporary enclosures. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.

F. Temporary Shoring: Provide and maintain shoring, bracing, or structural support to preserve stability and prevent movement, settlement, or collapse of construction to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

3.4 POLLUTION CONTROLS

A. Disposal: Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

1. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

B. Cleaning: Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

3.5 SELECTIVE DEMOLITION

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents

of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.

5. Maintain adequate ventilation when using cutting torches.
6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
9. Dispose of demolished items and materials promptly.
10. Return elements of construction and surfaces that are to remain to condition existing before selective demolition operations began.

B. Existing Facilities: Comply with County Project Manager's requirements for using and protecting elevators, stairs, walkways, loading docks, building entries, and other building facilities during selective demolition operations.

C. Removed and Salvaged Items: Comply with the following:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

D. Removed and Reinstalled Items: Comply with the following:

1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and reinstalled in their original locations after selective demolition operations are complete.

F. Concrete: Demolish in small sections. Cut concrete to a depth of at least 3/4 inch (19 mm) at junctures with construction to remain, using power-driven saw. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete indicated for selective demolition. Neatly trim openings to dimensions indicated.

G. Crush and re-use demolished concrete as clean fill, or provide to a recycler in accordance with Section 01350.

H. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.

I. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

J. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI-WP and its Addendum.

1. Remove residual adhesive and prepare substrate for new floor coverings by one of the methods recommended by RFCI.

K. Roofing: Remove no more existing roofing than can be covered in one day by new roofing. Refer to applicable Division 7 Section for new roofing requirements.

L. Air-Conditioning Equipment: Remove equipment without releasing refrigerants.

3.6 PATCHING AND REPAIRS

A. General: Promptly repair damage to adjacent construction caused by selective demolition operations.

B. Patching: Comply with Division 1 Section "Cutting and Patching."

C. Repairs: Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.

1. Completely fill holes and depressions in existing masonry walls that are to remain with an approved masonry patching material applied according to manufacturer's written recommendations.

D. Finishes: Restore exposed finishes of patched areas and extend restoration into adjoining construction in a manner that eliminates evidence of patching and refinishing.

E. Floors and Walls: Where walls or partitions that are demolished 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 existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

1. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.
2. Where patching occurs in a painted surface, apply primer and intermediate paint coats over patch and apply final paint coat over entire unbroken surface containing patch. Provide additional coats until patch blends with adjacent surfaces.
3. Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.

F. Ceilings: Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Promptly recycle or dispose of demolished materials. Do not allow demolished materials to accumulate on-site.

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials and legally dispose of them.

END OF SECTION 01732

SECTION 01770 - CLOSEOUT PROCEDURES -017700

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1. Inspection procedures.
2. Project Record Documents.
3. Operation and maintenance manuals.
4. Warranties.
5. Instruction of Owner's personnel.
6. Final cleaning.

B. Related Sections include the following:

1. Division 1 Section "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
2. Divisions 2 through 16 Sections for specific closeout and special cleaning requirements for products of 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 in 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 photographs, 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, Architect/ 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 Architect/Engineer, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

1.4 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to Division 1 Section "Payment Procedures."
2. Submit certified copy of Architect’s, Engineer's, and Project Manager’s Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by the Project Manager.. 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.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect/Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect/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. “Work list” type observations shall not occur. If the process becomes multiple “work list” observations, the contractor shall pay the Engineer for multiple observations.

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. Preparation: Submit three copies 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 Architect/ Engineer and Project Manager.
d. Name of Contractor.
e. Page number.

1.6 PROJECT RECORD DOCUMENTS

A. General: Do not use Project Record Documents for construction purposes. Protect Project Record Documents from deterioration and loss. Provide access to Project Record Documents for Engineer’s reference during normal working hours.

B. Record Drawings: Maintain and submit one set of blue- or black-line white prints of Contract Drawings and Shop Drawings.

1. 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 prepare the marked-up Record Prints.

a. Give particular attention to information on concealed elements that cannot be readily identified and recorded later.
b. Accurately record information in an understandable drawing technique.
c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
d. Mark Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. Where Shop Drawings are marked, show cross-reference on Contract Drawings.

2. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at the same location.
3. Mark important additional information that was either shown schematically or omitted from original Drawings.
4. Note Construction Change Directive numbers, Change Order numbers, alternate numbers, and similar identification where applicable.
5. Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location. Organize into manageable sets; bind each set with durable paper cover sheets. Include identification on cover sheets.

C. Record Specifications: Submit one copy of Project's Specifications, including addenda and contract modifications. Mark copy 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. Note related Change Orders, Record Drawings, and Product Data, where applicable.

D. Record Product Data: Submit one copy of each Product Data submittal. Mark one set to indicate the actual product installation where installation varies substantially from that indicated in Product Data.

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 Drawings, and Record Specifications, where applicable.

E. Miscellaneous Record Submittals: 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.

1.7 OPERATION AND MAINTENANCE MANUALS

A. Assemble a complete set of operation and maintenance data indicating the operation and maintenance of each system, subsystem, and piece of equipment not part of a system. Provide a copy of all operation and maintenance manuals in PDF format to the Owner’s Representative on a CD or DVD disc. Include operation and maintenance data required in individual Specification Sections and as follows:

1. Operation Data:

a. Emergency instructions and procedures.
b. System, subsystem, and equipment descriptions, including operating standards.
c. Operating procedures, including startup, shutdown, seasonal, and weekend operations.
d. Description of controls and sequence of operations.
e. Piping diagrams.

2. Maintenance Data:

a. Manufacturer's information, including list of spare parts.
b. Name, address, and telephone number of Installer or supplier.
c. Maintenance procedures.
d. Maintenance and service schedules for preventive and routine maintenance.
e. Maintenance record forms.
f. Sources of spare parts and maintenance materials.
g. Copies of maintenance service agreements.
h. Copies of warranties and bonds.

B. Organize operation and maintenance manuals into suitable sets of manageable size. Bind and index data in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, with pocket inside the covers to receive folded oversized sheets. Identify each binder on front and spine with the printed title "OPERATION AND MAINTENANCE MANUAL," Project name, and subject matter of contents.

1.8 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. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

C. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (115-by-280-mm) paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

D. Provide additional copies of each warranty to include in operation and maintenance manuals.

E. Project shall have a warranty for two years after the final complete written acceptance of the Owner's representative.

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.

PART 3 - EXECUTION

3.1 DEMONSTRATION AND TRAINING

A. Instruction: Instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

1. Provide instructors experienced in operation and maintenance procedures. Incorporate nontoxic cleaning methods and sustainable maintenance.
2. Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at the start of each season.
3. Schedule training with Owner, through Engineer with at least seven days' advance notice.
4. Coordinate instructors, including providing notification of dates, times, length of instruction, and course content.

B. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections. For each training module, develop a learning objective and teaching outline. Include instruction for the following:

1. System design and operational philosophy.
2. Review of documentation.
3. Operations.
4. Adjustments.
5. Troubleshooting.
6. Maintenance.
7. Repair.
8. Recycling.
9. Provide a list of all attendees that training was completed with date time and manufacturer's representative's name, and phone number.

3.2 FINAL CLEANING

A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and anti-pollution 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. 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.
f. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
g. Sweep concrete floors broom clean in unoccupied spaces.
h. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
i. 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.
j. Remove labels that are not permanent.
k. 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 similar labels, including mechanical and electrical nameplates.

l. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
m. Replace parts subject to unusual operating conditions.
n. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
o. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.

p. Clean ducts, blowers, and coils if units were operated without filters during construction.

q. 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.

r. Leave Project clean and ready for occupancy.

C. Comply with safety and environmental standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully. Use non-toxic and low-VOC cleaning products to the extent possible while complying with manufacturer's recommendations.

END OF SECTION 01770

SECTION 15010 - BASIC MECHANICAL REQUIREMENTS – 230500 CSI 2004

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this and the other sections of Division 15.

1.2 SUMMARY

A. This Section includes general administrative and procedural requirements for mechanical installations. The following administrative and procedural requirements are included in this Section to expand the requirements specified in Division 1:

1. Submittals
2. Coordination drawings
3. Record documents
4. Maintenance manuals
5. Rough-ins
6. Mechanical installations
7. Cutting and patching

B. Related Sections: The following sections contain requirements that relate to this section:

1. Division 15 Section "ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT," for factory-installed motors, controllers, accessories, and connections.
2. Division 15 Section "BASIC MECHANICAL MATERIALS AND METHODS," for materials and methods common to the remainder of Division 15, plus general related specifications including:

a. Access to mechanical installations.

1.3 SUBMITTALS

A. General: Follow the procedures specified in Division 1 Section "SUBMITTALS."

B. Increase, by the quantity listed below, the number of mechanical related shop

drawings, product data, and samples submitted, to allow for required distribution plus two copies of each submittal required, which will be retained by the Mechanical Consulting Engineer.

1. Shop Drawings - Initial Submittal: 1 additional blue- or black-line prints.
2. Shop Drawings - Final Submittal: 1 additional blue- or black-line prints.
3. Product Data: 1 additional copy of each item.
4. Samples: 1 addition as set.

1.4 RECORD DOCUMENTS

A. Prepare record documents in accordance with the requirements in Division 1 Section "PROJECT CLOSEOUT." In addition to the requirements specified in Division 1, indicate the following installed conditions:

1. Ductwork mains and branches, size and location, for both exterior and interior; locations of dampers and other control devices; filters, boxes, and terminal units requiring periodic maintenance or repair.
2. Mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located (i.e., traps, strainers, expansion compensators, tanks, etc.). Valve location diagrams, complete with valve tag chart. Refer to Division 15 Section "Mechanical Identification." Indicate actual inverts and horizontal locations of underground piping.
3. Equipment locations (exposed and concealed), dimensioned from prominent building lines.
4. Approved substitutions, Contract Modifications, and actual equipment and materials installed.
5. Contract Modifications, actual equipment and materials installed.

1.5 MAINTENANCE MANUALS

A. Prepare maintenance manuals in accordance with Division 1 Section "PROJECT CLOSEOUT." In addition to the requirements specified in Division 1, include the following information for equipment items:

6. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
7. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.

8. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
9. Servicing instructions and lubrication charts and schedules.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 ROUGH-IN

A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

B. Refer to equipment specifications in Divisions 2 through 16 for rough-in requirements.

3.2 MECHANICAL INSTALLATIONS

A. General: Sequence, coordinate, and integrate the various elements of mechanical systems, materials, and equipment. Comply with the following requirements:

1. Coordinate mechanical systems, equipment, and materials installation with other building components.
2. Verify all dimensions by field measurements.
3. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for mechanical installations.
4. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete, existing walls, and other structural components, as they are constructed.
5. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.
6. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.
7. Coordinate connection of mechanical systems with exterior underground and

overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.

8. Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Project Manager.
9. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
10. Install mechanical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to an accessible location.
11. Install access panel or doors where units are concealed behind finished surfaces. Access panels and doors are specified in Division 15 Section "BASIC MECHANICAL MATERIALS AND METHODS."
12. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.

3.3 CUTTING AND PATCHING

A. General: Perform cutting and patching in accordance with Division 1 Section "CUTTING AND PATCHING." In addition to the requirements specified in Division 1, the following requirements apply:

1. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.

B. Perform cutting, fitting, and patching of mechanical equipment and materials required to:

1. Uncover Work to provide for installation of ill-timed Work.
2. Remove and replace defective Work.
3. Remove and replace Work not conforming to requirements of the Contract Documents.
4. Remove samples of installed Work as specified for testing.
5. Install equipment and materials in existing structures.
6. Upon written instructions from the Project Manager, uncover and restore Work to provide for Project Manager’s observation of concealed Work.

C. Cut, remove and legally dispose of selected mechanical equipment, components, and materials as indicated, including but not limited to removal of mechanical piping, heating/ cooling units and other mechanical items made obsolete by the

new Work.

D. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.

E. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.

1. Patch existing finished surfaces and building components using new materials matching existing materials and experienced Installers. Installers' qualifications refer to the materials and methods required for the surface and building components being patched.

    a. Refer to Division 1 Section "References " for definition of "experienced Installer."

2. Patch finished surfaces and building components using new materials specified for the original installation and experienced Installers. Installers' qualifications refer to the materials and methods required for the surface and building components being patched.

    a. Refer to Division 1 Section "References" for definition of "experienced Installer."

END OF SECTION 15010

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SECTION 15030 - ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT – 230513 CSI 2004

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

B. Related Sections: Separate electrical components and materials required for field installation and electrical connections are specified in Division 16.

1.2 SUMMARY

A. This section specifies the basic requirements for electrical components which are an integral part of packaged mechanical equipment. These components include, but are not limited to factory installed motors, starters, and disconnect switches furnished as an integral part of packaged mechanical equipment.

B. Specific electrical requirements (i.e. horsepower and electrical characteristics) for mechanical equipment are specified within the individual equipment specification sections.

C. Specific electrical requirements (i.e. horsepower and electrical characteristics) for mechanical equipment are scheduled on the Drawings.

1.3 REFERENCES

A. NEMA Standards MG 1: Motors and Generators

B. NEMA Standards ICS 2: Industrial Control Devices, Controllers, and Assemblies.

C. NEMA Standard 250: Enclosures for Electrical Equipment

D. NEMA Standard KS 1: Enclosed Switches

E. Comply with National Electrical Code (NFPA 70).

F. ASHRAE 90.1 – 2010; motor efficiency tables

1.4 SUBMITTALS

A. No separate submittal is required. Submit product data for motors, starters, and other electrical components with submittal data required for the equipment for which it serves, as required by the individual equipment specification sections.

1.5 QUALITY ASSURANCE

A. Electrical components and materials shall be UL labeled.

PART 2 - PRODUCTS

2.1 MOTORS

A. The following are basic requirements for simple or common motors. For special motors, more detailed and specific requirements are specified in the individual equipment specifications.

1. Torque characteristics shall be sufficient to satisfactorily accelerate the driven loads.
2. Motor sizes shall be large enough so that the driven load will not require the motor to operate in the service factor range.
3. 2-speed motors shall have 2 separate windings on poly-phase motors.
4. Temperature Rating: Rated for 40 deg. C environment with maximum 50 deg. C temperature rise for continuous duty at full load (Class A Insulation).
5. Starting capability: frequency of starts as indicated by automatic control system, and not less than 5 evenly time spaced starts per hour for manually controlled motors.
6. Service Factor: 1.15 for poly-phase motors and 1.35 for single phase motors.
7. Motor construction: NEMA Standard MG 1, general purpose, continuous duty, Nema Premium type motors.

a. Frames: NEMA Standard No. 48 or 54; use driven equipment manufacturer's standards to suit specific application.
b. Bearings:

1) ball or roller bearings with inner and outer shaft seals;
2) re-greasable, except permanently sealed where motor is normally inaccessible for regular maintenance;
3) designed to resist thrust loading where belt drives or other drives produce lateral or axial thrust in motor;
4) for fractional horsepower, light duty motors, sleeve type bearings are permitted.

c. Enclosure Type:

1) open drip-proof motors for indoor use where satisfactorily housed or remotely located during operation;
2) guarded drip-proof motors where exposed to contact by employees or building occupants;
3) weather protected Type I for outdoor use, Type II where not housed;

d. Overload protection: built-in thermal overload protection and, where indicated, internal sensing device suitable for signaling and stopping motor at starter.
e. Noise rating: "Quiet"

f. Efficiency: "Energy Efficient" motors shall have a minimum efficiency as scheduled in accordance with Ashrae 90.1. If efficiency not specified, motors shall have a higher efficiency or Nema Premium .
g. Nameplate: indicate the full identification of manufacturer, ratings, characteristics, construction, special features and similar information.

2.2 STARTERS, ELECTRICAL DEVICES, AND WIRING

A. Motor Starter Characteristics:

1. Enclosures: NEMA 1, general purpose enclosures with padlock ears, except in wet locations shall be NEMA 3R with conduit hubs, or units in hazardous locations which shall have NEC proper class and division.
2. Type and size of starter shall be as recommended by motor manufacturer and the driven equipment manufacturer for applicable protection and start-up condition.

B. Manual switches shall have:

1. pilot lights and extra positions for multi-speed motors.
2. Overload protection: melting alloy type thermal overload relays.

C. Magnetic Starters:

1. Maintained contact push buttons and pilot lights, properly arranged for single speed or multi-speed operation as indicated.
2. Trip-free thermal overload relays, each phase.
3. Interlocks, pneumatic switches and similar devices as required for coordination with control requirements of Division-15 Controls sections.
4. Built-in 120 volts control circuit transformer, fused from line side, where service exceeds 240 volts.
5. Externally operated manual reset.
6. Under-voltage release or protection.

D. Motor connections:

1. Flexible conduit, except where plug-in electrical cords are specifically indicated.

2.3 CAPACITORS

A. Features:

1. Individual unit cells
2. all welded steel housing
3. each capacitor internally fused
4. non-flammable synthetic liquid impregnant
5. craft tissue insulation
6. aluminum foil electrodes
7. KVAR size shall be as required to correct motor power factor to 90 percent or better and shall be installed on all motors 1 horsepower and larger, that have an uncorrected power factor of less than 85 percent at rated load.

B. Disconnect Switches:

1. **All disconnects are to be provided by the Electrical Contractor. Coordinate all power requirements with the Project Manager prior to order.**

2. Fusible switches: fused, each phase; general duty; horsepower rated; non-teasible quick-make, quick-break mechanism; dead front line side shield; solderless lugs suitable for copper or aluminum conductors; spring reinforced fuse clips; electro silver plated current carrying parts; hinged doors; operating lever arranged for locking in the "OPEN" position; arc quenchers; capacity and characteristics as indicated.
2. Non-fusible switches: for equipment 2 horsepower and smaller, shall be horsepower rated; toggle switch type; quantity of poles and voltage rating as indicated. For equipment larger than 2 horsepower, switches shall be the same as fusible type.

PART 3 - EXECUTION (Not Applicable).

END OF SECTION 15030

SECTION 15050 - BASIC MECHANICAL MATERIALS AND METHODS – 230500 CSI 2004

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following basic mechanical materials and methods to complement other Division 15 Sections.

1. Piping materials and installation instructions common to most piping systems.
2. Concrete equipment base construction requirements.
3. Equipment nameplate data requirements.
4. Nonshrink grout for equipment installations.
5. Field-fabricated metal and wood equipment supports.
6. Installation requirements common to equipment specification Sections.
7. Mechanical demolition.
8. Cutting and patching.
9.. Touchup painting and finishing.

B. Pipe and pipe fitting materials are specified in piping system Sections.

1.3 DEFINITIONS

A. Pipe, pipe fittings, and piping include tube, tube fittings, and tubing.

B. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below the roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.

C. Exposed Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

D. Exposed Exterior Installations: Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

E. Concealed Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.

F. Concealed Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

1.4 SUBMITTALS

A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product data for following piping specialties:

1. Mechanical sleeve seals.
2. Identification materials and devices.

C. Samples of color, lettering style, and other graphic representation required for each identification material and device.

D. Shop drawings detailing fabrication and installation for metal and wood supports and anchorage for mechanical materials and equipment.

E. Coordination drawings for access panel and door locations.

F. Scheduling, sequencing, movement, and positioning of large equipment into the building during construction.

1. Floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.

2. Reflected ceiling plans to coordinate and integrate installations, air outlets and inlets, light fixtures, communication systems components, sprinklers, and other ceiling-mounted items.

G. Welder certificates signed by Contractor certifying that welders comply with requirements specified under the "Quality Assurance" Article.

1.5 QUALITY ASSURANCE

A. Qualify welding processes and operators for structural steel according to AWS D1.1 "Structural Welding Code--Steel."

B. Qualify welding processes and operators for piping according to ASME "Boiler and Pressure Vessel Code," Section IX, "Welding and Brazing Qualifications."

1. Comply with provisions of ASME B31 Series "Code for Pressure Piping."
2. Certify that each welder has passed AWS qualification tests for the welding processes involved and that certification is current.

C. ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

D. Equipment Selection: Equipment of greater or larger power, dimensions, capacities, and ratings may be furnished provided such proposed equipment is approved in writing and connecting mechanical and electrical services, circuit breakers, conduit, motors, bases, and equipment spaces are increased. No additional costs will be approved for these increases, if larger equipment is approved. If minimum energy ratings or efficiencies of the equipment are specified, the equipment must meet the design requirements and commissioning requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end-caps. Maintain end-caps through shipping, storage, and handling to prevent pipe-end damage and prevent entrance of dirt, debris, and moisture.

B. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. When stored inside, do not exceed structural capacity of the floor.

C. Protect flanges, fittings, and piping specialties from moisture and dirt.

D. Protect stored plastic pipes from direct sunlight. Support to prevent sagging and bending.

1.7 SEQUENCING AND SCHEDULING

A. Coordinate mechanical equipment installation with other building components.

B. Arrange for chases, slots, and openings in building structure during progress of construction to allow for mechanical installations.

C. Coordinate the installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

D. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Coordinate installation of large equipment requiring positioning prior to closing in the building.

E. Coordinate connection of electrical services.

F. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies.

G. Coordinate requirements for access panels and doors where mechanical items requiring access are concealed behind finished surfaces. Access panels and doors are specified in Division 8 Section "Access Doors."

H. Coordinate installation of identifying devices after completing covering and painting where devices are applied to surfaces. Install identifying devices prior to installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 PIPE AND PIPE FITTINGS

A. Refer to individual piping system specification Sections for pipe and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.2 JOINING MATERIALS

A. Refer to individual piping system specification Sections in Division 15 for special joining materials not listed below.

B. Pipe Flange Gasket Materials: Suitable for the chemical and thermal conditions of the piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch (3mm) maximum thickness, except where thickness or specific material is indicated.

    a. Full-Face Type: For flat-face, Class 125 cast-iron and cast-bronze flanges.
    b. Narrow-Face Type: For raised-face, Class 250 cast-iron and steel flanges.

2. ASME B16.20 for grooved, ring-joint, steel flanges.
3. AWWA C110, rubber, flat face, 1/8 inch (3 mm) thick, except where other thickness is indicated; and full-face or ring type, except where type is indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, except where other material is indicated.

D. Plastic Pipe Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, except where other type or material is indicated.

E. Solder Filler Metal: ASTM B 32.

1. Alloy Sn95 or Alloy Sn94: Tin (approximately 95 percent) and silver (approximately 5 percent), having 0.10 percent lead content.
2. Alloy Sn50: Tin (50 percent) and lead (50 percent).
3. Alloy E: Tin (approximately 95 percent) and copper (approximately 5 percent), having 0.10 percent maximum lead content.
4. Alloy HA: Tin-antimony-silver-copper-zinc, having 0.10 percent maximum lead content.
5. Alloy HB: Tin-antimony-silver-copper-nickel, having 0.10 percent maximum lead content.
6. Alloy Sb5: Tin (95 percent) and antimony (5 percent), having 0.20 percent maximum lead content.

F. Brazing Filler Metals: AWS A5.8.

1. BCuP Series: Copper-phosphorus alloys.
2. BAg1: Silver alloy.

G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

H. Solvent Cements: Manufacturer's standard solvents complying with the following:

1. Chlorinated Poly(Vinyl Chloride) (CPVC): ASTM F 493.
2. Poly(Vinyl Chloride) (PVC): ASTM D 2564.

I. Plastic Pipe Seals: ASTM F 477, elastomeric gasket.

J. Flanged, Ductile-Iron Pipe Gasket, Bolts, and Nuts: AWWA C110, rubber gasket, carbon steel bolts and nuts.

K. Couplings: Iron body sleeve assembly, fabricated to match outside diameters of plain-end pressure pipes.

1. Sleeve: ASTM A 126, Class B, gray iron.
2. Followers: ASTM A 47 (ASTM A 47M), Grade 32510 or ASTM A 536 ductile iron.
3. Gaskets: Rubber.
4. Bolts and Nuts: AWWA C111.
5. Finish: Enamel paint.

2.3 PIPING SPECIALTIES

A. Escutcheons: Manufactured wall, ceiling, and floor plates; deep-pattern type where required to conceal protruding fittings and sleeves.

1. Inside Diameter: Closely fit around pipe, tube, and insulation.
2. Outside Diameter: Completely cover opening.
3. Cast Brass: One-piece, with set-screw.
   a Finish: Polished chrome plate.

4. Cast Brass: Split casting, with concealed hinge and set-screw.
   a. Finish: Polished chrome plate.

5. Stamped Steel: One-piece, with set-screw and chrome-plated finish.
6. Stamped Steel: One-piece, with spring clips and chrome-plated finish.
7. Cast-Iron Floor Plate: One-piece casting.

B. Dielectric Fittings: Assembly or fitting having insulating material isolating joined dissimilar metals to prevent galvanic action and stop corrosion.

1. Description: Combination of copper alloy and ferrous; threaded, solder, plain, and weld neck end types and matching piping system materials.
2. Insulating Material: Suitable for system fluid, pressure, and temperature.
3. Dielectric Unions: Factory-fabricated, union assembly for 250-psig (1725kPa) minimum working pressure at a 180 deg F (82 deg C) temperature.
4. Dielectric Flanges: Factory-fabricated, companion-flange assembly for 150- or 300-psig (1035kPa or 2070kPa) minimum pressure to suit system pressures.
5. Dielectric-Flange Insulation Kits: Field-assembled, companion-flange assembly, full-face or ring type. Components include neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.

   a. Provide separate companion flanges and steel bolts and nuts for 150- or 300-psig (1035kPa or 2070kPa) minimum working pressure to suit system pressures.

6. Dielectric Couplings: Galvanized-steel coupling, having inert and noncorrosive, thermoplastic lining, with threaded ends and 300-psig (2070kPa) minimum working pressure at 225 deg F (107 deg C) temperature.
7. Dielectric Nipples: Electroplated steel nipple, having inert and noncorrosive thermoplastic lining, with combination of plain, threaded, or grooved end types and 300-psig (2070kPa) working pressure at 225 deg F (107 deg C) temperature.

C. Mechanical Sleeve Seals: Modular, watertight mechanical type. Components include interlocking synthetic rubber links shaped to continuously fill annular space between pipe and sleeve. Connecting bolts and pressure plates cause rubber

sealing elements to expand when tightened.

D. Sleeves: The following materials are for wall, floor, slab, and roof penetrations:

1. Steel Sheet-Metal: 24-gage (0.70mm) or heavier galvanized sheet metal, round tube closed with welded longitudinal joint.
2. Steel Pipe: ASTM A 53, Type E, Grade A, Schedule 40, galvanized, plain ends.
3. Cast-Iron: Cast or fabricated wall pipe equivalent to ductile-iron pressure pipe, having plain ends and integral water stop, except where other features are specified.
4. Wall Penetration Systems: Wall sleeve assembly, consisting of housing, gaskets, and pipe sleeve, with 1 mechanical-joint end conforming to AWWA C110 and 1 plain pipe-sleeve end.

    a. Penetrating Pipe Deflection: 5 percent without leakage.
    b. Housing: Ductile-iron casting having waterstop and anchor ring, with ductile-iron gland, steel studs and nuts, and rubber gasket conforming to AWWA C111, of housing and gasket size as required to fit penetrating pipe.
    c. Pipe Sleeve: AWWA C151, ductile-iron pipe.
    d. Housing-to-Sleeve Gasket: Rubber or neoprene push-on type of manufacturer's design.

5. Cast-Iron Sleeve Fittings: Commercially made sleeve having an integral clamping flange, with clamping ring, bolts, and nuts for membrane flashing.

    a. Underdeck Clamp: Clamping ring with set-screws.

6. PVC Plastic: Manufactured, permanent, with nailing flange for attaching to wooden forms.
7. PVC Plastic Pipe: ASTM D 1785, Schedule 40.

2.4 IDENTIFYING DEVICES AND LABELS

A. General: Manufacturer's standard products of categories and types required for each application as referenced in other Division 15 Sections. Where more than one type is specified for listed application, selection is Installer's option, but provide single selection for each product category.

B. Equipment Nameplates: Metal nameplate with operational data engraved or stamped, permanently fastened to equipment.

1. Data: Manufacturer, product name, model number, serial number, capacity,

operating and power characteristics, labels of tested compliances, and similar essential data.

2. Location: An accessible and visible location.

C. Stencils: Standard stencils, prepared for required applications with letter sizes conforming to recommendations of ASME A13.1 for piping and similar applications, but not less than 1-1/4-inch (30mm) -high letters for ductwork and not less than 3/4-inch (19mm) -high letters for access door signs and similar operational instructions.

1. Material: Brass.
2. Stencil Paint: Standard exterior type stenciling enamel; black, except as otherwise indicated; either brushing grade or pressurized spray-can form and grade.
3. Identification Paint: Standard identification enamel of colors indicated or, if not otherwise indicated for piping systems, comply with ASME A13.1 for colors.

D. Snap-On Plastic Pipe Markers: Manufacturer's standard preprinted, semirigid snap-on, color-coded pipe markers, conforming to ASME A13.1.

E. Pressure-Sensitive Pipe Markers: Manufacturer's standard preprinted, permanent adhesive, color-coded, pressure-sensitive vinyl pipe markers, conforming to ASME A13.1.

1. Black on Yellow : pipes containing hazardous liquids, or gases Inherently hazardous, IE corrosive, toxic, flammable, Radioactive, high pressure, extreme temperature
2. White on Blue : pipes containing non- hazardous gases, IE non- Toxic, non-radioactive, low pressure
3. White on Green : pipes containing non- hazardous liquids, IE Non-flammable, non-toxic
4. White on Red : pipes containing fire quenching materials, IE Water, CO_2, foam

F. Plastic Duct Markers: Manufacturer's standard laminated plastic, color coded duct markers. Conform to following color code:

1. Green: Cold air.
2. Yellow: Hot air.
3. Yellow/Green: Supply air.
4. Blue: Exhaust, outside, return, and mixed air.
5. For hazardous exhausts, use colors and designs recommended by ASME A13.1.
6. Nomenclature: Include following:

   a. Direction of air flow.

b. Duct service (supply, return, exhaust, etc.).
c. Duct origin (from).
d. Duct destination (to).
e. Design cfm.

G. Engraved Plastic-Laminate Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white (letter color) melamine subcore, except when other colors are indicated.

1. Fabricate in sizes required for message.
2. Engraved with engraver's standard letter style, of sizes and with wording to match equipment identification.
3. Punch for mechanical fastening.
4. Thickness: 1/16 inch (1.5 mm) for units up to 20 square inches (13,000 sq. mm) or 8 inches (200 mm) long; 1/8 inch (3 mm) for larger units.
5. Fasteners: Self-tapping stainless-steel screws or contact-type permanent adhesive.

H. Plastic Equipment Markers: Laminated-plastic, color-coded equipment markers. Conform to following color code:

1. Green: Cooling equipment and components.
2. Yellow: Heating equipment and components.
3. Yellow/Green: Combination cooling and heating equipment and components.
4. Brown: Energy reclamation equipment and components.
5. Blue: Equipment and components that do not meet any of the above criteria.
6. For hazardous equipment, use colors and designs recommended by ASME A13.1.
7. Nomenclature: Include following, matching terminology on schedules as closely as possible:

a. Name and plan number.
b. Equipment service.
c. Design capacity.
d. Other design parameters such as pressure drop, entering and leaving conditions, and rpm

8. Size: Approximately 2-1/2 by 4 inches (65 by 100 mm) for control devices, dampers, and valves; and 4-1/2 by 6 inches (115 by 150 mm) for equipment.

I. Lettering and Graphics: Coordinate names, abbreviations, and other designations used in mechanical identification, with corresponding designations indicated. Use numbers, lettering, and wording indicated for proper identification and operation/maintenance of mechanical systems and equipment.

1. Multiple Systems: Where multiple systems of same generic name are indicated, provide identification that indicates individual system number as well as service such as "Boiler No. 3," "Air Supply No. 1H," or "Standpipe F12."

2.5 GROUT

A. Nonshrink, Nonmetallic Grout: ASTM C 1107, Grade B.

1. Characteristics: Post-hardening, volume-adjusting, dry, hydraulic-cement grout, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psi (34.50MPa), 28-day compressive strength.
3. Packaging: Premixed and factory-packaged.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS--COMMON REQUIREMENTS

A. General: Install piping as described below, except where system Sections specify otherwise. Individual piping system specification Sections in Division 15 specify piping installation requirements unique to the piping system.

B. General Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated, except where deviations to layout are approved on coordination drawings.

C. Install piping at indicated slope.

D. Install components having pressure rating equal to or greater than system operating pressure.

E. Install piping in concealed interior and exterior locations, except in equipment rooms and service areas.

F. Install piping free of sags and bends.

G. Install exposed interior and exterior piping at right angles or parallel to building walls. Diagonal runs are prohibited, except where indicated.

H. Install piping tight to slabs, beams, joists, columns, walls, and other building elements. Allow sufficient space above removable ceiling panels to allow for

ceiling panel removal.

I. Install piping to allow application of insulation plus 1-inch (25mm) clearance around insulation.

J. Locate groups of pipes parallel to each other, spaced to permit valve servicing.

K. Install fittings for changes in direction and branch connections.

L. Install couplings according to manufacturer's printed instructions.

M. Install pipe escutcheons for pipe penetrations of concrete and masonry walls, wall board partitions, and suspended ceilings according to the following:

1. Chrome-Plated Piping: Cast-brass, one-piece, with set-screw, and polished chrome-plated finish. Use split-casting escutcheons, where required, for existing piping.
2. Uninsulated Piping Wall Escutcheons: Cast-brass or stamped-steel, with set-screw.
3. Uninsulated Piping Floor Plates in Utility Areas: Cast-iron floor plates.
4. Insulated Piping: Cast-brass or stamped-steel, with concealed hinge, spring clips, and chrome-plated finish.
5. Piping in Utility Areas: Cast-brass or stamped-steel, with set-screw or spring clips.

N. Sleeves are not required for core drilled holes.

O. Permanent sleeves are not required for holes formed by PE plastic (removable) sleeves.

P. Install sleeves for pipes passing through concrete and masonry walls, concrete floor and roof slabs, and where indicated.

Q. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, concrete floor and roof slabs, and where indicated.

1. Cut sleeves to length for mounting flush with both surfaces.

   a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches (50 mm) above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring where specified.

2. Build sleeves into new walls and slabs as work progresses.
3. Install large enough sleeves to provide 1/4-inch (6mm) annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve

materials:

a. PVC Pipe Sleeves: For pipes smaller than 6 inches (150 mm).
b. Steel Pipe Sleeves: For pipes smaller than 6 inches (150 mm).
c. Steel Sheet-Metal Sleeves: For pipes 6 inches (150 mm) and larger that penetrate gypsum-board partitions.
d. Cast-Iron Sleeve Fittings: For floors having membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches (50 mm) above finished floor level. Flashing is specified in Division 7 Section "Flashing and Sheet Metal."

1) Seal space outside of sleeve fittings with nonshrink, nonmetallic grout.

4. Except for below-grade wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using elastomeric joint sealants specified in Division 7 Section "Joint Sealants."

R. Above Grade, Exterior Wall, Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Size sleeve for 1-inch (25mm) annular clear space between pipe and sleeve for installation of mechanical seals.

1. Install steel pipe for sleeves smaller than 6 inches (150 mm).
2. Install cast-iron wall pipes for sleeves 6 inches (150 mm) and larger.
3. Assemble and install mechanical seals according to manufacturer's printed instructions.

S. Verify final equipment locations for roughing in.

T. Refer to equipment specifications in other Sections for roughing-in requirements.

U. Piping Joint Construction: Join pipe and fittings as follows and as specifically required in individual piping system Sections.

1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
3. Soldered Joints: Construct joints according to AWS "Soldering Manual," - "The Soldering of Pipe and Tube."
4. Brazed Joints: Construct joints according to AWS "Brazing Manual" in the "Pipe and Tube" chapter.
5. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full inside diameter. Join pipe fittings and valves as follows:

a. Note the internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
b. Apply appropriate tape or thread compound to external pipe threads (except where dry seal threading is specified).
c. Align threads at point of assembly.
d. Tighten joint with wrench. Apply wrench to valve end into which pipe is being threaded.
e. Damaged Threads: Do not use pipe or pipe fittings having threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

6. Welded Joints: Construct joints according to AWS D10.12 "Recommended Practices and Procedures for Welding Low Carbon Steel Pipe" using qualified processes and welding operators according to the "Quality Assurance" Article.
7. Flanged Joints: Align flange surfaces parallel. Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly using torque wrench.
8. Plastic Pipe and Fitting Solvent-Cement Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join pipe and fittings according to the following standards:

   a. Comply with ASTM F 402 for safe handling of solvent-cement and primers.
   b. Chlorinated Poly(Vinyl Chloride) (CPVC): ASTM D 2846 and ASTM F 493.
   c. Poly(Vinyl Chloride) (PVC) Pressure Application: ASTM D 2672.
   d. Poly(Vinyl Chloride) (PVC) Non-Pressure Application: ASTM D 2855.

9. Plastic Pipe and Fitting Heat-Fusion Joints: Prepare pipe and fittings and join with heat-fusion equipment according to manufacturer's printed instructions.

   a. Plain-End Pipe and Fittings: Butt joining.
   b. Plain-End Pipe and Socket-Type Fittings: Socket joining.

V. Piping Connections: Except as otherwise indicated, make piping connections as specified below.

1. Install unions in piping 2 inches (50 mm) and smaller adjacent to each valve and at final connection to each piece of equipment having a 2-inch (50mm) or smaller threaded pipe connection.

2. Install flanges in piping 2-1/2 inches (65 mm) and larger adjacent to flanged valves and at final connection to each piece of equipment having flanged pipe connection.
3. Dry Piping Systems (Gas, Compressed Air, and Vacuum): Install dielectric unions and flanges to connect piping materials of dissimilar metals.
4. Wet Piping Systems (Water and Steam): Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.2 EQUIPMENT INSTALLATION--COMMON REQUIREMENTS

A. Install equipment to provide the maximum possible headroom where mounting heights are not indicated.

B. Install equipment according to approved submittal data. Portions of the Work are shown only in diagrammatic form. Refer conflicts to the Architect.

C. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, except where otherwise indicated.

D. Install mechanical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. Connect equipment for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to an accessible location.

E. Install equipment giving right-of-way to piping systems installed at a required slope.

3.3 LABELING AND IDENTIFYING

A. Piping Systems: Install pipe markers on each system. Include arrows showing normal direction of flow.

1. Stenciled Markers: Complying with ASME A13.1.
2. Plastic markers, with application systems. Install on pipe insulation segment where required for hot noninsulated pipes.
3. Locate pipe markers wherever piping is exposed in finished spaces, machine rooms, accessible maintenance spaces (shafts, tunnels, plenums), and exposed exterior locations as follows:

    a. Near each valve and control device.
    b. Near each branch, excluding short take-offs for fixtures and terminal units. Mark each pipe at branch, where flow pattern is not obvious.
    c. Near locations where pipes pass through walls, floors, ceilings, or enter inaccessible enclosures.

d. At access doors, manholes, and similar access points that permit view of concealed piping.
e. Near major equipment items and other points of origination and termination.
f. Spaced at a maximum of 50-foot (15m) intervals along each run. Reduce intervals to 25 feet (7.5 m) in congested areas of piping and equipment.
g. On piping above removable acoustical ceilings, except omit intermediately spaced markers.

B. Equipment: Install engraved plastic laminate sign or equipment marker on or near each major item of mechanical equipment.

1. Lettering Size: Minimum 1/4-inch (6mm) -high lettering for name of unit where viewing distance is less than 2 feet (0.6 m), 1/2-inch (13mm) -high for distances up to 6 feet (1.8 m), and proportionately larger lettering for greater distances. Provide secondary lettering 2/3 to 3/4 of size of principal lettering.
2. Text of Signs: Provide text to distinguish between multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to name of identified unit.

C. Duct Systems: Identify air supply, return, exhaust, intake, and relief ducts with duct markers; or provide stenciled signs and arrows, showing duct system service and direction of flow.

1. Location: In each space where ducts are exposed or concealed by removable ceiling system, locate signs near points where ducts enter into space and at maximum intervals of 50 feet (15 m).

D. Adjusting: Relocate identifying devices which become visually blocked by work of this Division or other Divisions.

3.4 PAINTING AND FINISHING.

A. Damage and Touch Up: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.5 ERECTION OF METAL SUPPORTS AND ANCHORAGE

A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.

B. Field Welding: Comply with AWS D1.1 "Structural Welding Code--Steel."

3.6 ERECTION OF WOOD SUPPORTS AND ANCHORAGE

A. Cut, fit, and place wood grounds, nailers, blocking, and anchorage to support and anchor mechanical materials and equipment.

B. Select fastener sizes that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood members.

C. Attach to substrates as required to support applied loads.

3.7 DEMOLITION

A. Disconnect, demolish, and remove work specified under Division 15 and as indicated.

B. Where pipe, ductwork, insulation, or equipment to remain is damaged or disturbed, remove damaged portions and install new products of equal capacity and quality.

C. Accessible Work: Remove indicated exposed pipe and ductwork in its entirety.

D. Abandoned Work: Cut and remove buried pipe abandoned in place, 2 inches (50 mm) beyond the face of adjacent construction. Cap and patch surface to match existing finish.

E. Removal: Remove indicated equipment from the Project site.

F. Temporary Disconnection: Remove, store, clean, reinstall, reconnect, and make operational equipment indicated for relocation.

3.8 CUTTING AND PATCHING

A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces necessary for mechanical installations. Perform cutting by skilled mechanics of the trades involved.

B. Repair cut surfaces to match adjacent surfaces.

3.9 GROUTING

A. Install nonmetallic nonshrink grout for mechanical equipment base bearing surfaces, and equipment base plates, and anchors. Mix grout according to manufacturer's printed instructions.

B. Clean surfaces that will come into contact with grout.

C. Provide forms for placement of grout, as required.

D. Avoid air entrapment when placing grout.

E. Place grout to completely fill equipment bases.

F. Place grout on concrete bases to provide a smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout according to manufacturer's printed instructions.

END OF SECTION 15050

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SECTION 15055 - BASIC PIPING MATERIALS AND METHODS – 232113 CSI 2004

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2 SUMMARY

A. This Section specifies piping materials and installation methods common to more than one section of Division 15 and includes joining materials, piping specialties, and basic piping installation instructions.

B. Related Sections:

1. Division 15 Basic Mechanical Requirements section applies to the work at this Section.
2. Piping materials and installation methods peculiar to individual systems are specified within their respective system specification sections of Divisions 1 and 15.
3. Valves are specified in a separate section and in individual piping system sections of Division 15.
4. Supports and Anchors are specified in a separate section of Division 15.

1.3 SUBMITTALS

A. Refer to Division 1 and Basic Mechanical Requirements for administrative and procedural requirements for submittals.

B. Product Data: Submit product data on the following items:

1. Escutcheons
2. Dielectric Unions and Fittings
3. Mechanical Sleeve Seals

C. Quality Control Submittals:

1. Submit welders' certificates specified in Quality Assurance below.

1.4 QUALITY ASSURANCE

A. Welder's Qualifications: All welders shall be qualified in accordance with ASME Boiler and Pressure Vessel Code, Section IX, Welding and Brazing Qualifications.

B. Welding procedures and testing shall comply with ANSI Standard B31.1.0 - Standard Code for Pressure Piping, Power Piping, and The American Welding Society, Welding Handbook.

C. Soldering and Brazing procedures shall conform to ANSI B9.1 Standard Safety Code for Mechanical Refrigeration.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Provide factory-applied plastic end-caps on each length of pipe and tube, except for concrete, corrugated metal, hub-and-spigot, clay pipe. Maintain end-caps through shipping, storage and handling to prevent pipe-end damage and prevent entrance of dirt, debris, and moisture.

B. Protect stored pipes and tubes. Elevate above grade and enclose with durable, waterproof wrapping. When stored inside, do not exceed structural capacity of the floor.

C. Protect flanges, fittings, and specialties from moisture and dirt by inside storage and enclosure, or by packaging with durable, waterproof wrapping.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer Uniformity: Conform with the requirements specified in Basic Mechanical Requirements, under "Product Options."

B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering piping materials and specialties which may be incorporated in the work include, but are not limited to, the following:

1. Pipe Escutcheons:

a. Chicago Specialty Mfg. Co.
b. Sanitary-Dash Mfg. Co.
c. Grinnell

2. Dielectric Waterway Fittings:

    a. Epco Sales, Inc.
    b. Victaulic Company of America

3. Dielectric Unions:

    a. Eclipse, Inc.
    b. Perfection Corp.
    c. Watts Regulator Co.

4. Mechanical Sleeve Seals:

    a. Thunderline Corp.

2.2 PIPE AND FITTINGS

A. Refer to the individual piping system specification sections in Division 15 for specifications on piping and fittings relative to that particular system.

2.3 JOINING MATERIALS

A. Welding Materials: Comply with Section II, Part C, ASME Boiler and Pressure Vessel Code for welding materials appropriate for the wall thickness and chemical analysis of the pipe being welded.

B. Brazing Materials: Comply with SFA-5.8, Section II, ASME Boiler and Pressure Vessel Code for brazing filler metal materials appropriate for the materials being joined.

C. Soldering Materials: Refer to individual piping system specifications for solder appropriate for each respective system.

D. Gaskets for Flanged Joints: Gasket material shall be full-faced for cast-iron flanges and raised-face for steel flanges. Select materials to suit the service of the piping system in which installed and which conform to their respective ANSI Standard (A21.11, B16.20, or B16.21). Provide materials that will not be detrimentally affected by the chemical and thermal conditions of the fluid being carried.

2.4 PIPING SPECIALTIES

A. Escutcheons: Chrome-plated, stamped steel, hinged, split-ring escutcheon, with set screw. Inside diameter shall closely fit pipe outside diameter, or outside of pipe insulation where pipe is insulated. Outside diameter shall completely cover the opening in floors, walls, or ceilings.

B. Unions: Malleable-iron, Class 150 for low pressure service and class 250 for high pressure service; hexagonal stock, with ball-and-socket joints, metal-to-metal bronze seating surfaces; female threaded ends.

C. Dielectric Unions: Provide dielectric unions with appropriate end connections for the pipe materials in which installed (screwed, soldered, or flanged), which effectively isolate dissimilar metals, prevent galvanic action, and stop corrosion.

D. Dielectric Waterway Fittings: Electroplated steel or brass nipple, with an inert and non-corrosive, thermoplastic lining.

E. Sleeves:

1. Sheet-Metal Sleeves: 10 gage, galvanized sheet metal, round tube closed with welded longitudinal joint.
2. Steel Sleeves: Schedule 40 galvanized, welded steel pipe, ASTM A53, Grade A.

F. Mechanical Sleeve Seals: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between pipe and sleeve, connected with bolts and pressure plates which cause rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

PART 3 - EXECUTION

3.1 PREPARATION

A. Ream ends of pipes and tubes, and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris for both inside and outside of piping and fittings before assembly.

3.2 INSTALLATIONS

A. General Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate the general location and arrangement of the piping systems.

Location and arrangement of piping layout take into consideration pipe sizing and friction loss, expansion, pump sizing, and other design considerations. So far as practical, install piping as indicated. Refer to individual system specifications for requirements for coordination drawing submittals.

B. Conceal all pipe installations in walls, pipe chases, utility spaces, above ceilings, below grade or floors, unless indicated otherwise.

C. Install piping free of sags or bends and with ample space between piping to permit proper insulation applications.

D. Install exposed piping at right angles or parallel to building walls. Diagonal runs are not permitted, unless expressly indicated on the Drawings.

E. Install piping tight to slabs, beams, joists, columns, walls and other permanent elements of the building. Provide space to permit insulation applications, with 1" clearance outside the insulation. Allow sufficient space above removable ceiling panels to allow for panel removal.

F. Locate groups of pipes parallel to each other, spaced to permit applying full insulation and servicing of valves.

G. Install drains at low points in mains, risers, and branch lines consisting of a tee fitting, 3/4" ball valve, and short 3/4" threaded nipple and cap.

H. Exterior Wall Penetrations: Seal pipe penetrations through exterior walls using sleeves and mechanical sleeve seals. Pipe sleeves smaller than 6" shall be steel; pipe sleeves 6" and larger shall be sheet metal.

I. Fire Barrier Penetrations: Where pipes pass through fire rated walls, partitions, ceilings, or floors, the fire rated integrity shall be maintained. Refer to Division 7 for special sealers and materials

3.3 FITTINGS AND SPECIALTIES

A. Use fittings for all changes in direction and all branch connections.

B. Remake leaking joints using new materials.

C. Install strainers on the supply side of each control valve, pressure reducing or regulating valve, solenoid valve, and elsewhere as indicated.

D. Install unions adjacent to each valve, and at the final connection to each piece of equipment and plumbing fixture having 2" and smaller connections, and elsewhere as indicated.

E. Install Flanges in piping 2-1/2" and larger, where indicated, adjacent to each valve, and at the final connection to each piece of equipment.

F. Install dielectric unions to connect piping materials of dissimilar metals in dry piping systems (gas, compressed air, vacuum).

G. Install dielectric fittings to connect piping materials of dissimilar metals in wet piping systems (water, steam).

3.4 JOINTS

A. Steel Pipe Joints:

1. Pipe 2" and Smaller: Thread pipe with tapered pipe threads in accordance with ANSI B2.1. Cut threads full and clean using sharp dies. Ream threaded ends to remove burrs and restore full inside diameter. Apply pipe joint lubricant or sealant suitable for the service for which the pipe is intended on the male threads at each joint and tighten joint to leave not more than 3 threads exposed.
2. Pipe Larger Than 2":

    a. Weld pipe joints (except for exterior water service pipe) in accordance with ASME Code for Pressure Piping, B31.
    b. Weld pipe joints of exterior water service pipe in accordance with AWWA C206.
    c. Install flanges on all valves, apparatus, and equipment. Weld pipe flanges to pipe ends in accordance with ASME B31.1.0 Code for Pressure Piping. Clean flange faces and install gaskets. Tighten bolts to torque specified by manufacturer of flange and flange bolts, to provide uniform compression of gaskets.

B. Non-ferrous Pipe Joints:

1. Brazed And Soldered Joints: For copper tube and fitting joints, braze joints in accordance with ANSI B31.1.0 - Standard Code for Pressure Piping, Power Piping and ANSI B9.1 - Standard Safety Code for Mechanical Refrigeration.
2. Thoroughly clean tube surface and inside surface of the cup of the fittings, using very fine emory cloth, prior to making soldered or brazed joints. Wipe tube and fittings clean and apply flux. Flux shall not be used as the sole means for cleaning tube and fitting surfaces.
3. Mechanical Joints: Flared compression fittings may be used for refrigerant lines 3/4" and smaller.

C. Joints for other piping materials are specified within the respective piping system sections.

3.5 FIELD QUALITY CONTROL

A. Testing: Refer to individual piping system specification sections.

END OF SECTION 15055

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SECTION 15100 – VALVES - 230523 CSI 2004

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to this section.

B. Requirements of the following Division 15 Sections apply to this section:

1. "Basic Mechanical Requirements."
2. "Basic Mechanical Materials and Methods."
3. "Basic Piping Materials and Methods."

1.2 SUMMARY

A. This Section includes general duty valves common to most mechanical piping systems.

1. Special purpose valves are specified in individual piping system specifications.

B. Valve tags and charts are specified in Division 15 Section "MECHANICAL IDENTIFICATION."

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data, including body material, valve design, pressure and temperature classification, end connection details, seating materials, trim material and arrangement, dimensions and required clearances, and installation instructions.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility: Comply with the requirements specified in Division 1 Section "MATERIALS AND EQUIPMENT," under "Source Limitations."

B. American Society of Mechanical Engineers (ASME) Compliance: Comply with

ASME B31.9 for building services piping and ASME B31.1 for power piping.

C. Manufacturers Standardization Society of the Valve and Fittings Industry (MSS) Compliance: Comply with the various MSS Standard Practices referenced.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Preparation For Transport: Prepare valves for shipping as follows:

1. Ensure valves are dry and internally protected against rust and corrosion.
2. Protect valve ends against damage to threads, flange faces, and weld-end preps.
3. Set valves in best position for handling. Set globe and gate valves closed to prevent rattling; set ball and plug valves open to minimize exposure of functional surfaces; set butterfly valves closed or slightly open; and block swing check valves in either closed or open position.

B. Storage: Use the following precautions during storage:

1. Do not remove valve end protectors unless necessary for inspection; then reinstall for storage.
2. Protect valves from weather. Store valves indoors. Maintain valve temperature higher than the ambient dew point temperature. If outdoor storage is necessary, support valves off the ground or pavement in watertight enclosures.

C. Handling: Use a sling to handle valves whose size requires handling by crane or lift. Rig valves to avoid damage to exposed valve parts. Do not use handwheels and stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, those listed in valve schedule.

2.2 VALVE FEATURES, GENERAL

A. Valve Design: Rising stem or rising outside screw and yoke stems.

1. Nonrising stem valves may be used where headroom prevents full extension

of rising stems.

B. Pressure and Temperature Ratings: As scheduled and required to suit system pressures and temperatures.

C. Sizes: Same size as upstream pipe, unless otherwise indicated.

D. Operators: Provide the following special operator features:

1. Handwheels, fastened to valve stem, for valves other than quarter turn.
2. Lever handles, on quarter-turn valves 6-inch and smaller, except for plug valves. Provide plug valves with square heads; provide one wrench for every 10 plug valves.
3. Chain-wheel operators, for valves 2-1/2-inch and larger, install 72 inches or higher above finished floor elevation. Extend chains to an elevation of 5'-0" above finished floor elevation.
4. Gear drive operators, on quarter-turn valves 8-inch and larger.

E. Extended Stems: Where insulation is indicated or specified, provide extended stems arranged to receive insulation.

F. Bypass and Drain Connections: Comply with MSS SP-45 bypass and drain connections.

G. End Connections: As indicated in the valve specifications.

1. Threads: Comply with ANSI B1.20.1
2. Flanges: Comply with ANSI B16.1 for cast iron, ANSI B16.5 for steel, and ANSI B16.24 for bronze valves
3. Solder-Joint: Comply with ANSI B16.18

a. Caution: Where soldered end connections are used, use solder having a melting point below 840 deg F for gate, globe, and check valves; below 421 deg F for ball valves.

2.3 GATE VALVES

A. Gate Valves, 2-Inch and Smaller: MSS SP-80; Class 150, body and union bonnet of ASTM B 62 cast bronze; with threaded or solder ends, solid disc, copper-silicon alloy stem, brass packing gland, "Teflon" impregnated packing, and malleable iron handwheel. Do not use solder end valves for hot water heating or steam piping applications.

B. Gate Valves, 2-1/2-Inch and Larger: MSS SP-70; Class 125 iron body, bronze mounted, with body and bonnet conforming to ASTM A 126 Class B; with flanged

ends, "Teflon" impregnated packing, and two-piece backing gland assembly.

2.4 BALL VALVES

A. Ball Valves, 1 Inch and Smaller: Rated for 150 psi saturated steam pressure, 400 psi WOG pressure; two-piece construction; with bronze body conforming to ASTM B 62, standard (or regular) port, chrome-plated brass ball, replaceable "Teflon" or "TFE" seats and seals, blowout-proof stem, and vinyl-covered steel handle. Provide solder ends for condenser water, chilled water, and domestic hot and cold water service; threaded ends for heating hot water and low-pressure steam.

B. Ball Valves, 1-1/4-Inch to 2-Inch: Rated for 150 psi saturated steam pressure, 400 psi WOG pressure; 3-piece construction; with bronze body conforming to ASTM B 62, conventional port, chrome-plated brass ball, replaceable "Teflon" or "TFE" seats and seals, blowout proof stem, and vinyl-covered steel handle. Provide solder ends for condenser water, chilled water, and domestic hot and cold water service; threaded ends for heating hot water and low-pressure steam.

2.5 PLUG VALVES

A. Plug Valves, 2-Inch and Smaller: Rated at 150 psi WOG; bronze body, with straightaway pattern, square head, and threaded ends.

B. Plug Valves, 2-1/2-Inch and Larger: MSS SP-78; rated at 175 psi WOG; lubricated plug type, with semisteel body, single gland, wrench operated, and flanged ends.

2.6 GLOBE VALVES

A. Globe Valves, 2-Inch and Smaller: MSS SP-80; Class 125; body and screwed bonnet of ASTM B 62 cast bronze; with threaded or solder ends, brass or replaceable composition disc, copper-silicon alloy stem, brass packing gland, "Teflon" impregnated packing, and malleable iron handwheel. Provide Class 150 valves meeting the above where system pressure requires.

B. Globe Valves, 2-1/2-Inch and Larger: MSS SP-85; Class 125 iron body and bolted bonnet conforming to ASTM A 126, Class B; with outside screw and yoke, bronze mounted, flanged ends, and "Teflon" impregnated packing, and two-piece backing gland assembly.

2.7 BUTTERFLY VALVES

A. Butterfly Valves, 2-1/2-Inch and Larger: MSS SP-67; rated at 200 psi; cast-iron body conforming to ASTM A 126, Class B. Provide valves with field replaceable EPDM sleeve, nickel-plated ductile iron disc (except aluminum bronze disc for valves installed in condenser water piping), stainless steel stem, and EPDM O-ring stem seals. Provide lever operators with locks for sizes 2 through 6 inches and gear operators with position indicator for sizes 8 through 24 inches. Provide lug or wafer type as indicated. Drill and tap valves on dead-end service or requiring additional body strength.

2.8 CHECK VALVES

A. Swing Check Valves, 2-Inch and Smaller: MSS SP-80; Class 125, cast-bronze body and cap conforming to ASTM B 62; with horizontal swing, Y-pattern, and bronze disc; and having threaded or solder ends. Provide valves capable of being reground while the valve remains in the line. Provide Class 150 valves meeting the above specifications, with threaded end connections, where system pressure requires or where Class 125 valves are not available.

B. Swing Check Valves, 2-1/2-Inch and Larger: MSS SP-71; Class 125 (Class 175 FM approved for fire protection piping systems), cast iron body and bolted cap conforming to ASTM A 126, Class B; horizontal swing, and bronze disc or cast-iron disc with bronze disc ring; and flanged ends. Provide valves capable of being refitted while the valve remains in the line.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine valve interior through the end ports for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks used to prevent disc movement during shipping and handling.

B. Actuate valve through an open-close and close-open cycle. Examine functionally significant features, such as guides and seats made accessible by such actuation. Following examination, return the valve closure member to the shipping position.

C. Examine threads on both the valve and the mating pipe for form (i.e., out-of-round or local indentation) and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Check gasket material for proper size, material composition suitable for service, and freedom from defects and damage.

E. Prior to valve installation, examine the piping for cleanliness, freedom from foreign materials, and proper alignment.

F. Replace defective valves with new valves.

3.2 VALVE ENDS SELECTION

A. Select valves with the following ends or types of pipe/tube connections:

1. Copper Tube Size, 2-Inch and Smaller: Solder ends, except provide threaded ends for heating hot water and low-pressure steam service.
2. Steel Pipe Sizes, 2-Inch and Smaller: threaded or grooved end.
3. Steel Pipe Sizes 2-1/2 Inch and Larger: grooved end or flanged.

3.3 VALVE INSTALLATIONS

A. General Application: Use gate, ball, and butterfly valves for shut-off duty; globe, ball, and butterfly for throttling duty. Refer to piping system specification sections for specific valve applications and arrangements.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves and unions for each fixture and item of equipment arranged to allow equipment removal without system shutdown. Unions are not required on flanged devices.

D. Install three-valve bypass around each pressure reducing valve using throttling-type valves.

E. Install valves in horizontal piping with stem at or above the center of the pipe.

F. Install valves in a position to allow full stem movement.

G. Installation of Check Valves: Install for proper direction of flow as follows:

1. Swing Check Valves: Horizontal position with hinge pin level.

3.4 SOLDER CONNECTIONS

A. Cut tube square and to exact lengths.

B. Clean end of tube to depth of valve socket with steel wool, sand cloth, or a steel wire brush to a bright finish. Clean valve socket in same manner.

C. Apply proper soldering flux in an even coat to inside of valve socket and outside of tube.

D. Open gate and globe valves to full open position.

E. Remove the cap and disc holder of swing check valves having composition discs.

F. Insert tube into valve socket, making sure the end rests against the shoulder inside valve. Rotate tube or valve slightly to ensure even distribution of the flux.

G. Apply heat evenly to outside of valve around joint until solder will melt upon contact. Feed solder until it completely fills the joint around tube. Avoid hot spots or overheating valve. Once the solder starts cooling, remove excess amounts around the joint with a cloth or brush.

3.5 THREADED CONNECTIONS

A. Note the internal length of threads in valve ends, and proximity of valve internal seat or wall, to determine how far pipe should be threaded into valve.

B. Align threads at point of assembly.

C. Apply appropriate tape or thread compound to the external pipe threads (except where dry seal threading is specified).

D. Assemble joint, wrench tight. Wrench on valve shall be on the valve end into which the pipe is being threaded.

3.6 FLANGED CONNECTIONS

A. Align flange surfaces parallel.

B. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly with a torque wrench.

C. For dead-end service, butterfly valves require flanges both upstream and downstream for proper shutoff and retention.

3.7 FIELD QUALITY CONTROL

A. Tests: After piping systems have been tested and put into service, but before final adjusting and balancing, inspect valves for leaks. Adjust or replace packing

to stop leaks; replace valves if leak persists.

3.8 ADJUSTING AND CLEANING

A. Cleaning: Clean mill scale, grease, and protective coatings from exterior of valves and prepare valves to receive finish painting or insulation.

3.9 VALVE PRESSURE/TEMPERATURE CLASSIFICATION SCHEDULES

VALVES, 2-INCH AND SMALLER

SERVICE	GATE	GLOBE	BALL	CHECK
Chilled Water	125	125	150	125

VALVES, 2-1/2-INCH AND LARGER

SERVICE	GATE	GLOBE	BUTTERFLY	CHECK
Chilled Water	125	125	200	125

3.10 VALVE SCHEDULE

A. Gate Valves - 2 Inch and Smaller:

MANUFACTURER	THREADED NRS	THREADED RS	SOLDER NRS	SOLDER RS
Crane	x	431UB	x	x
Grinnell	3050	3060	x	x
Hammond	IB637	IB629	x	IB648
Jenkins	x	47U	x	x
Lunkenheimer 3153	3151	3154	3155	
Milwaukee	x	1151	x	1169
Nibco	T-136	T-135	S-136	x
Powell	2712	2714	x	1842
Stockham	B-130	B-120	x	B-124

1. x means not available.

B. Gate Valves - 2-1/2 Inch and Larger:

MANUFACTURER	OS&Y RS	NRS

Crane		465-1/2	461
Grinnell		6020A	6060A
Hammond		IR1140	IR1138
Jenkins		651A	326
Lunkenheimer	1430	1428	
Milwaukee		F2885	F-2882
Nibco		617-O	F-619
Stockham		G623	G-612
Powell		1793	1787

C. Ball Valves - 1 Inch and Smaller:

MANUFACTURER		THREADED ENDS	SOLDER ENDS
Conbraco (Apollo)	70-100	70-200	
Crane		9302	9322
Grinnell		3500	3500SJ
Jamesbury		351	x
Jenkins		900T	902T
Lunkenheimer		708HST	x
Metraflex		IT	IS
Nibco		T-580	S-580
Powell		4210T	x
Stockham		S-216 BR-R-T	S-216 BR-R-S
Watts		B-6000	B-6001

1. x means not available.

D. Ball Valves - 1-1/4 Inch to 2 Inch:

MANUFACTURER		THREADED ENDS	SOLDER ENDS
Conbraco (Apollo)	82-100	82-200	
Grinnell		3810	3810SJ
Nibco		T-590-Y	S-590-Y
Powell		4201R	x
Stockham		S-216 BR-R-T	S-216 BR-R-S
Watts		B-6800	B-6801

1. For grooved end connections, use Victaulic Style 721.

E. Plug Valves - 2 Inch and Smaller:

1. Lunkenheimer: 454

F. Plug Valves - 2-1/2 Inch and Larger:

1. Powell: 2201

G. Globe Valves - 2 Inch and Smaller:

MANUFACTURER	CLASS 125 THREADED	CLASS 125 SOLDER	CLASS 150 THREADED
Crane	1	1310	17TF
Grinnell	3210	3210SJ	3240
Hammond	IB440	IB423	IB413T
Jenkins	746	1200	106-A-2
Lunkenheimer 2140	2146	407	
Milwaukee	502	1502	590
Nibco	T-211-B T-211-Y	S-211-B S-211-Y	T-235-Y
Powell	650	1823	150
Stockham	B-16	B-14T	B-22

H. Globe Valves - 2-1/2 Inch and Larger:

MANUFACTURER	STRAIGHT BODY	ANGLE BODY
Crane	351	353
Grinnell	6200A	x
Hammond	IR116	IR118
Jenkins	613	x
Lunkenheimer 1123	1124	
Milwaukee	F2981	F2986
Nibco	F-718-B	F-818-B
Powell	241	243
Stockham	G-512	G-515

1. x means not available

I. Butterfly Valves - 2-1/2 Inch and Larger:

1. The following are model numbers for wafer-type, with nickel-plated ductile-iron disc:

MANUFACTURER	LEVER	GEAR
Center Line	Series A	Series A
Crane	12	12
Conbraco (Apollo)	6X13X-01	6W13X-02
Grinnell	WC-8209-7	WC-8202-7

Keystone	239	239
Nibco	WD-20103	WD-20105
Powell	1011-DA1	1011-DA1
Stockham	LG512-DS3E	LG-522-DS3E
Watts	BF-04-111-11	BF-04-111-12

2. Grooved Ends: Victaulic Series 300 and 704

3. The following are model numbers for lug-type, with nickel-plated ductile-iron disc:

MANUFACTURER	LEVER	GEAR
Center Line	Series LT	Series LT
Crane	14	14
Conbraco (Apollo)	6L13X-01	6L-13X-02
Grinnell	LC-8209-7	LC-8202-7
Keystone	129	129
Nibco	LD-20103	LD-20105
Powell	5011-DA1	5011-DA1
Stockham	LG-712-DS3E	LG-722-DS3E
Watts	BF-03-111-11	BF-03-111-12

4. Grooved Ends: Victaulic Series 300 and 704

5. The following are model numbers for wafer-type, with aluminum-bronze disc:

MANUFACTURER	LEVER	GEAR
Center Line	Series A	Series A
Crane	42	42
Conbraco (Apollo)	6W-14X-01	6W-14X-02
Grinnell	WC-8289-7	WC-8282-7
Keystone	239	239
Nibco	WD-20003	WD-20005
Powell	1011-EA1	1011-EA1
Stockham	LG-512-BS3E	LG-522-BS3E
Watts	BF-04-121-11	BF-04-121-12

6. Grooved Ends: Victaulic Series 300A, 700A, and 703A

7. The following are model numbers for lug-type, with aluminum-bronze disc:

MANUFACTURER	LEVER	GEAR
Center Line	Series LT	Series LT
Crane	44	44
Conbraco (Apollo)	6L-14X-01	6L-14X-02

Grinnell	LC-8289-7	LC-8282-7
Keystone	129	129
Nibco	LD-20003	LD-20005
Powell	5011-BA1	5011-BA1
Stockham	LG-712-BS3E	LG-722-BS3E
Watts	BF-03-121-11	BF-03-121-12

8. Grooved Ends: Victaulic Series 300A, 700A, and 703A

A. Swing Check Valves - 2 Inch and Smaller:

MANUFACTURER	CLASS 125 THREADED ENDS	CLASS 125 SOLDER ENDS	CLASS 150 THREADED ENDS
Crane	37	1342	137
Grinnell	3300	3300SJ	3320
Hammond	IB940	IB941	IB946
Jenkins	92-A	1222	92-A
Lunkenheimer	2144 2145	230-70	
Milwaukee	509	1509	510
Nibco	T-413	S-413	T-433
Powell	578	1825	596
Stockham	B-319	B-309	B-321

1. For grooved connections, use Victaulic Series 712

B. Swing Check Valves - 2-1/2 Inch and Larger:

MANUFACTURER	CLASS 125	CLASS 175
Crane	373	x
Grinnell	6300A	x
Hammond	IR1124	x
Jenkins	x	729
Kennedy	x	Fig. 126
Lunkenheimer	1790 IBBM x	
Milwaukee	F2974	x
Nibco	F-918	x
Powell	559	x
Stockham	G-931	G-940

1. For grooved connections, use Victaulic Series 712
2. x means not available

M. Control valves
1. Johnson
2. Bray
3. Fischer
4. Tyco
5. Robertshaw
6. or equal

END OF SECTION 15100

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SECTION 15135 - METERS AND GAGES – 230900 CSI 2004

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes meters and gages used in mechanical systems.

B. Related Sections: Division 15 piping Sections contain requirements that relate to this Section.

1. Meters and gages furnished as part of factory-fabricated equipment are specified as part of the equipment assembly in other Division 15 Sections.

1.3 SUBMITTALS

A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product data for each type of meter, gage, and fitting specified. Include scale range, ratings, and calibrated performance curves, certified where indicated. Submit a meter and gage schedule showing manufacturer's figure number, scale range, location, and accessories for each meter and gage.

C. Product certificates signed by manufacturers of meters and gages certifying accuracies under specified operating conditions and compliance with specified requirements.

D. Maintenance data to include in the "Operating and Maintenance Manuals" specified in Division 1 Section "Project Closeout." Include data for the following:

1. Test plugs.

1.4 QUALITY ASSURANCE

A. Comply with applicable portions of American Society of Mechanical Engineers (ASME) and Instrument Society of America (ISA) standards pertaining to construction and installation of meters and gages.

B. Design Criteria: The Drawings indicate types, sizes, capacities, ranges, profiles, connections, and dimensional requirements of meters and gages and are based on the specific manufacturer types and models indicated. Meters and gages having equal performance characteristics by other manufacturers may be considered, provided that deviations do not change the design concept or intended performance as judged by the Project Manager. The burden of proof for equality of meters and gages is on the proposer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

1. Liquid-in-Glass Thermometers:

    a. Marsh Instrument Co.
    b. Marshalltown Instruments, Inc.
    c. H.O. Trerice Co.
    d. Weiss Instruments, Inc.
    e. Weksler Instruments Corp.

2. Direct-Mounting Filled-System Dial Thermometers:

    a. Ashcroft Instrument Div. of Dresser Industries.
    b. Marsh Instrument Co.
    c. H.O. Trerice Co.
    d. Weiss Instruments, Inc.
    e. Weksler Instruments Corp.

3. Remote-Reading Filled-System Dial Thermometers:

    a. AMETEK, U.S. Gauge Div.
    b. Ashcroft by Dresser Industries, Instrument Div.
    c. Marsh Instrument Co.
    d. Tel-Tru Manufacturing Co., Inc.
    e. H.O. Trerice Co.
    f. Weiss Instruments, Inc.
    g. Weksler Instruments Corp.

4. Bimetal Dial Thermometers:

a. Ashcroft by Dresser Industries, Instrument Div.
b. Marsh Instrument Co.
c. Marshalltown Instruments, Inc.
d. Reotemp Instrument Corp.
e. Tel-Tru Manufacturing Co., Inc.

f. H.O. Trerice Co.
g. Weiss Instruments, Inc.
h. Weksler Instruments Corp.

5. Insertion Dial Thermometers:

a. Ashcroft by Dresser Industries, Instrument Div.
b. Reotemp Instrument Corp.
c. Tel-Tru Manufacturing Co., Inc.
d. H.O. Trerice Co.
e. Weiss Instruments, Inc.
f. Weksler Instruments Corp.

6. Pressure Gages:

a. AMETEK, U.S. Gauge Div.
b. Ashcroft by Dresser Industries, Instrument Div.
c. Marsh Instrument Co.
d. Marshalltown Instruments, Inc.
e. H.O. Trerice Co.
f. Weiss Instruments, Inc.
g. Weksler Instruments Corp.
h. WIKA Instruments Corp.

7. Test Plugs:

a. Flow Design, Inc.
b. MG Piping Products Co.
c. Peterson Equipment Co., Inc.
d. Sisco Co., Spedco, Inc.
e. H.O. Trerice Co.
f. Watts Regulator Co.

2.2 THERMOMETERS, GENERAL

A. Scale Range: Temperature ranges for services listed as follows:

1. Chilled Water: 0 to 100 deg F, with 2-degree scale divisions (minus 18 to 38 deg C, with 1-degree scale divisions).

B. Accuracy: Plus or minus 1 percent of range span or plus or minus one scale division to maximum of 1.5 percent of range span.

2.3 LIQUID-IN-GLASS THERMOMETERS

A. Description: ASTM E 1, liquid-in-glass thermometer.

B. Case: Die-cast and aluminum-finished in baked-epoxy enamel, glass front, spring secured, 9 inches (230 mm) long.

C. Adjustable Joint: Finished to match case, 180-degree (3.1rad) adjustment in vertical plane, 360-degree (6.3rad) adjustment in horizontal plane, with locking device.

D. Tube: Red-reading, organic liquid-filled instead of mercury-filled, with magnifying lens.

E. Scale: Satin-faced nonreflective aluminum with permanently etched markings.

F. Stem: Copper-plated, steel, aluminum, or brass for a separable socket of length to suit installation.

2.4 DIRECT-MOUNTING FILLED-SYSTEM DIAL THERMOMETERS

A. Description: Vapor-actuated universal-angle dial thermometer.

B. Case: Drawn steel or cast aluminum, with 4-1/2-inch (115mm) -diameter glass lens.

C. Adjustable Joint: Finish to match case, 180-degree (3.1rad) adjustment in vertical plane, 360-degree (6.3rad) adjustment in horizontal plane, with locking device.

D. Thermal Bulb: Copper with phosphor-bronze Bourdon pressure tube.

E. Movement: Brass, precision geared.

F. Scale: Progressive satin-faced nonreflective aluminum with permanently etched markings.

G. Stem: Copper-plated steel, aluminum, or brass for a separable socket of length to suit installation.

2.5 REMOTE-READING, FILLED-SYSTEM DIAL THERMOMETERS

A. Description: Vapor-actuated remote-reading dial thermometer.

B. Case: Drawn steel or cast aluminum, with 4-1/2-inch (115mm) -diameter glass lens.

C. Movement: Brass, precision geared.

D. Scale: Progressive satin-faced nonreflective aluminum with permanently etched markings.

E. Tubing: Bronze double-braided armor-over-copper capillary of length to suit installation.

F. Bulb: Copper with separable socket for liquids; averaging element for air.

2.6 BIMETAL DIAL THERMOMETERS

A. Description: Direct-mounted universal-angle bimetal dial thermometer.

B. Case: Stainless steel with 5-inch (125mm) -diameter glass lens.

C. Adjustable Joint: Finish to match case, 180-degree (3.1rad) adjustment in vertical plane, 360-degree (6.3rad) adjustment in horizontal plane, with locking device.

D. Element: Bimetal coil.

E. Scale: Satin-faced nonreflective-aluminum with permanently etched markings.

F. Stem: Stainless steel for separable socket, of length to suit installation.

2.7 INSERTION DIAL THERMOMETERS

A. Description: Bimetal dial thermometer.

B. Dial: 1-inch (25mm) diameter.

C. Case: Stainless steel.

D. Stem: Dustproof and leakproof 1/8-inch (3mm) -diameter tapered-end stem with nominal length of 5 inches (125 mm).

2.8 THERMOMETER WELLS

A. Description: Brass or stainless-steel thermometer well.

B. Pressure Rating: Not less than piping system design pressure.

C. Stem Length: To extend 2 inches (50 mm) into fluid.

D. Stem Length: To extend to center of pipe.

E. Extension for Insulated Piping: 2 inches (50 mm) nominal, but not less than thickness of insulation.

F. Threaded Cap Nut: With chain permanently fastened to well and cap.

2.9 PRESSURE GAGES

A. Description: ASME B40.1, Grade A phosphor-bronze Bourdon-tube pressure gage, with bottom connection.

B. Case: Drawn steel, brass, or aluminum with 4-1/2-inch (115mm) -diameter glass lens.

C. Connector: Brass, 1/4-inch (8mm) NPS.

D. Scale: White-coated aluminum, with permanently etched markings.

E. Accuracy: Plus or minus 1 percent of range span.

F. Range: Conform to the following:

1. Fluids Under Pressure: 2 times operating pressure.

2.10 PRESSURE-GAGE ACCESSORIES

A. Syphons: 1/4-inch (8mm) straight coil of brass tubing with threads on each end.

B. Snubbers: 1/4-inch (8mm) brass bushing with corrosion-resistant porous-metal disc of material suitable for system fluid and working pressure.

2.11 TEST PLUGS

A. Description: Nickel-plated brass-body test plug in 1/2-inch (15mm) fitting.

B. Body: Length as required to extend beyond insulation.

C. Pressure Rating: 500 psig (3450 kPa) minimum.

D. Core Inserts: 2 self-sealing valve types, suitable for inserting a 1/8-inch (3mm) outside-diameter probe from a dial thermometer or pressure gage.

E. Core Material: According to the following for fluid and temperature range:

1. Air, Water, Oil, and Gas: 20 to 200 deg F (minus 7 to 93 deg C), neoprene rubber.
2. Air and Water: Minus 30 deg to 275 deg F (minus 35 to 136 deg C), ethylene-propylene-diene-terpolymer (EPDM) rubber.

F. Test-Plug Cap: Gasketed and threaded cap, with retention chain.

G. Test Kit: Provide test kit consisting of 1 pressure gage and gage adapter with probe, 2 bimetal dial thermometers and a carrying case.

H. Pressure Gage and Thermometer Ranges: Approximately 2 times systems operating conditions.

PART 3 - EXECUTION

3.1 METER AND GAGE APPLICATIONS

A. General: Where indicated, install meters and gages of types, sizes, capacities, and with features indicated.

3.2 METER AND GAGE INSTALLATION, GENERAL

A. Install meters, gages, and accessories according to manufacturers' written instructions for applications where used.

3.3 THERMOMETER INSTALLATION

A. Install thermometers and adjust vertical and tilted positions.

B. Install in the following locations and elsewhere as indicated:

1. At inlet and outlet of each hydronic zone.
2. At inlet and outlet of each hydronic coil in air-handling units and built-up central systems.

C. Remote-Reading Dial Thermometers: Install in control panels with tubing connecting panel and thermometer bulb supported to prevent kinks. Use minimum tubing length.

D. Thermometer Wells: Install in vertical position in piping tees where thermometers are indicated.

1. Install wells with stem extending minimum of 2 inches (50 mm) into fluid.
2. Install wells with stem extending to center of pipe.

3. Fill wells with oil or graphite and secure caps.

3.4 PRESSURE GAGE INSTALLATION

A. Install pressure gages in piping tee with pressure gage valve located on pipe at most readable position.

B. Install in the following locations and elsewhere as indicated:

1. At chilled water and condenser water inlets and outlets of hydronic coils.

C. Pressure Gage Needle Valves: Install in piping tee with snubber. Install syphon instead of snubber for steam pressure gages.

3.5 TEST PLUG INSTALLATION

A. Install test plugs in piping tees where indicated, located on pipe at most readable position. Secure cap.

END OF SECTION 15135

SECTION 15145 - HANGERS AND SUPPORTS – 230529 CSI 2004

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawing and general provisions of the Contract, including the General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes hangers and supports for mechanical systems piping and equipment.

1.3 DEFINITIONS

A. Terminology used in this Section is defined in MSS SP-90.

1.4 PERFORMANCE REQUIREMENTS

A. Design seismic restraint hangers and supports, for piping and equipment.

B. Design and obtain approval from authority with jurisdiction over seismic restraint hangers and supports for piping and equipment.

1.5 SUBMITTALS

A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product data for each type of hanger and support.

C. Submit pipe hanger and support schedule showing manufacturer's Figure No., size, location, and features for each required pipe hanger and support.

D. Welder certificates signed by Contractor certifying that welders comply with requirements specified under the "Quality Assurance" Article.

E. Shop drawings for each type of hanger and support, indicating dimensions, weights, required clearances, and methods of component assembly.

1.6 QUALITY ASSURANCE

A. Qualify welding processes and welding operators according to AWS D1.1

"Structural Welding Code--Steel."

1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

B. Qualify welding processes and welding operators according to ASME "Boiler and Pressure Vessel Code," Section IX, "Welding and Brazing Qualifications."

C. Listing and Labeling: Provide hangers and supports that are listed and labeled as defined in NFPA 70, Article 100.

1. UL and FM Compliance: Hangers, supports, and components include listing and labeling by UL and FM where used for fire protection piping systems.
2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

D. Licensed Operators: Use operators that are licensed by powder-operated tool manufacturers to operate their tools and fasteners.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Hangers, Supports, and Components: Factory-fabricated according to MSS SP-58.

1. Components include galvanized coatings where installed for piping and equipment that will not have a field-applied finish.
2. Pipe attachments include nonmetallic coating for electrolytic protection where attachments are in direct contact with copper tubing.

B. Thermal-Hanger Shield Inserts: 100-psi (690kPa) average compressive strength, waterproofed calcium silicate, encased with sheet metal shield. Insert and shield cover entire circumference of pipe and are of length indicated by manufacturer for pipe size and thickness of insulation.

C. Powder-Actuated Drive-Pin Fasteners: Powder-actuated-type, drive-pin attachments with pull-out and shear capacities appropriate for supported loads and building materials where used. Fasteners for fire protection systems include UL listing and FM approval.

D. Mechanical-Anchor Fasteners: Insert-type attachments with pull-out and shear capacities appropriate for supported loads and building materials where used. Fasteners for fire protection systems include UL listing and FM approval.

2.2 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars, black and galvanized.

B. Bolts and Nuts: ASME B18.10 or ASTM A 183, steel, hex-head, track bolts and nuts.

C. Washers: ASTM F 844, steel, plain, flat washers.

D. Grout: ASTM C 1107, Grade B, nonshrink, nonmetallic.

1. Characteristics include post-hardening, volume-adjusting, dry, hydraulic-cement-type grout that is nonstaining, noncorrosive, nongaseous and is recommended for both interior and exterior applications.
2. Design Mix: 5000-psi (34.5MPa), 28-day compressive strength.
3. Water: Potable.
4. Packaging: Premixed and factory-packaged.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT APPLICATIONS

A. Specific hanger requirements are specified in the Section specifying the equipment and systems.

B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping specification Sections.

3.2 HANGER AND SUPPORT INSTALLATION

A. General: Comply with MSS SP-69 and SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.

B. Arrange for grouping of parallel runs of horizontal piping supported together on field-fabricated, heavy-duty trapeze hangers where possible.

C. Install supports with maximum spacings complying with MSS SP-69.

D. Where pipes of various sizes are supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.

E. Install building attachments within concrete or to structural steel. Space

attachments within maximum piping span length indicated in MSS SP-69. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten insert to forms. Install reinforcing bars through openings at top of inserts.

F. Install concrete inserts in new construction prior to placing concrete. Concrete drilling is allowed on exterior concrete on the ground level for mounting pipe supports.

G. Install powder-actuated drive-pin fasteners in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual. Do not use in lightweight concrete slabs or in concrete slabs less than 4 inches (100 mm) thick.

H. Install mechanical-anchor fasteners in concrete after concrete is placed and completely cured. Install according to fastener manufacturer's written instructions. Do not use in lightweight concrete slabs or in concrete slabs less than 4 inches (100 mm) thick.

I. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

J. Heavy-Duty Steel Trapezes: Field-fabricate from ASTM A 36 steel shapes selected for loads being supported. Weld steel according to AWS D-1.1.

K. Support fire protection systems piping independent of other piping.

L. Install hangers and supports to allow controlled movement of piping systems, permit freedom of movement between pipe anchors, and facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

M. Load Distribution: Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.

N. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so that maximum pipe deflections allowed by ASME B31.9 "Building Services Piping" is not exceeded.

O. Insulated Piping: Comply with the following installation requirements.

1. Clamps: Attach clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed pipe stresses allowed by ASME B31.9.

2. Saddles: Install protection saddles MSS Type 39 where insulation without vapor barrier is indicated. Fill interior voids with segments of insulation that match adjoining pipe insulation.
3. Shields: Install MSS Type 40, protective shields on cold piping with vapor barrier. Shields span an arc of 180 degrees (3.1 rad) and have dimensions in inches (mm) not less than the following:

NPS (Inches)	LENGTH (Inches)	THICKNESS (Inches)
1/4 to 3-1/2	12	0.048
4	12	0.060
5 and 6	18	0.060
8 to 14	24	0.075

PIPE SIZE (mm)	LENGTH (mm)	THICKNESS (mm)
8 to 90	300	1.22
100	300	1.52
125 and 150	450	1.52
200 to 350	600	1.91

4. Insert Material: Length at least as long as the protective shield.
5. Thermal-Hanger Shields: Install with insulation of same thickness as piping.

3.3 EQUIPMENT SUPPORTS

A. Fabricate structural steel stands to suspend equipment from structure above or support equipment above floor.

B. Grouting: Place grout under supports for equipment, and make a smooth bearing surface.

3.4 METAL FABRICATION

A. Cut, drill, and fit miscellaneous metal fabrications for pipe and equipment supports.

B. Fit exposed connections together to form hairline joints. Field-weld connections that cannot be shop-welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1 procedures for manual shielded metal-arc welding, appearance and quality of welds, methods used in correcting welding work, and the following:

1. Use materials and methods that minimize distortion and develop strength and

corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so that no roughness shows after finishing, and so that contours of welded surfaces match adjacent contours.

3.5 ADJUSTING

A. Hanger Adjustment: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

3.6 PAINTING

A. Touching Up: Clean field welds and abraded areas of shop paint and paint exposed areas immediately after erection of hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils (0.05 mm).

B. Touching Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal to match existing paint colors

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 15145

SECTION 15170 – MOTORS –230513 CSI 2004

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes basic requirements for motors. It includes motors that are factory-installed as part of equipment and appliances as well as field-installed motors.

1.3 QUALITY ASSURANCE

A. Comply with NFPA 70, "National Electrical Code."

B. NRTL Listing: Provide NRTL listed motors.

1. Term "Listed": As defined in "National Electrical Code," Article 100.
2. Listing Agency Qualifications: "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

C. Comply with NEMA MG 1, "Motors and Generators."

D. Comply with UL 1004, "Motors, Electric."

E. Comply with Ashrae 90.1 and the Florida Energy Code standard for motor efficiency.

PART 2 - PRODUCTS

2.1 MOTORS, GENERAL

A. General: Requirements below apply to motors covered by this Section except as otherwise indicated.

B. Motors 1/2 HP and Larger: Polyphase.

C. Motors Smaller Than 1/2 HP: Single-phase.

D. Frequency Rating: 60 Hz.

E. Voltage Rating: Determined by voltage of circuit to which motor is connected for the following motor voltage ratings (utilization voltages):

1. 120 V Circuit: 115 V - motor rating.
2. 208 V Circuit: 200 V - motor rating.
3. 240 V Circuit: 230 V - motor rating.
4. 480 V Circuit: 460 V - motor rating.

F. Service factors indicated for motors are minimum values and apply at frequency and utilization voltage at which motor is connected. Provide motors which will not operate in service factor range when supply voltage is within 10 percent of motor voltage rating.

G. Capacity: Sufficient to start and operate connected loads at designated speeds in indicated environment, and with indicated operating sequence, without exceeding nameplate ratings. Provide motors rated for continuous duty at 100 percent of rated capacity.

H. Temperature Rise: Based on 40 deg C ambient except as otherwise indicated.

I. Enclosure: Open dripproof, TEFC for exterior motors .

2.2 POLYPHASE MOTORS

A. General: Squirrel-cage induction-type conforming to the following requirements except as otherwise indicated.

B. NEMA Design Letter Designation: "B."

C. Multi-Speed Motors: Separate winding for each speed.

D. Energy Efficient Motors: Nominal efficiency equal to or greater than that stated in Ashrae 90.1 -2010 for that type and rating of motor.

E. Variable Speed Motors for Use With Solid-State Drives: Energy efficient, squirrel-cage induction, design B units with ratings, characteristics, and features coordinated with and approved by drive manufacturer.

F. Internal Thermal Overload Protection For Motors: For motors so indicated, protection automatically opens control circuit arranged for external connection. Protection operates when winding temperature exceeds safe value calibrated to

the temperature rating of the motor insulation.

G. Bearings: Double-shielded, prelubricated ball bearings suitable for radial and thrust loading of the application.

H. Rugged Duty Motors: Totally enclosed with 1.25 minimum service factor. Provide motors with regreasable bearings and equipped with capped relief vents. Insulate windings with nonhygroscopic material. External finish shall be chemical resistant paint over corrosion resistant primer. Provide integral condensate drains.

I. Motors for Reduced Inrush Starting: Coordinate with indicated reduced inrush controller type and with characteristics of driven equipment load. Provide required wiring leads in motor terminal box to suit control method.

2.3 SINGLE-PHASE MOTORS

A. General: Conform to the following requirements except as otherwise indicated.

B. Energy Efficient Motors: One of the following types as selected to suit the starting torque and other requirements of the specific motor application.

1. Permanent Split Capacitor.
2. Split-Phase Start, Capacitor-Run.
3. Capacitor-Start, Capacitor-Run.
4. Nema Premium Efficient

C. Shaded-Pole Motors: Use only for motors smaller than 1/20 hp.

D. Internal Thermal Overload Protection for Motors: For motors so indicated, protection automatically opens the power supply circuit to the motor, or a control circuit arranged for external connection. Protection operates when winding temperature exceeds a safe value calibrated to the temperature rating of the motor insulation. Provide device that automatically resets when motor temperature returns to normal range except as otherwise indicated.

E. Bearings, belt connected motors and other motors with high radial forces on motor shaft shall be ball bearing type. Sealed, prelubricated sleeve bearings may be used for other single phase motors.

F. Refer to schedules for motors in air streams rated for smoke and heat use with shields and extended lubricant lines.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: The following requirements apply to field-installed motors.

B. Install motors in accordance with manufacturer's published instructions and the following:

1. Direct Connected Motors: Mount securely in accurate alignment.
2. Belt Drive Motors: Use adjustable motor mounting bases. Align pulleys and install belts. Use belts identified by the manufacturer and tension belts in accordance with manufacturer recommendations.

3.2 COMMISSIONING

A. Check operating motors, both factory and field-installed, for unusual conditions during normal operation. Coordinate with the commissioning of the equipment for which the motor is a part.

B. Report unusual conditions.

C. Correct deficiencies of field-installed units including sheave and bearing changes.

END OF SECTION 15170

SECTION 15250 - MECHANICAL INSULATION –230700 CSI 2004

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes pipe, duct, and equipment insulation.

B. Related Sections: The following sections contain requirements that relate to this section:

1. Division 15 Section "Supports and Anchors" for pipe insulation shields and protection saddles.
2. Division 15 Section "Metal Ductwork" for duct lining.

1.3 DEFINITIONS

A. Hot Surfaces: Normal operating temperatures of 100 deg F or higher.

B. Dual-Temperature Surfaces: Normal operating temperatures that vary from hot to cold.

C. Cold Surfaces: Normal operating temperatures less than 75 deg F.

D. Thermal Resistivity: "r-values" represent the reciprocal of thermal conductivity (k-value). Thermal conductivity is the rate of heat flow through a homogenous material exactly 1 inch thick. Thermal resistivities are expressed by the temperature difference in degrees F between two exposed faces required to cause one Btu to flow through one square foot of material, in one hour, at a given mean temperature.

E. Density: Is expressed in lb/sq.ft.

1.4 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data for each type of mechanical insulation identifying k-value, thickness, and accessories.

C. Samples of each type of insulation and jacket. Identify each sample describing product and intended use. Submit the following sizes of sample materials:

1. Board and Block Insulation: 12-inch square section.
2. Pre-Formed Pipe Insulation: 12 inches long, 4-inch NPS.

D. Material certificates, signed by the manufacturer, certifying that materials comply with specified requirements where laboratory test reports cannot be obtained.

E. Material test reports prepared by a qualified independent testing laboratory. Certify insulation meets specified requirements.

1.5 QUALITY ASSURANCE

A. Fire Performance Characteristics: Conform to the following characteristics for insulation including facings, cements, and adhesives, when tested according to ASTM E 84, by UL or other testing or inspecting organization acceptable to the authority having jurisdiction. Label insulation with appropriate markings of testing laboratory.

1. Interior Insulation: Flame spread rating of 25 or less and a smoke developed rating of 50 or less.
2. Exterior Insulation: Flame spread rating of 75 or less and a smoke developed rating of 150 or less.

1.6 SEQUENCING AND SCHEDULING

A. Schedule insulation application after testing of piping and duct systems.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

1. Glass Fiber:

    a. CertainTeed Corporation.
    b. Knauf Fiberglass GmbH.
    c. Manville.
    d. Owens-Corning Fiberglas Corporation.
    e. USG Interiors, Inc. - Thermafiber Division.

2. Cellular Glass:

    a. Pittsburgh Corning Corporation Foamglass

3. Flexible Elastomeric Cellular:

    a. Armstrong World Industries, Inc.
    b. Halstead Industrial Products.
    c. IMCOA.
    d. Rubatex Corporation.

2.2 GLASS FIBER

A. Material: Inorganic glass fibers, bonded with a thermosetting resin.

B. Jacket: All-purpose, factory-applied, laminated glass-fiber-reinforced, flame-retardant kraft paper and aluminum foil having self-sealing lap.

C. Board: ASTM C 612, Class 2, semi-rigid jacketed board.

1. Thermal Conductivity: 0.26 average maximum, at 75 deg F mean temperature.
2. Density: 12 pcf average maximum.

D. Blanket: ASTM C 553, Type II, Class F-1, jacketed flexible blankets.

1. Thermal Conductivity: 0.32 average maximum, at 75 deg F mean temperature.

E. Preformed Pipe Insulation: ASTM C 547, Class 1, rigid pipe insulation, jacketed.

1. Thermal Conductivity: 0.26 average maximum at 75 deg F mean temperature.
2. Density: 10 average maximum.

F. Adhesive: Produced under the UL Classification and Follow-up service.

1. Type: Non-flammable, solvent-based.
2. Service Temperature Range: Minus 20 to 180 deg F.

G. Vapor Barrier Coating: Waterproof coating recommended by insulation manufacturer for outside service.

2.3 CELLULAR GLASS

A. Material: Inorganic, foamed or cellulated glass, annealed, rigid, hermetically sealed cells, incombustible.

B. Facing: ASTM C 921, Type 1, factory-applied, laminated foil, flame-retardant, vinyl facing.

C. Form: The following as indicated:

1. Blocks: ASTM C 552, Type I.
2. Boards: ASTM C 552, Type IV.
3. Preformed Pipe: ASTM C 552, Type II, Class 2 (jacketed).
4. Special Shapes: ASTM C 552, Type III, in shapes and thicknesses as indicated.

D. Thermal Conductivity: 0.29 average maximum at 75 deg F mean temperature.

E. Minimum Density: 7 pcf.

F. Maximum Density: 9.5 pcf.

2.4 FLEXIBLE ELASTOMERIC CELLULAR

A. Material: Flexible expanded closed-cell structure with smooth skin on both sides.

1. Tubular Materials: ASTM C 534, Type I.
2. Sheet Materials: ASTM C 534, Type II.

B. Thermal Conductivity: 0.30 average maximum at 75 deg F.

C. Coating: Water based latex enamel coating recommended by insulation manufacturer.

2.5 INSULATING CEMENTS

A. Mineral Fiber: ASTM C 195.

1. Thermal Conductivity: 1.0 average maximum at 500 deg F mean temperature.
2. Compressive Strength: 10 psi at 5 percent deformation.

B. Expanded or Exfoliated Vermiculite: ASTM C 196.

1. Thermal Conductivity: 1.10 average maximum at 500 deg F mean temperature.
2. Compressive Strength: 5 psi at 5 percent deformation.

C. Mineral Fiber, Hydraulic-Setting Insulating and Finishing Cement: ASTM C 449.

1. Thermal Conductivity: 1.2 average maximum at 400 deg F mean temperature.
2. Compressive Strength: 100 psi at 5 percent deformation.

2.6 ADHESIVES

A. Flexible Elastomeric Cellular Insulation Adhesive: Solvent-based, contact adhesive recommended by insulation manufacturer.

B. Lagging Adhesive: MIL-A-3316C, non-flammable adhesive in the following Classes and Grades:

1. Class 1, Grade A for bonding glass cloth and tape to unfaced glass fiber insulation, sealing edges of glass fiber insulation, and bonding lagging cloth to unfaced glass fiber insulation.
2. Class 2, Grade A for bonding glass fiber insulation to metal surfaces.

2.7 JACKETS

A. General: ASTM C 921, Type 1, except as otherwise indicated.

B. Foil and Paper Jacket: Laminated glass-fiber-reinforced, flame-retardant kraft paper and aluminum foil.

1. Water Vapor Permeance: 0.02 perm maximum, when tested according to ASTM E 96.
2. Puncture Resistance: 50 beach units minimum, when tested according to ASTM D 781.

C. Aluminum Jacket: ASTM B 209, 3003 Alloy, H-14 temper, factory cut and rolled to indicated sizes.

2.8 ACCESSORIES AND ATTACHMENTS

A. Glass Cloth and Tape: Woven glass fiber fabrics, plain weave, presized a minimum of 8 ounces per sq. yd.

1. Tape Width: 4 inches.
2. Cloth Standard: MIL-C-20079H, Type I.
3. Tape Standard: MIL-C-20079H, Type II.

B. Bands: 3/4-inch wide, in one of the following materials compatible with jacket:

1. Stainless Steel: Type 304, 0.020 inch thick.
2. Galvanized Steel: 0.005 inch thick.
3. Aluminum: 0.007 inch thick.
4. Brass: 0.01 inch thick.
5. Nickel-Copper Alloy: 0.005 inch thick.

C. Wire: 14-gage nickel copper alloy, 16-gage, soft-annealed stainless steel, or 16-gage, soft-annealed galvanized steel.

D. Corner Angles: 28-gage, 1-inch by 1-inch aluminum, adhered to 2-inch by 2-inch kraft paper.

E. Anchor Pins: Capable of supporting 20 pounds each. Provide anchor pins and speed washers of sizes and diameters as recommended by the manufacturer for insulation type and thickness.

2.9 SEALING COMPOUNDS

A. Vapor Barrier Compound: Water-based, fire-resistive composition.

1. Water Vapor Permeance: 0.08 perm maximum.
2. Temperature Range: Minus 20 to 180 deg F.

B. Weatherproof Sealant: Flexible-elastomer-based, vapor-barrier sealant designed to seal metal joints.

1. Water Vapor Permeance: 0.02 perm maximum.
2. Temperature Range: Minus 50 to 250 deg F.
3. Color: Aluminum.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Preparation: Clean, dry, and remove foreign materials such as rust, scale, and dirt.

B. Mix insulating cements with clean potable water. Mix insulating cements contacting stainless-steel surfaces with demineralized water.

1. Follow cement manufacturer's printed instructions for mixing and portions.

3.2 INSTALLATION, GENERAL

A. Refer to schedules at the end of this Section for materials, forms, jackets, and thicknesses required for each mechanical system.

B. Select accessories compatible with materials suitable for the service. Select accessories that do not corrode, soften, or otherwise attack the insulation or jacket in either the wet or dry state.

C. Install vapor barriers on insulated pipes, ducts, and equipment having surface operating temperatures below 60 deg F.

D. Apply insulation material, accessories, and finishes according to the manufacturer's printed instructions.

E. Install insulation with smooth, straight, and even surfaces.

F. Seal joints and seams to maintain vapor barrier on insulation requiring a vapor barrier.

G. Seal penetrations for hangers, supports, anchors, and other projections in insulation requiring a vapor barrier.

H. Seal Ends: Except for flexible elastomeric insulation, taper ends at 45 degree angle and seal with lagging adhesive. Cut ends of flexible elastomeric cellular insulation square and seal with adhesive.

I. Apply adhesives and coatings at manufacturer's recommended coverage-per-gallon rate.

J. Keep insulation materials dry during application and finishing.

K. Items Not Insulated: Unless otherwise indicated do not apply insulation to the following systems, materials, and equipment:

1. Fibrous glass ducts.

2. Metal ducts with duct liner.
3. Factory-insulated flexible ducts.
4. Factory-insulated plenums, casings, terminal boxes, and filter boxes and sections.
5. Flexible connectors for ducts and pipes.
6. Vibration control devices.
7. Testing laboratory labels and stamps.
8. Nameplates and data plates.
9. Access panels and doors in air distribution systems.

3.3 PIPE INSULATION INSTALLATION, GENERAL

A. Tightly butt longitudinal seams and end joints. Bond with adhesive.

B. Stagger joints on double layers of insulation.

C. Apply insulation continuously over fittings, valves, and specialties, except as otherwise indicated.

D. Apply insulation with a minimum number of joints.

E. Apply insulation with integral jackets as follows:

1. Pull jacket tight and smooth.
2. Cover circumferential joints with butt strips, at least 3-inches wide, and of same material as insulation jacket. Secure with adhesive and outward clinching staples along both edges of butt strip and space 4 inches on center.
3. Longitudinal Seams: Overlap seams at least 1-1/2 inches. Apply insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches on center.

    a. Exception: Do not staple longitudinal laps on insulation applied to piping systems with surface temperatures at or below 35 deg F.

4. Vapor Barrier Coatings: Where vapor barriers are indicated, apply on seams and joints, over staples, and at ends butt to flanges, unions, valves, and fittings.
5. At penetrations in jackets for thermometers and pressure gages, fill and seal voids with vapor barrier coating.
6. Repair damaged insulation jackets, except metal jackets, by applying jacket material around damaged jacket. Adhere, staple, and seal. Extend patch at least 2 inches in both directions beyond damaged insulation

jacket and around the entire circumference of the pipe.

F. Roof Penetrations: Apply insulation for interior applications to a point even with the top of the roof flashing. Seal with vapor barrier coating. Apply insulation for exterior applications butted tightly to interior insulation ends. Extend metal jacket for exterior insulation outside roof flashing at least 2 inches below top of roof flashing. Seal metal jacket to roof flashing with vapor barrier coating.

G. Interior Walls and Partitions Penetrations: Apply insulation continuously through walls and partitions, except fire-rated walls and partitions. Apply an aluminum jacket with factory-applied moisture barrier over insulation. Extend 2 inches from both surfaces of wall or partition. Secure aluminum jacket with metal bands at both ends. Seal ends of jacket with vapor barrier coating. Seal around penetration with joint sealer. Refer to Division 7 Section "Joint Sealants."

H. Fire-Rated Walls and Partitions Penetrations: Terminate insulation at penetrations through fire-rated walls and partitions. Seal insulation ends with vapor barrier coating. Seal around penetration with firestopping or fire-resistant joint sealer. Refer to plans for firestopping.

I. Floor Penetrations: Terminate insulation underside of floor assembly and at floor support at top of floor.

J. Flanges, Fittings, and Valves - Interior Exposed and Concealed: Coat pipe insulation ends with vapor barrier coating. Apply premolded, precut, or field-fabricated segments of insulation around flanges, unions, valves, and fittings. Make joints tight. Bond with adhesive.

1. Use same material and thickness as adjacent pipe insulation.
2. Overlap nesting insulation by 2 inches or 1-pipe diameter, which ever is greater.
3. Apply materials with adhesive, fill voids with mineral fiber insulating cement. Secure with wire or tape.
4. Insulate elbows and tees smaller than 3-inches pipe size with premolded insulation.
5. Insulate elbows and tees 3 inches and larger with premolded insulation or insulation material segments. Use at least 3 segments for each elbow.
6. Cover insulation, except for metal jacketed insulation, with PVC fitting covers and seal circumferential joints with butt strips.
7. Cover insulation, except for metal jacketed insulation, with 2 layers of lagging adhesive to a minimum thickness of 1/16 inch. Install glass cloth between layers. Overlap adjacent insulation by 2 inches in both directions from joint with glass cloth and lagging adhesive.

K. Hangers and Anchors: Apply insulation continuously through hangers and around anchor attachments. Install saddles, shields, and inserts as specified in Division 15 Section "Supports and Anchors." For cold surface piping, extend

insulation on anchor legs a minimum of 12 inches and taper and seal insulation ends.

1. Inserts and Shields: Cover hanger inserts and shields with jacket material matching adjacent pipe insulation.

3.4 GLASS FIBER PIPE INSULATION INSTALLATION

A. Bond insulation to pipe with lagging adhesive.

B. Seal exposed ends with lagging adhesive.

C. Seal seams and joints with vapor barrier compound.

3.5 CELLULAR GLASS PIPE INSULATION INSTALLATION

A. Cellular Glass Insulation: Join sections of cellular glass insulation with vapor barrier compound. Secure insulation with manufacturer's recommended adhesive. Seal joints with manufacturer's recommended joint sealer.

2. Multiple Layer Installations: Stagger joints of multilayer installations. Secure inner layer with glass fiber reinforced tape. Secure outer layers with 2 metal bands for each insulation section.
3. Finishing: Apply manufacturer's recommended weather barrier mastic.
4. Finishing: Apply metal jacket over manufacturer's recommended vapor barrier mastic.

3.6 FLEXIBLE ELASTOMERIC CELLULAR PIPE INSULATION INSTALLATION

A. Slip insulation on the pipe before making connections wherever possible. Seal joints with adhesive. Where the slip-on technique is not possible, cut one side longitudinally and apply to the pipe. Seal seams and joints with adhesive.

B. Valves, Fittings, and Flanges: Cut insulation segments from pipe or sheet insulation. Bond to valve, fitting, and flange and seal joints with adhesive.

1. Miter cut materials to cover soldered elbows and tees.
2. Fabricate sleeve fitting covers from flexible elastomeric cellular insulation for screwed valves, fittings, and specialties. Miter cut materials. Overlap adjoining pipe insulation.

3.7 EQUIPMENT INSULATION INSTALLATION, GENERAL

A. Install board and block materials with a minimum dimension of 12 inches and a maximum dimension of 48 inches.

B. Groove and score insulation materials as required to fit as closely as possible to the equipment and to fit contours of equipment. Stagger end joints.

C. Insulation Thicknesses Greater than 2 Inches: Install insulation in multiple layers with staggered joints.

D. Bevel insulation edges for cylindrical surfaces for tight joint.

E. Secure sections of insulation in place with wire or bands spaced at 9-inch centers, except for flexible elastomeric cellular insulation.

F. Protect exposed corners with corner angles under wires and bands.

G. Manholes, Handholes, and Information Plates: Bevel and seal insulation ends around manholes, handholes, ASME stamps, and nameplates.

H. Removable Insulation: Install insulation on components that require periodic inspecting, cleaning, and repairing for easy removal and replacement without damage to adjacent insulation.

I. Finishing: Except for flexible elastomeric cellular insulation, apply 2 coats of vapor barrier compound to a minimum thickness of 1/16 inch. Install a layer of glass cloth embedded between layers.

3.8 GLASS FIBER EQUIPMENT INSULATION INSTALLATION

A. Secure insulation with anchor pins and speed washers.

B. Space anchors at maximum intervals of 18 inches in both directions and not more than 3 inches from edges and joints.

C. Apply a smoothing coat of insulating and finishing cement to finished insulation.

3.9 CELLULAR GLASS EQUIPMENT INSULATION INSTALLATION

A. Join sections of insulation with vapor barrier compound.

B. Secure insulation with manufacturer's recommended adhesive. Seal joints with manufacturer's recommended joint sealer.

C. Secure inner layer of multiple layer installations with glass fiber reinforced tape. Secure outer layers with 2 metal bands for each insulation section.

3.10 FLEXIBLE ELASTOMERIC CELLULAR EQUIPMENT INSULATION INSTALLATION

A. Install sheets of the largest manageable size.

B. Apply full coverage of adhesive to the surfaces of the equipment and to the insulation.

C. Butt insulation joints firmly together and apply adhesive to insulation edges at joints.

3.11 DUCT INSULATION

A. Install block and board insulation as follows:

3. Adhesive and Band Attachment: Secure block and board insulation tight and smooth with at least 50 percent coverage of adhesive. Install bands spaced 12 inches apart. Protect insulation under bands and at exterior corners with metal corner angles. Fill joints, seams, and chipped edges with vapor barrier compound.
4. Speed Washers Attachment: Secure insulation tight and smooth with speed washers and welded pins. Space anchor pins 18 inches apart each way and 3 inches from insulation joints. Apply vapor barrier coating compound to insulation in contact, open joints, breaks, punctures, and voids in insulation.

B. Blanket Insulation: Install tight and smooth. Secure to ducts having long sides or diameters as follows:

1. Smaller Than 24 Inches: Bonding adhesive applied in 6-inch-wide transverse strips on 12-inch centers.
2. 24 Inches and Larger: Anchor pins spaced 12 inches apart each way. Apply bonding adhesive to prevent sagging of the insulation.
3. Overlap joints 3 inches.
4. Seal joints, breaks, and punctures with vapor barrier compound.

3.12 JACKETS

A. Foil and Paper Jackets (FP): Install jackets drawn tight. Install lap or butt strips at joints with material same as jacket. Secure with adhesive. Install jackets with 1-1/2-inch laps at longitudinal joints and 3-inch-wide butt strips at end joints.

1. Seal openings, punctures, and breaks in vapor barrier jackets and exposed insulation with vapor barrier compound.

B. Interior Exposed Insulation: Install continuous aluminum jackets.

C. Exterior Exposed Insulation: Install continuous aluminum jackets and seal all joints and seams with waterproof sealant.

D. Install metal jacket with 2-inch overlap at longitudinal and butt joints. Overlap longitudinal joints to shed water. Seal butt joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel draw bands 12 inches on center and at butt joints.

3.13 FINISHES

A. Paint finished insulation as specified in Division 9 Section "Painting."

B. Flexible Elastomeric Cellular Insulation: After adhesive has fully cured, apply 2 coats of protective coating to exposed insulation.

3.14 APPLICATIONS

C. General: Materials and thicknesses are specified in schedules at the end of this Section.

D. Interior, Exposed Piping Systems: Unless otherwise indicated, insulate the following piping systems:

1. Condensate piping
2. Refrigerant suction.
3. Hydronic piping (35 to 99 deg F).

E. Interior, Concealed Piping Systems: Unless otherwise indicated, insulate the following piping systems:

1. Condensate piping
2. Refrigerant suction.
3. Hydronic piping (35 to 99 deg F).

F. Exterior, Exposed Piping Systems: Unless otherwise indicated, insulate the following piping systems:

1. Refrigerant suction.
2. Hydronic piping (35 to 99 deg F).

G. Exterior, Concealed Piping Systems: Unless otherwise indicated, insulate the following piping systems:

1. Refrigerant suction.
2. Hydronic piping (35 to 99 deg F).

H. Equipment: Unless otherwise indicated, insulate the following indoor equipment:

1. Chilled water equipment.

3.14 PIPE INSULATION SCHEDULES

A. General: Abbreviations used in the following schedules include:

1. Field-Applied Jackets: P - PVC, K - Foil and Paper, A - Aluminum, SS - Stainless Steel.
2. Pipe Sizes: NPS - Nominal Pipe Size.

INTERIOR REFRIGERANT SUCTION, CONDENSATE, AND DUAL-TEMP HYDRONIC (35 TO 100 DEG F) EXPOSED AND CONCEALED

PIPE SIZES (NPS)	MATERIALS	THICKNESS IN INCHES	VAPOR BARRIER REQ'D	FIELD-APPLIED JACKET
1/2 TO 1-1/4	GLASS FIBER	1	YES	NONE
	CELLULAR GLASS	1	YES	NONE
	FLEXIBLE ELASTOMERIC	3/4	YES	NONE
1-1/2 TO 4	GLASS FIBER	2	YES	NONE
	CELLULAR GLASS	2	YES	NONE
	FLEXIBLE ELASTOMERIC	3/4	YES	NONE
5 TO 10	GLASS FIBER	2	YES	NONE
	CELLULAR GLASS	2	YES	NONE
12 TO 36	GLASS FIBER	2	YES	NONE
	CELLULAR GLASS	2	YES	NONE

EXTERIOR REFRIGERANT SUCTION AND DUAL-TEMP HYDRONIC (35 TO 100 DEG F) EXPOSED AND CONCEALED

PIPE SIZES (NPS)	MATERIALS	THICKNESS IN INCHES	VAPOR BARRIER REQ'D	FIELD-APPLIED JACKET
1/2 TO 1-1/4	GLASS FIBER	2	YES	(A)(SS)
	CELLULAR GLASS	2	YES	(A)(SS)
	FLEXIBLE ELASTOMERIC	3/4	YES	PAINT
1-1/2 TO 4	GLASS FIBER	2	YES	(A)(SS)
	CELLULAR GLASS	2-1/2	YES	(A)(SS)
	FLEXIBLE ELASTOMERIC	3/4	YES	PAINT
5 TO 10	GLASS FIBER	2-1/2	YES	(A)(SS)
	CELLULAR GLASS	2-1/2	YES	(A)(SS)
12 TO 36	GLASS FIBER	2-1/2	YES	(A)(SS)
	CELLULAR GLASS	3	YES	(A)(SS)

3.16 EQUIPMENT INSULATION SCHEDULES

INTERIOR AND EXTERIOR EXPOSED CHILLED AND DUAL-TEMP WATER EQUIP (35 TO 100 DEG F)

MATERIAL	FORM	THICKNESS IN INCHES	VAPOR BARRIER REQ'D	FIELD-APPLIED JACKET
GLASS FIBER	BLOCK	2-1/2	YES	(A)(SS)
CELLULAR GLASS	BLOCK	3	YES	(A)(SS)

END OF SECTION 15250

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SECTION 15510 - HYDRONIC PIPING –232100 CSI 2004

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to this section.

B. The following Division-15 Sections apply to this Section:

1. Basic Mechanical Requirements.
2. Basic Mechanical Materials and Methods.
3. General Duty Valves.
4. Supports and Anchors.

1.2 SUMMARY

A. This Section includes piping systems for chilled water cooling emergency back up piping, and condensate drain piping. Piping materials and equipment specified in this Section include:

1. Pipes, fittings, and specialties;
2. Special duty valves;
3. hydronic specialties.

B. Related Sections: The following sections contain requirements that relate to this Section:

1. Division 15 Section "General Duty Valves" for gate, globe, ball, butterfly, and check valves.
2. Division 15 Section "Gages" for thermometers, flow meters, and pressure gages.
3. Division 15 Section "Mechanical Identification" for labeling and identification of hydronic piping system.
4. Division 15 Section "Mechanical Insulation" for pipe insulation.
5. Division 15 Section "Electric Control System" for temperature control valves and sensors.
6. Division 15 Section "Adjusting and Balancing" for procedures for hydronic systems adjusting and balancing.

1.3 DEFINITIONS

A. Pipe sizes used in this Specification are Nominal Pipe Size (NPS).

1.4 SYSTEM DESCRIPTION

A. General: The hydronic piping systems are the "water-side" of an air-and-water or all water heating and air conditioning system. Hydronic piping systems specified in this Section include 4-pipe, chilled water/ heating piping system. These systems are classified by ASHRAE as Low Water Temperature, Forced, Recirculating systems.

1.5 SUBMITTALS

A. Product Data, including rated capacities of selected models, weights (shipping, installed, and operating), furnished specialties and accessories, and installation instructions for each hydronic specialty and special duty valve specified.

1. Furnish flow and pressure drop curves for diverting fittings and calibrated plug valves, based on manufacturer's testing.

B. Maintenance Data for hydronic specialties and special duty valves, for inclusion in operating and maintenance manual specified in Division 1 and Division-15 Section "Basic Mechanical Requirements."

C. Welders' certificates certifying that welders comply meet the quality requirements specified in Quality Assurance below.

D. Certification of compliance with ASTM and ANSI manufacturing requirements for pipe, fittings, and specialties.

E. Reports specified in Part 3 of this Section.

1.6 QUALITY ASSURANCE

A. Regulatory Requirements: comply with the provisions of the following:

1. ASME B 31.9 "Building Services Piping" for materials, products, and installation. Safety valves and pressure vessels shall bear the appropriate ASME label.
2. Fabricate and stamp air separators and compression tanks to comply with ASME Boiler and Pressure Vessel Code, Section VIII, Division 1.
3. ASME "Boiler and Pressure Vessel Code", Section IX, "Welding and Brazing Qualification" for qualifications for welding processes and operators.
4. Florida Mechanical Code, latest edition.

1.7 EXTRA STOCK

A. Maintenance Stock: Furnish a sufficient quantity of chemical for initial system start-up and for preventative maintenance for one year from Substantial

Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide hydronic piping system products from one of the following:

1. Grooved Mechanical Joint Pipe, Fittings, and Couplings:

a. Victaulic Company of America.
b. or equal

2. Air Vents (manual and automatic):

a. Armstrong Machine Works.
b. Bell & Gossett ITT; Fluid Handling Div.
c. Hoffman Specialty ITT; Fluid Handling Div.
d. Spirax Sarco.
e. or equal

3. Dielectric Unions:

a. Perfection Corp.
b. Watts Regulator Co.
c. or equal

2.2 PIPE AND TUBING MATERIALS

A. General: Refer to Part 3 Article "PIPE APPLICATIONS" for identification of where the below materials are used.

B. Annealed Temper Copper Tubing: ASTM B 88, Type K.

C. Steel Pipe: ASTM A 120, Schedule 40, seamless, black steel pipe, plane ends.

D. CPVC Plastic Pipe: ASTM D 2846, Chlorinated Poly (Vinyl Chloride) (CPVC) pipe.- condensate pipe only

2.3 FITTINGS

A. Cast-Iron Threaded Fittings: ANSI B16.4, Class 125, standard pattern, for threaded joints. Threads shall conform to ANSI B1.20.1.

B. Malleable-Iron Threaded Fittings: ANSI B16.3, Class 150, standard pattern, for threaded joints. Threads shall conform to ANSI B1.20.1.

C. Steel Fittings: ASTM A 234, seamless or welded, for welded joints.

D. Grooved Mechanical Fittings: ASTM A 536, Grade 65-45-12 Ductile Iron; ASTM A 47 Grade 32510 Malleable Iron; ASTM A 53, Type F, or Types E or S, Grade B fabricated steel; or ASTM A 106, Grade B steel fittings with grooves or shoulders designed to accept grooved end couplings.

E. Grooved Mechanical Couplings: consist of ductile or malleable iron housing, a synthetic rubber gasket of a central cavity pressure-responsive design; with nuts, bolts, locking pin, locking toggle, or lugs to secure grooved pipe and fittings.

F. Wrought-Copper Fittings: ANSI B16.22, streamlined pattern.

G. Cast Bronze Flanges: ANSI B16.24, Class 150; raised ground face, bolt holes spot faced.

H. Steel Flanges and Flanged Fittings: ANSI B16.5, including bolts, nuts, and gaskets of the following material group, end connection and facing:

1. Material Group: 1.1.
2. End Connections: Butt Welding.
3. Facings: Raised face.

I. Unions: ANSI B16.39 malleable-iron, Class 150, hexagonal stock, with ball-and-socket joints, metal-to-metal bronze seating surfaces; female threaded ends. Threads shall conform to ANSI B1.20.1.

J. Dielectric Unions: Threaded or soldered end connections for the pipe materials in which installed; constructed to isolate dissimilar metals, prevent galvanic action, and prevent corrosion.

K. Flexible Connectors: Stainless steel bellows with woven flexible bronze wire reinforcing protective jacket; minimum 150 psig working pressure, maximum 250 deg F operating temperature. Connectors shall have flanged or threaded end connections to match equipment connected; and shall be capable of 3/4 inch misalignment.

2.4 JOINING MATERIALS

A. Solder Filler Metals: ASTM B 32, 50-50, Tin-Lead, for condenser water, chilled water, and make-up water and drain piping.

B. Solder Filler Metals: ASTM B 32, 95-5 Tin-Antimony, for heating hot water and low pressure steam piping.

C. Brazing Filler Metals: AWS A5.8, Classification BAg 1 (Silver).

1. WARNING: Some filler metals contain compounds which produce highly toxic fumes when heated. Avoid breathing fumes. Provide adequate ventilation.

D. Welding Materials: Comply, with Section II, Part C. ASME Boiler and Pressure Vessel Code for welding materials appropriate for the wall thickness and chemical analysis of the pipe being welded.

E. Gasket Material: thickness, material, and type suitable for fluid to be handled, and design temperatures and pressures.

2.5 GENERAL DUTY VALVES

A. General duty valves (i.e., gate, globe, check, ball, and butterfly valves) are specified in Division 15 Section "General Duty Valves." Special duty valves are specified below by their generic name; refer to Part 3 Article "VALVE APPLICATION" for specific uses and applications for each valve specified.

2.6 SPECIAL DUTY VALVES

A. Automatic Flow Control Valves: Class 150, cast iron housing, stainless steel operating parts; threaded connections for 2 inch and smaller, flanged connections for 2-1/2 inch and larger. Factory set to automatically control flow rates within plus or minus 5 percent design, while compensating for system operating pressure differential. Provide quick disconnect valves for flow measuring equipment. Provide a metal identification tag with chain for each valve, factory marked with the zone identification, valve model number, and rate flow in GPM.

2.7 HYDRONIC SPECIALTIES

A. Manual Air Vent: bronze body and nonferrous internal parts; 150 psig working pressure, 225 deg F operating temperature; manually operated with screwdriver or thumbscrew; and having 1/8 inch discharge connection and 1/2 inch inlet connection.

B. Automatic Air Vent: designed to vent automatically with float principle; bronze body and nonferrous internal parts; 150 psig working pressure, 240 deg F operating temperature; and having 1/4 inch discharge connection and 1/2 inch inlet connection.

C. Diverting Fittings: cast iron body with threaded ends, or wrought copper with solder ends; 125 psig working pressure, 250 deg F maximum operating temperature. Indicate flow direction on fitting.

PART 3 - EXECUTION

3.1 PIPE APPLICATIONS

A. Install steel pipe with threaded joints and fittings fittings for 2 inch and smaller, and with welded joints for 2-1/2 inch and larger.

B. Install mechanical grooved end steel pipe with mechanical couplings and fittings for condenser water piping systems.

3.2 PIPING INSTALLATIONS

A. Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate the general location and arrangement of piping systems. Locations and arrangements of piping take into consideration pipe sizing and friction loss, expansion, pump sizing, and other design considerations. So far as practical, install piping as indicated.

B. Use fittings for all changes in direction and all branch connections.

C. Install exposed piping at right angles or parallel to building walls. Diagonal runs are not permitted, unless expressly indicated.

D. Conceal all pipe installations in walls, pipe chases, utility spaces, above ceilings, below grade or floors, unless indicated to be exposed to view.

E. Install piping tight to slabs, beams, joists, columns, walls, and other permanent elements of the building. Provide space to permit insulation applications, with 1" clearance outside the insulation. Allow sufficient space above removable ceiling panels to allow for panel removal.

F. Locate groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.

G. Install drains at low points in mains, risers, and branch lines consisting of a tee fitting, 3/4" ball valve, and short 3/4" threaded nipple and cap.

H. Exterior Wall Penetrations: Seal pipe penetrations through exterior walls using sleeves and mechanical sleeve seals. Pipe sleeves smaller than 6 inch shall be steel; pipe sleeves 6 inch and larger shall be sheet metal.

I. Fire Barrier Penetrations: Where pipes pass through fire rated walls, partitions, ceilings, and floors, maintain the fire rated integrity. Refer to Division 7 for special

sealers and materials.

J. Install piping at a uniform grade of 1 inch in 40 feet upward in the direction of flow.

K. Make reductions in pipe sizes using eccentric reducer fitting installed with the level side up.

L. Install branch connections to mains using Tee fittings in main with take-off out the bottom of the main, except for up-feed risers which shall have take-off out the top of the main line.

M. Install unions in pipes 2 inch and smaller, adjacent to each valve, at final connections each piece of equipment, and elsewhere as indicated. Unions are not required on flanged devices.

N. Install dielectric unions to join dissimilar metals.

O. Install flanges on valves, apparatus, and equipment having 2-1/2 inch and larger connections.

P. Install strainers on the supply side of each control valve, pressure reducing valve, pressure regulating valve, solenoid valve, inline pump, and elsewhere as indicated. Install nipple and ball valve in blow down connection of strainers 2 inch and larger.

Q. Anchor piping to ensure proper direction of expansion and contraction.

3.3 HANGERS AND SUPPORTS

A. General: Hanger, supports, and anchors devices are specified in Division 15 Section "SUPPORTS AND ANCHORS." Conform to the table below for maximum spacing of supports:

B. Install the following pipe attachments:

1. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet in length.
2. Adjustable roller hangers and spring hangers for individual horizontal runs 20 feet or longer.
3. Pipe roller complete - MSS Type 44 for multiple horizontal runs, 20 feet or longer, supported on a trapeze.
4. Spring hangers to support vertical runs.

C. Install hangers with the following minimum rod sizes and maximum spacing:

Nom. Pipe Size	Max. Span-Ft.	Min. Rod Size-Inches
1	7	3/8
1-1/2	9	3/8
2	10	3/8
3	12	1/2
3-1/2	13	1/2
4	14	5/8
5	16	5/8
6	17	3/4
8	19	7/8
10	22	7/8
12	23	7/8

D. Support vertical runs at each floor.

3.4 PIPE JOINT CONSTRUCTION

A. Soldered Joints: Comply with the procedures contained in the AWS "Soldering Manual."

B. Brazed Joints: Comply with the procedures contained in the AWS "Brazing Manual."

1. CAUTION: Remove stems, seats, and packing of valves and accessible internal parts at piping specialties before brazing.
2. Fill the pipe and fittings during brazing, with an inert gas (ie., nitrogen or carbon dioxide) to prevent formation of scale.
3. Heat joints using oxy-acetylene torch. Heat to proper and uniform temperature.

C. Threaded Joints: Conform to ANSI B1.20.1, tapered pipe threads for field cut threads. Join pipe fittings and valves as follows:

1. Note the internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
2. Align threads at point of assembly.
3. Apply appropriate tape or thread compound to the external pipe threads (except where dry seal threading is specified).
4. Assemble joint wrench tight. Wrench on valve shall be on the valve end into which the pipe is being threaded.

a. Damaged Threads: Do not use pipe with threads which are corroded or damaged. If a weld opens during cutting or threading operations, that portion of pipe shall not be used.

D. Welded Joints: Comply with the requirement in ASME Code B31.9-"Building Services Piping."

E. Flanged Joints: Align flanges surfaces parallel. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly using torque wrench.

F. Grooved Joints: Assemble joints in accordance with fitting manufacturers written instructions.

3.5 VALVE APPLICATIONS

A. General Duty Valve Applications: The Drawings indicate valve types to be used. Where specific valve types are not indicated the following requirements apply:

1. Shut-off duty: use gate, ball, and butterfly valves
2. Throttling duty: use globe, ball, and butterfly valves
3. Install shut-off duty valves at each branch connection to supply mains, at supply connection to each piece of equipment, and elsewhere as indicated.
4. Install throttling duty valves at each branch connection to return mains, at return connections to each piece of equipment, elsewhere as indicated.

B. Install calibrated plug valves on the outlet of each heating or cooling element and elsewhere as required to facilitate system balancing.

C. Install drain valves at low points in mains, risers, branch lines, and elsewhere as required for system drainage.

3.6 HYDRONIC SPECIALTIES INSTALLATION

A. Install manual air vents at high points in the system, at heat transfer coils, and elsewhere as required for system air venting.

B. Install automatic air vents at high points in the system, heat transfer coils, and elsewhere as required for system air venting.

3.7 FIELD QUALITY CONTROL

A. Preparation for testing: Prepare hydronic piping in accordance with ASME B 31.9 and as follows:

1. Leave joints including welds uninsulated and exposed for examination during the test.
2. Provide temporary restraints for expansion joints which cannot sustain the reactions due to test pressure. If temporary restraints are not practical, isolate expansion joints from testing.
3. Flush system with clean water. Clean strainers.
4. Isolate equipment that is not to be subjected to the test pressure from the piping. If a valve is used to isolate the equipment, its closure shall be capable of sealing against the test pressure without damage to the valve. Flanged joints at which blinds are inserted to isolate equipment need not be tested.
5. Install relief valve set at a pressure no more than 1/3 higher than the test pressure, to protect against damage by expansion of liquid or other source of overpressure during the test.

B. Testing: Test hydronic piping as follows:

1. Use ambient temperature water as the testing medium, except where there is a risk of damage due to freezing. Another liquid may be used if it is safe for workmen and compatible with the piping system components.
2. Use vents installed at high points in the system to release trapped air while filling the system. Use drains installed at low points for complete removal of the that liquid.
3. Examine system to see that equipment and parts that cannot withstand test pressures are properly isolated. Examine test equipment to ensure that it is tight and that low pressure filling lines are disconnected.
4. Subject piping system to a hydrostatic test pressure which at every point in the system is not less than 1.5 times the design pressure. The test pressure shall not exceed the maximum pressure for any vessel, pump, valve, or other component in the system under test. Make a check to verify that the stress due to pressure at the bottom of vertical runs does not exceed either 90 percent of specified minimum yield strength, or 1.7 times the "SE" value in Appendix A of ASME B31.9, Code For Pressure Piping, Building Services Piping.
5. After the hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components as appropriate, and repeat hydrostatic test until there are no leaks.

3.8 ADJUSTING AND CLEANING

A. Clean and flush hydronic piping systems. Remove, clean, and replace strainer

screens. After cleaning and flushing hydronic piping system, but before balancing, remove disposable fine mesh strainers in pump suction diffusers.

B. Mark calibrated name plates of pump discharge valves after hydronic system balancing has been completed, to permanently indicate final balanced position.

C. Chemical Treatment: Provide a water analysis prepared by the chemical treatment supplier to determine the type and level of chemicals required for prevention of scale and corrosion. Preform initial treatment after completion of system testing.

3.9 COMMISSIONING

A. Fill system and perform initial chemical treatment.

B. Check expansion tanks to determine that they are not air bound and that the system is completely full of water.

C. Before operating the system perform these steps:

1. Open valves to full open position. Close coil bypass valves.
2. Remove and clean strainers.
3. Check pump for proper direction of correct improper wiring.
4. Set automatic fill valves for required system pressure.
5. Check air vents at high points of systems and determine if all are installed and operating freely (automatic type) or to bleed air completely (manual type).
6. Set temperature controls so all coils are calling for full flow.
7. Check operation of automatic bypass valves.
8. Check and set operating temperatures of chillers, and pumps to design requirements.
9. Lubricate motors and bearings.

END OF SECTION 15510

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SECTION 15530 - REFRIGERANT PIPING – 232300 CSI

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Requirements of the following Division 15 Sections apply to this section:

1. Basic Mechanical Requirements.
2. Basic Mechanical Materials and Methods.
3. Supports and Anchors.

1.2 SUMMARY

A. This Section includes refrigerant piping used for air conditioning applications for the UPS room air conditioning system. This Section includes:

1. Pipes, tubing, fittings, and specialties.
2. Special duty valves.
3. Refrigerants.

B. Related Sections: The following sections contain requirements that relate to this section:

1. Division 15, Section "Mechanical Identification" for labeling and identification of refrigerant piping.
2. Division 15, Section "Mechanical Insulation" for pipe insulation.

C. Products installed but not furnished under this Section include pre-charged tubing, refrigerant specialties, and refrigerant accessories furnished as an integral part of or separately with packaged air conditioning equipment.

1.3 SUBMITTALS

A. Product data for the following products:

1. Each type valve specified.
2. Each type refrigerant piping specialty specified.

B. Shop Drawings showing layout of refrigerant piping, specialties, and fittings including, but not necessarily limited to, pipe and tube sizes, valve arrangements and locations, slopes of horizontal runs, wall and floor penetrations, and

equipment connection details. Show interface and spatial relationship between piping and proximate to equipment. Show manufacturer's calculations and piping sizing for dual evaporator system.

C. Brazer's Certificates signed by Contractor certifying that brazers comply with requirements specified under "Quality Assurance" below.

D. Maintenance data for refrigerant valves and piping specialties, for inclusion in Operating and Maintenance Manual specified in Division 1 and Division 15 Section "Basic Mechanical Requirements."

1.4 QUALITY ASSURANCE

A. Qualify brazing processes and brazing operators in accordance with ASME "Boiler and Pressure Vessel Code," Section IX, "Welding and Brazing Qualifications".

B. Regulatory Requirements: Comply with provisions of the following codes:

1. ANSI B31.5: ASME Code for Pressure Piping - Refrigerant Piping.
2. ANSI/ASHRAE Standard 15: Safety Code for Mechanical Refrigeration.
3. Florida Mechanical Code.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

4. Refrigerant Valves and Specialties:

a. Alco Controls Div, Emerson Electric.
b. Danfoss Electronics, Inc.
c. EATON Corporation, Control Div.
d. Henry Valve Company.
e. Parker-Hannifin Corporation, Refrigeration and Air Conditioning Division.
f. Sporlan Valve Company.

2.2 PIPE AND TUBING MATERIALS

A. General: Refer to Part 3, Article "PIPE APPLICATION" for identification of systems where the below specified pipe and fitting materials are used.

B. Copper Tubing: ASTM B 280, Type ACR, hard-drawn straight lengths, and soft-annealed coils, seamless copper tubing. Tubing shall be factory cleaned, ready for installation, and have ends capped to protect cleanliness of pipe interiors prior to shipping.

C. Copper Tubing: ASTM B 88, Type L, hard-drawn straight lengths, and soft-annealed coils, seamless copper tubing.

2.3 FITTINGS

A. Wrought-Copper Fittings: ANSI B16.22, streamlined pattern.

2.4 JOINING MATERIALS

A. Brazing Filler Metals: AWS A5.8, Classification BAg-1 (Silver).

2.5 VALVES

A. General: Complete valve assembly shall be UL-listed and designed to conform to ARI 760.

B. Globe: 450 psig maximum operating pressure, 275 deg. F maximum operating temperature; cast bronze body, with cast bronze or forged brass wing cap and bolted bonnet; replaceable resilient seat disc; plated steel stem. Valve shall be capable of being repacked under pressure. Valve shall be straight through or angle pattern, with solder-end connections.

C. Check Valves - Smaller Than 7/8 inch: 500 psig maximum operating pressure, 300 deg. F maximum operating temperature; cast brass body, with removable piston, Teflon seat, and stainless steel spring; straight through globe design. Valve shall be straight through pattern, with solder-end connections.

D. Check Valves - 7/8 inch and Larger: 450 psig maximum operating pressure, 300 deg. F maximum operating temperature; cast bronze body, with cast bronze or forged brass bolted bonnet; floating piston with mechanically retained Teflon seat disc. Valve shall be straight through or angle pattern, with solder-end connections.

E. Solenoid Valves: 250 deg. F temperature rating, 400 psig working pressure; forged brass, with Teflon valve seat, two-way straight through pattern, and solder end connections. Provide manual operator to open valve. Furnish complete with NEMA 1 solenoid enclosure with 1/2 inch conduit adapter, and 24 volt, 60 Hz. normally closed holding coil.

F. Evaporator Pressure Regulating Valves: pilot-operated, forged brass or cast bronze; complete with pilot operator, stainless steel bottom spring, pressure gage tappings, 24 volts DC, 50/60 Hz, standard coil; and wrought copper fittings for

solder end connections.

G. Thermal Expansion Valves: thermostatic adjustable, modulating type; size as required for specific evaporator requirements, and factory set for proper evaporator superheat requirements. Valves shall have copper fittings for solder end connections; complete with sensing bulb, a distributor having a side connection for hot gas bypass line, and an external equalizer line.

H. Hot Gas Bypass Valve: adjustable type, sized to provide capacity reduction beyond the last step of compressor unloading; and wrought copper fittings for solder end connections.

I. Manufacturer's Distribution Valves and Refrigerant Control Devices: adjustable type, sized for operating the evaporator system requirements and providing control signals to the master control on the compressor/ condenser system

2.6 REFRIGERANT PIPING SPECIALTIES

A. General: Complete refrigerant piping specialty assembly shall be UL-listed and designed to conform to ARI 760.

B. Strainers: 500 psig maximum working pressure; forged brass body with monel 80-mesh screen, and screwed cleanout plug; Y-pattern, with solder end connections.

C. Moisture/liquid Indicators: 500 psig maximum operation pressure, 200 deg. F maximum operating temperature; forged brass body, with replaceable polished optical viewing window, and solder end connections.

D. Filter-driers: 500 psig maximum operation pressure; steel shell, flange ring, and spring, ductile iron cover plate with steel capscrews, and wrought copper fittings for solder end connections. Furnish complete with replaceable filter-drier core kit, including gaskets, as follows:

1. Standard capacity desiccant sieves to provide micronic filtration.
2. High capacity desiccant sieves to provide micronic filtration and extra drying capacity.

E. Suction Line Filter-Drier: 350 psig maximum operation pressure, 225 deg. F maximum operating temperature; steel shell, and wrought copper fittings for solder end connections. Permanent filter element shall be molded felt core surrounded by a desiccant. for removal of acids and moisture for refrigerant vapor.

F. Suction Line Filters: 500 psig maximum operation pressure; steel shell, flange ring, and spring, ductile iron cover plate with steel capscrews, and wrought copper fittings for solder end connections. Furnish complete with replaceable

filter core kit, including gaskets, as follows:

G. Flanged Unions: 400 psig maximum working pressure, 330 deg. F maximum operating temperature; two brass tailpiece adapters for solder end connections to copper tubing; flanges for 7/8 inch through 1-5/8 inch unions shall be forged steel, and for 2-1/8 inch through 3-1/8 inch shall be ductile iron; four plated steel bolts, with silicon bronze nuts and fiber gasket. Flanges and bolts shall have factory-applied rust-resistant coating.

H. Flexible Connectors: 500 psig maximum operating pressure; seamless tin bronze or stainless steel core, high tensile bronze braid covering, solder connections, and synthetic covering; dehydrated, pressure tested, minimum 7 inch in length.

2.7 REFRIGERANT

A. Refrigerant No. R410A in accordance with ASHRAE Standard 34.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine rough-in for refrigerant piping systems to verify actual locations of piping connections prior to installation.

3.2 PIPE APPLICATIONS

A. Use Type L, or Type ACR drawn copper tubing with wrought copper fittings and brazed joints above ground, within building. Use Type K, annealed temper copper tubing for 2 inch and smaller without joints, below ground and within slabs. Mechanical fittings (crimp or flair) are not permitted.

1. Install annealed temper tubing in pipe duct. Vent pipe duct to the outside.

B. If other than Type ACR tubing is used, clean and protect inside of tubing as specified in Article "CLEANING" below.

3.3 PIPING INSTALLATIONS

A. General: Install refrigerant piping in accordance with ASHRAE Standard 15 - "The Safety Code for Mechanical Refrigeration" and Florida Mechanical Code.

B. Install piping in as short and direct arrangement as possible to minimize pressure drop.

C. Install piping for minimum number of joints using as few elbows and other fitting as possible.

D. Arrange piping to allow normal inspection and servicing of compressor and other equipment. Install valves and specialties in accessible locations to allow for servicing and inspection.

E. Provide adequate clearance between pipe and adjacent walls and hanger, or between pipes for insulation installation. Use sleeves through floors, walls, or ceilings, sized to permit installation of full thickness insulation.

F. Insulate suction lines. Liquid line are not required to be insulated, except where they are installed adjacent and clamped to suction lines, where both liquid and suction lines shall be insulated as a unit.

   1. Do not install insulation until system testing has been completed and all leaks have been eliminated.

G. Install branch tie-in lines to parallel compressors equal length, and pipe identically and symmetrically.

H. Install copper tubing in rigid or flexible conduit in locations where copper tubing will be exposed to mechanical injury.

I. Slope refrigerant piping as follows:

   1. Install horizontal hot gas discharge piping with 1/2" per 10 feet downward slope away from the compressor.
   2. Install horizontal suction lines with 1/2 inch per 10 feet downward slope to the compressor, with no long traps or dead ends which may cause oil to separate from the suction gas and return to the compressor in damaging slugs.
   3. Install traps and double risers where indicated, and where required to entrain oil in vertical runs.
   4. Liquid lines may be install level.

J. Use fittings for all changes in direction and all branch connections.

K. Install exposed piping at right angles or parallel to building walls. Diagonal runs are not permitted, unless expressly indicated.

L. Install piping free of sags or bends and with ample space between piping to permit proper insulation applications.

M. Conceal all pipe installations in walls, pipe chases, utility spaces, above ceilings, below grade or floors, unless indicated to be exposed to view.

N. Install piping tight to slabs, beams, joists, columns, walls, and other permanent elements of the building. Provide space to permit insulation applications, with 1

inch clearance outside the insulation. Allow sufficient space above removable ceiling panels to allow for panel removal.

O. Locate groups of piper parallel to each other, spaced to permit applying insulation and servicing of valves.

P. Exterior Wall Penetrations: Seal pipe penetrations through exterior walls using sleeves and mechanical sleeve seals. Pipe sleeves smaller than 6 inch shall be steel; pipe sleeves 6 inch and larger shall be sheet metal.

Q. Make reductions in pipe sizes using eccentric reducer fittings installed with the level side down.

R. Install strainers immediately ahead of each expansion valve, solenoid valve, hot gas bypass valve, compressor suction valve, and as required to protect refrigerant piping system components.

S. Install moisture/liquid indicators in liquid lines between filter/driers and thermostatic expansion valves and in liquid line to receiver.

1. Install moisture/liquid indicators in lines larger than 2-1/8 inch OD, using a bypass line.

T. Install unions to allow removal of solenoid valves, pressure regulating valves, expansion valves, and at connections to compressors and evaporators.

U. Install flexible connectors at the inlet and discharge connection of compressors.

V. Install manufacturer’s distribution valves and controls in accordance with the manufacturer’s requirements.

3.4 HANGERS AND SUPPORTS

A. General: Hanger, supports, and anchors are specified in Division 15 Section "SUPPORTS AND ANCHORS." Conform to the table below for maximum spacing of supports:

B. Install the following pipe attachments:

1. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet in length.
2. Roller hangers and spring hangers for individual horizontal runs 20 feet or longer.
3. Pipe rollers complete supports for multiple horizontal runs, 20 feet or longer supported by a trapeze.
4. Spring hangers to support vertical runs.

C. Install hangers with the following minimum rod sizes and maximum spacing:

NOM. PIPE SIZE	MAX. SPAN-FT	MIN. ROD SIZE - INCHES
1	7	3/8
1-1/2	9	3/8
2	10	3/8
3	12	1/2
3-1/2	13	1/2
4	14	5/8

D. Support vertical runs at each floor.

3.5 PIPE JOINT CONSTRUCTION

A. Brazed Joints: Comply with the procedures contained in the AWS "Brazing Manual."

1. WARNING: Some filler metals contain compounds which produce highly toxic fumes when heated. Avoid breathing fumes. Provide adequate ventilation.
2. CAUTION: When solenoid valves are being installed, remove the coil to prevent damage. When sight glasses are being installed, remove the glass. Remove stems, seats, and packing of valves, and accessible internal parts of refrigerant specialties before brazing. Do no apply heat near the bulb of the expansion valve.

B. Fill the pipe and fittings during brazing, with an inert gas (ie., nitrogen or carbon dioxide) to prevent formation of scale.

C. Heat joints using oxy-acetylene torch. Heat to proper and uniform brazing temperature.

3.6 VALVE INSTALLATIONS

A. General: Install refrigerant valves where indicated, and in accordance with manufacturer's instructions.

B. Install globe valves on each side of strainers and driers, in liquid and suction lines at evaporators, and elsewhere as indicated.

C. Install a full sized, 3-valve bypass around each drier.

D. Install solenoid valves ahead of each expansion valve and hot-gas bypass valve.

Install solenoid valves in horizontal lines with coil at the top.

1. Electrical wiring for solenoid valves is specified in Division 16. Coordinate electrical requirements and connections.

E. Thermostatic expansion valves may be mounted in any position, as close as possible to the evaporator.

1. Where refrigerant distributors are used, mount the distributor directly on the expansion valve outlet.
2. Install the valve in such a location so that the diaphragm case is warmer than the bulb.
3. Secure the bulb to a clean, straight, horizontal section of the suction line using two bulb straps. Do not mount bulb in a trap or at the bottom of the line.
4. Where external equalizer lines are required make the connection where it will clearly reflect the pressure existing in the suction line at the bulb location.

F. Install pressure regulating and relieving valves as required by ASHRAE Standard 15.

G. Install manufacturer’s distribution valves and controls in accordance with the manufacturer’s requirements. Provide and install additional elbows , 45 ‘s , and traps as noted on manufacturer’s installation documents .

3.7 EQUIPMENT CONNECTIONS

A. The Drawings indicate the general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to machine to allow servicing and maintenance.

3.8 FIELD QUALITY CONTROL

A. Inspect, test, and perform corrective action of refrigerant piping in accordance with ASHRAE Standard 15, and ASME Code B31.5.

B. Repair leaking joints using new materials, and retest for leaks.

3.9 CLEANING

A. Before installation of copper tubing other than Type ACR tubing, clean the tubing and fitting using following cleaning procedure:

1. Remove coarse particles of dirt and dust by drawing a clean, lintless cloth through the tubing by means of a wire or an electrician's tape.
2. Draw a clean, lintless cloth saturated with trichloroethylene through the tube

or pipe. Continue this procedure until cloth is not discolored by dirt.

3. Draw a clean, lintless cloth, saturated with compressor oil, squeezed dry, through the tube or pipe to remove remaining lint. Inspect tube or pipe visually for remaining dirt and lint.
4. Finally, draw a clean, dry, lintless cloth through the tube or pipe.

3.10 ADJUSTING AND CLEANING

A. Verify actual evaporator applications and operating conditions, and adjust thermostatic expansion valve to obtain proper evaporator superheat requirements.

B. Clean and inspect refrigerant piping systems in accordance with requirements of Division-15 Basic Mechanical Materials and Methods section "Pipes and Pipe Fittings".

C. Adjust controls and safeties. Replace damaged or malfunctioning controls and equipment with new materials and products.

3.11 COMMISSIONING

A. Charge system using the following procedure:

1. Install core in filter dryer after leak test but before evacuation.
2. Evacuate refrigerant system with vacuum pump; until temperature of 35 deg F is indicated on vacuum dehydration indicator.
3. During evacuation, apply heat to pockets, elbows, and low spots in piping.
4. Maintain vacuum on system for minimum of 5 hours after closing valve between vacuum pump and system.
5. Break vacuum with refrigerant gas, allow pressure to build up to 2 psi.
6. Complete charging of system, using new filter dryer core in charging line. Provide full operating charge.

B. Train Owner's maintenance personnel on procedures and schedules related to start-up and shut-down, troubleshooting, servicing, and preventative maintenance of refrigerant piping valves and refrigerant piping specialties.

C. Review data in Operating and Maintenance Manuals. Refer to Division 1 section "Project Closeout."

D. Schedule training with County personnel through the County Project Manager, with at least 7 days advance notice.

END OF SECTION 15530

SECTION 15670 - CONDENSING UNITS – 236213 CSI 2004

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

B. Division-15 Basic Mechanical Materials and Methods sections apply to work of this section.

1.2 SUMMARY

A. Section includes:
1. Air-cooled condensing units.

B. Related Sections:

1. Section 15030 - Electrical Provisions for Mechanical Work
2. Section 15530 - Refrigerant Piping

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data, including rated capacities of selected model clearly indicated, weights (shipping, installed, and operating), dimensions, required clearances, and methods of assembly of components, furnished specialties and accessories; and installation and start-up instructions.

B. Wiring Diagrams: Submit ladder-type wiring diagrams for power and control wiring required for final installation of condensing units and controls. Clearly differentiate between portions of wiring that are factory-installed and portions to be field-installed.

C. Operation and Maintenance Data: Submit maintenance data and parts list for each condensing unit, control, and accessory; including "trouble shooting" maintenance guide; plus servicing, and preventative maintenance procedures and schedule. Include this data and product data in maintenance manual; in accordance with requirements of Division 1.

1.4 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of

condensing units, of types and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Codes and Standards:

1. Capacity ratings for condensing units shall be in accordance with ARI Standard 360 "Standard for Commercial and Industrial Unitary Air-Conditioning Equipment".
2. Refrigeration system of condensing units shall be constructed in accordance with ASHRAE Standard ASHRAE 15 "Safety Code for Mechanical Refrigeration".
3. Condensing units shall meet or exceed the minimum COP/Efficiency levels as prescribed in ASHRAE 90 "Energy Conservation in New Building Design".
4. Construction and testing of water cooled condensing units shall be in accordance with ASME Boiler and Pressure Vessel Code, Section VIII.
5. Condensing units shall be listed by UL and have UL label affixed.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Handle condensing units and components carefully to prevent damage. Follow manufacturer's written instructions for rigging. Replace damaged condensing units or components.

B. Store condensing units and components in clean dry place off the ground. Protect from weather, water, and physical damage.

1.6 SPECIAL PROJECT WARRANTY

A. Warranty on Motor/Compressor: Provide written warranty, signed by manufacturer, agreeing to replace/repair, within warranty period, motors/compressors with inadequate or defective materials and workmanship, including leakage, breakage, improper assembly, or failure to perform as required; provided manufacturer's instructions for handling, installing, protecting, and maintaining units have been adhered to during warranty period. Replacement is limited to component replacement only, and does not include labor for removal and reinstallation.

1. Warranty Period: 5 years from date of substantial completion.

PART 2 - PRODUCTS

2.1 AIR-COOLED CONDENSING UNITS

A. Manufacturers: Subject to compliance with requirements, provide air-cooled condensing units of one of the following:

1. Fujitsu
2. Sanyo
3. Mistsubishi
4. or equal

A. General: factory-assembled and tested air-cooled condensing units, consisting of casing, compressors, condensers, coils, condenser fans and motors, and unit controls. Capacities and electrical characteristics are scheduled on the Drawings.

B. Unit Casings: designed for outdoor installation and complete with weather protection for components and controls, and complete with removable panels for required access to compressors, controls, condenser fans, motors, and drives. Additional features include:

1. zinc-coated steel for exposed casing surfaces, treated and finished with manufacturer's standard paint coating;
2. lifting lugs to facilitate rigging of units;
3. factory-installed metal grilles, for protection of condenser coil during shipping, installation, and operation;
4. hinged and gasketed control panel door.
5. coated coils for corrosion resitance

C. Compressor: reciprocating hermetic-type compressors or hermetic scroll, 1,750 RPM, VRF, designed for air-cooled condensing, complete with crankcase sight glass, crankcase heater, and back seating service access valves on suction and discharge ports. Capacity shall be controlled through cylinder unloading. Additional features include:

1. Crankcase heater in well within crankcase;
2. Capacity steps as scheduled, or greater number;
3. Compressor of same manufacturer as condensing unit.
4. VRF refrigerant control mater panel

D. Controls: Operating and safety controls shall include high and low pressure cutouts, oil pressure cutout, compressor winding thermostat cutout, 3-leg compressor overload protection, and condenser fan motors with thermal and overload cutouts. VRF control, Control transformer if required shall be 24 or 115-volts. Provide magnetic contactors and speed drive for compressor and condenser fan motors. Additional features include:

1. Reset relay circuit for manual resetting of cutouts from remote thermostat

location and refrigerant control valves;

2. Automatic nonrecycling pumpdown, and timing device to prevent excessive compressor cycling;
3. Factory- wired, for single external electrical power disconnect supplied by Electrical Contractor connection.

E. Condensing Section: Condenser coil shall be seamless copper tubing mechanically bonded to heavy-duty, configurated aluminum fins, coated coils, with separate and independent refrigeration circuit for each compressor. Units shall include liquid accumulator and subcooling circuit, and backseating liquid line service access valve. Condenser coils shall be factory-tested at 500 psig, vacuum dehydrate, and filled with a holding charge of nitrogen.

F. Condenser fans and drives: propeller-type condenser fans for vertical air discharge; either direct drive or belt drive. Additional features include:

1. Permanent lubricated ball bearing condenser fan motors;
2. Separate motor for each condenser fan;
3. Constant speed condenser fan motors;
4. Each fan assembly shall be dynamically and statically balanced.

G. Low ambient control: factory-installed low ambient assembly, fan speed control, or fan cycling control.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify site structure, mounting supports, and existing pads are complete to the proper point to allow installation of units. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install condensing units in accordance with manufacturers installation instructions. Install units plumb and level, firmly anchored in locations indicated, and maintain manufacturer's recommended clearances.

B. Support:

1. Install ground-mounted units on 4" thick reinforced concrete pad, 4" larger on each side than condensing unit. Coordinate installation of anchoring and isolation devices as noted on plans.

2. Air-Cooled Condensing Units: Connect refrigerant piping to unit; maintain required access to unit.

a. Install furnished field-mounted accessories.

3.3 FIELD QUALITY CONTROL

A. Testing:

1. Charge systems with refrigerant and oil, and test for leaks. Repair leaks and replace lost refrigerant and oil.

3.4 DEMONSTRATION

A. Provide services of manufacturer's authorized service representative to provide start-up service and to instruct Owner's personnel in operation and maintenance of condensing units.

B. Start-up condensing units, in accordance with manufacturer's start-up instructions. Test controls and demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment. As- built all piping and valve locations on the plan.

C. Train Owner's personnel on start-up and shut-down procedures, troubleshooting procedures, servicing, and preventative maintenance schedule and procedures. Review with the Owner's personnel, the data contained in the Operating and Maintenance Manuals specified in Division One.

1. Schedule training with Owner, provide at least 7-day prior notice to Project Manager.

END OF SECTION 15670

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SECTION 15830 - TERMINAL UNITS –233600 CSI 2004

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

B. Division-15 Basic Mechanical Materials and Methods sections apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Extent of terminal unit work is indicated by drawings and schedules, and by requirements of this section.

B. Types of terminal units required for project include the following:

1. Fan-Coil units.- New wall pack evaporator units

C. Refer to other Division-15 sections for piping; and testing, adjusting and balancing of terminal units; not work of this section.

D. Refer to electrical plans for the following work; not work of this Section.

1. Power supply wiring from power source to power connection on terminal unit. Include starters, controls, disconnects, and required electrical devices, except where specified as furnished, or factory-installed, by manufacturer.
2. Interlock wiring between electrically-operated terminal units; and between terminal units and field-installed control devices..
3. Interlock wiring specified as factory-installed is work of this section.

E. Provide the following electrical work as work of this section, complying with requirements of the electrical plans:

1. Control wiring between field-installed controls, indicating devices, and terminal unit control panels and condenser.

a. Control wiring specified as work of Division-15 for Automatic Temperature Controls is work of that section.

1.3 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of

terminal units, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 3 years.

B. Codes and Standards:

1. ARI Compliance: Provide coil ratings in accordance with ARI Standard 410 "Forced-Circulation Air-Cooling and Air-Heating Coils".
2. ASHRAE Compliance: Test coils in accordance with ASHRAE Standard 33 "Methods of Testing Forced Circulation Air Cooling and Heating Coils".
3. ARI Compliance: Test and rate fan-coil units in accordance with ARI Standard 440 "Room Fan-Coil Air Conditioners".
4. UL Compliance: Construct and install fan-coil units in compliance with UL 883 "Safety Standards for Fan Coil Units and Room Fan Heater Units".
5. UL Compliance: Provide electrical components for terminal units which have been listed and labeled by UL.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's specifications for terminal units showing dimensions, capacities, ratings, performance characteristics, gages and finishes of materials, and installation instructions.

B. Shop Drawings: Submit assembly-type shop drawings showing unit dimensions, construction details, and field connection details.

C. Wiring and Piping Diagrams: Submit manufacturer's electrical and refrigeration requirements for power supply wiring to terminal units. Submit manufacturer's ladder-type wiring diagrams for interlock and control wiring. Clearly differentiate between portions of wiring that are factory-installed and portions to be field-installed.

D. Maintenance Data: Submit maintenance instructions, including lubrication instructions, filter replacement, motor and drive replacement, and spare parts lists. Include this data, product data, shop drawings in maintenance manuals; in accordance with requirements of Division 1.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Handle terminal units and components carefully to prevent damage, breaking, denting and scoring. Do not install damaged terminal units or components; replace with new.

B. Store terminal units and components in clean dry place. Protect from weather, dirt, fumes, water, construction debris, and physical damage.

C. Comply with Manufacturer's rigging and installation instructions for unloading terminal units, and moving them to final location.

PART 2 - PRODUCTS

2.1 FAN-COIL UNITS- existing reused and repaired

A. General: Provide fan-coil units having cabinet sizes, and in locations indicated, and of capacities, style, and having accessories as scheduled. Include in basic unit chassis, coils. Fan board; drain pan assembly, fans, housing, motor, filter and insulation
Wall unit with supply and return grille for fit on drywall wall . Provide wall mount thermostats and bracket with unit with alarm contacts for over temperature. (adjustable).

B. Chassis: Construct chassis of galvanized steel with flanged edges.

C. Insulation: Faced, heavy density glass fiber.

D. Cabinet: Construct of 18-ga steel removable panels, 16-ga front. Provide insulation over entire coil section. Clean cabinet parts, bonderize, phosphatize, and flow-coat with baked-on primer.

E. Coils: Construct of 5/8" seamless copper tubes mechanically bonded to configurated aluminum fins. Design for 300 psi working pressure, and leak test at 300 psi under water.

F. Drain Pans: Construct of galvanized steel. Insulate with polystyrene or polyurethane insulation. Provide drain connection with integral condensate pump. Provide condensate alarm contact.

G. Fans: Provide centrifugal forward curved double width wheels of reinforced fiberglass, in galvanized steel fan scrolls.

H. Motors: Provide motors with integral thermal overload protection. Run test motors at factory in assembled unit prior to shipping. Provide quickly detachable motor cords.

I. Filters: Provide 1" thick throwaway type filters in fiberboard frames.

K. Accessories: Provide the following accessories as indicated and/or scheduled:

1. Discharge Grille Panels: Provide 18-ga galvanized steel, stamped integral grilles, with access doors.
2. Sub-Bases: Provide 18-ga steel sub-base, height as indicated.
3. Extended Oilers: Provide plastic motor oiler tubes extending to beneath top discharge grille.

4. Mounting Flanges: Provide 16-ga steel flanges for mounting fan-coil units into wall .

L. Manufacturer: Subject to compliance with requirements, provide fan-coil units of one of the following:

1. Fujitsu
2. Sanyo
3. Mitsubishi
4. or equal

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine areas and conditions under which terminal units are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 INSTALLATION OF FAN-COIL UNITS

A. General: Install fan-coil units as indicated, and in accordance with manufacturer's installation instructions.

B. Locate fan-coil units as indicated, coordinate with other trades to assure correct recess size for recessed units.

C. Install piping as indicated.

D. Protect units with protective covers during balance of construction.

3.3 ELECTRICAL WIRING

A. General: Install electrical devices furnished by manufacturer but not specified to be factory-mounted. Furnish copy of manufacturer's wiring diagram submittal to Electric Installer.

1. Verify that electrical wiring installation is in accordance with manufacturer's submittal and installation requirements of electrical plans. Do not proceed with equipment start-up until wiring installation is acceptable to equipment installer.

3.4 ADJUSTING AND CLEANING

A. General: After construction is completed, including painting, clean unit exposed

surfaces, vacuum clean terminal coils and inside of cabinets.

B. Retouch any marred or scratched surfaces of factory-finished cabinets, using finish materials furnished by manufacturer.

C. Install new filter units for terminals requiring same.

D, Provide and install condensate piping and refrigeration piping as noted on the plans and the manufacturer's diagrams for a complete installation.

E. Leak test the fan coil after installation of piping and the condenser system. Provide certification letter unit has been tested.

END OF SECTION 15830

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SECTION 15971 - ELECTRIC CONTROL SYSTEMS – 230933 CSI 2004

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

B. Division-15 Basic Mechanical Materials and Methods sections apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Extent of electric control systems work required by this section is indicated on drawings and schedules, and by requirements of this section.

1. Tie to the Data / It room ac unit (Bacnet capable) for temperature and humidity set point and alarms.
Provide flow switch, and its installation, and the temporary chiller controls at a plug/ terminal board in a Nema 4 panel next to the temporary chilled water piping arrangement on the exterior wall. Refer to plans for location.

B. Refer to other Division-15 sections for installation of dampers in mechanical systems; not work of this section.

C. Refer to electrical plans for the following work; not work of this section.

1. Power supply wiring for power source to power connection on controls and/or unit control panels. Include starters, disconnects, and required electrical devices, except where specified as furnished, or factory-installed, by manufacturer.
2. Interlock wiring between electrically-operated equipment units; and between equipment and field-installed control devices.

a. Interlock wiring specified as factory-installed is work of this section.

D. Provide the following electrical work as work of this section, complying with requirements of Division-16 sections:

1. Control wiring between field-installed controls, indicating devices, and unit control panels.

1.3 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of electric control equipment, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer's Qualifications: Firms specializing and experienced in electric control system installations for not less than 5 years.

C. Codes and Standards:

1. Electrical Standards: Provide electrical products which have been tested, listed and labeled by UL and comply with NEMA standards.
2. NEMA Compliance: Comply with NEMA standards pertaining to components and devices for electric control systems.
3. NFPA Compliance: Comply with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems" where applicable to controls and control sequences.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data for each control device furnished, indicating dimensions, capacities, performance characteristics, electrical characteristics, finishes of materials, and including installation instructions and start-up instructions.

B. Shop Drawings: Submit shop drawings for each electric control system, containing the following information:

1. **Schematic flow diagram of system showing fans, pumps, coils, dampers, valves, and control devices shall be provided by the control contractor.**
2. Label each control device with setting or adjustable range of control.
3. Indicate all required electrical wiring. Clearly differentiate between portions of wiring that are factory- installed and portions to be field-installed.
4. Provide details of faces of control panels, including controls, instruments, and labeling.
5. Include verbal description of sequence of operation.

C. Samples: Submit sample of each type of furnished thermostat cover, in accordance with requirements of Division 1.

D. Maintenance Data: Submit maintenance instructions and spare parts lists. Include this data, product data, and shop drawings in maintenance manuals; in accordance with requirements of Division 1.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Provide factory shipping cartons for each piece of equipment, and control device. Maintain cartons through shipping, storage and handling as required to prevent equipment damage, and to eliminate dirt and moisture from equipment. Store equipment and materials inside and protected from weather.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide electric control systems of one of the following:

1. Automated Logic ; the County has a contractual agreement with Automated Logic to provide services and equipment. The placement of this equipment other than this manufacturer would cause additional cost of operation and maintenance.

2.2 MATERIALS AND EQUIPMENT

A. General: Provide electric control products in sizes and capacities indicated, consisting of valves, controls, sensors, main DDC control panels, local DDC control panels, sensors, controllers, software, modems, and other components as required for a complete installation. Except as otherwise indicated, provide manufacturer's standard control system components as indicated by published product information, designed and constructed as recommended by manufacturer. Provide electric control systems with following functional and construction features as indicated.

B. Control Valves: Provide factory-fabricated electrical control valves of type, body material and pressure class indicated. Where type or body material is not indicated, provide selection as determined by manufacturer for installation requirements and pressure class, based on maximum pressure and temperature rating of piping system. Except as otherwise indicated, provide valves which mate and match material of connecting piping. Equip control valves with control valve motors, and with proper shutoff ratings for each individual application.

(1) Water Service Valves: Equal percentage characteristics with rangeability of 50 to 1, and maximum full flow pressure drop of 5 psig..
(2) Single-Seated Valves: Cage type trim, providing seating and guiding surfaces for plug on "top and bottom" guided plugs.
(3) Double-Seated Valves: Balanced plug-type, with cage type trim providing seating and guiding surfaces for plugs on "top and bottom" guided plugs.
(4) Valve Trim and Stems: Polished stainless steel.

(5) Packing: Spring-loaded Teflon, self-adjusting.

ii. Remote-Bulb Thermostats: Provide remote-bulb thermostats of on- off or modulating type, as required by sequence of operation. Provide liquid-filled units designed to compensate for changes in ambient temperature at instrument case. Provide capillary and bulb of copper unless otherwise indicated. Equip bulbs in water lines with separate wells of same material as bulb. Support bulbs installed in air ducts securely, to prevent damage and noise from vibrations. Provide averaging bulbs where shown or specified in operational sequence, consisting of copper tubing not less than 8'-0" in length with either single or multiple-unit elements. Extend tubing to cover full width of duct or unit, and support adequately.

(1) Provide scale settings and differential settings where applicable, which are clearly visible and adjustable from front of instrument.
(2) Equip on-off remote-bulb thermostats with precision snap switches, and with electrical rating as required by application.
(3) Provide modulating remote-bulb thermostats of potentiometer type constructed so that complete potentiometer coil and wiper assembly is removable for inspection or replacement without disturbing calibration of instrument.

iii. Electronic Sensors: Provide electronic temperature and relative humidity sensors of supersensitive resistance type, which are vibration and corrosion-resistant, and of wall mounted immersion, duct mounting, averaging or bulb type as required for application.

iv. Electronic Controllers: Provide electronic controllers of "Wheatstone Bridge" amplifier type, designed as individual components and fully protected by steel enclosures. Provide individual controllers of multiple-input type with provisions for remote resistance type readjustment. Identify adjustments clearly on controllers, including proportional band, authority, etc.

(1) Where single electronic controller is required for specific application, it can be built-in as integral part of control motor, but only where provided with easily accessible control readjustment potentiometer.
(2) Provide 2-position of proportional electric controller power output as required by specified sequence of operations.

v. Valve Motors: Size each motor to operate dampers or valves with sufficient reserve power to provide smooth modulating action or 2-position action as specified.

1. Provide permanent split-capacitor or shaded pole type motors with gear trains completely oil-immersed and sealed. Equip spring-return motors, where

indicated on drawings or in operational sequence, with integral spiral-spring mechanism. Furnish entire spring mechanism in housings designed for easy removal for service or adjustment of limit switches, auxiliary switches, or feedback potentiometer.

2. Equip motors for outdoor locations and for outside air intakes with "O ring" gaskets designed to make motors completely weatherproof, and equip with internal heaters to permit normal operation at -40 degrees F (-40 degrees C).
3. Furnish non-spring return motors for dampers larger than 25 sq. ft., and for valves larger than 2-1/2", sized for running torque rating of 150 inch-pounds, and breakaway torque rating of 300 inch-pounds. Size spring-return motors for running torque rating of 150 inch-pounds, and breakaway torque rating of 150 inch-pounds.

vi. Water Flow Switches: Provide water flow switches of stainless steel or bronze paddle types. Where flow switches are used in chilled water applications, provide vapor-proof type to prevent condensation of electrical switch. Provide pressure-flow switches of bellows actuated mercury type or snap-acting type, with appropriate scale range and differential adjustment for service indicated.

vii. Local Control Panels: Provide control panels with suitable brackets for either wall or floor mounting, for each supply fan and miscellaneous control system. Locate panel adjacent to systems served.

(1) Fabricate panels of 14-ga furniture-quality steel, or 6063-T5 extruded aluminum alloy, totally enclosed, with hinged doors and keyed lock, with manufacturer's standard shop-painted finish and color. Provide UL-listed cabinets for use with line voltage devices.
(2) Panel Mounted Equipment: Include temperature and humidity controllers, relays and automatic switches, except exclude low-temperature protection thermostats, firestats, and other devices excluded in sequence of operation. Fasten devices with adjustments accessible through front of panels.
(3) Door-Mounted Equipment: Flush-mount (on hinged door) manual switches, including damper "minimum-off" positioning switches, "summer-winter" switches, and "manual-automatic" switches; and including dial thermometers.
(4) Graphics: Where specified, provide color-coded graphic laminated plastic displays on doors, to schematically show system being controlled. Provide protective sheet of clear plastic bonded to entire door to prevent damage to symbols.
(5) Provide standard steel cabinets as required to contain temperature controllers, relays, switches, and similar devices,

except limit controllers and other devices excluded in sequence of operations. Provide full-enclosure cabinets, with painted gray finish.

viii. Central (Master) Control Panels: Provide central control panels of fully-enclosed steel cubical type, with locking doors and/or locking removable backs. Match finish of panels and provide multi- color graphic displays, schematically showing system being controlled.

J. Standalone Controllers: Provide stand-alone distributed processing DDC units capable of being fully user-programmable and executing the sequence of operations and other software functions as specified hereinandindicated on the plans. The use of a separate computer or special software shall not be required to generate user-defined programs. The DDC shall be capable of executing standard mathematical and Boolean functions and provide for PID control algorithms.

Provide software graphical Displays, Reports, Alarms and other Operator Interface Features for these systems for the Front-End Color Graphics User Interface.

The DDC shall provide as minimum all digital inputs, analog inputs, digital outputs, and analog outputs as required to execute the sequence of operations. The system shall be capable of expansion to 1,024 digital inputs, 1,024 analog inputs,1,024 digital outputs and 1,024 analog outputs without changing (upgrading) software or front-end hardware.Expansion shall not require removal of any existing hardware.

Main or master control panels (MCU) shall be the central controllers, with local control units(LCU) shall have the smaller standalone processors. The main control units shall have 7-day battery back -up, while the LCU shall have 24 hour battery back-up.

MCU s and LCU s shall be able ot communicate with standard peripherial equipment devices suchas crt s, computers, modems and printers using a stnadard RS232 communications.

MCU s and LCU s shall receive analog inputs 0-10vdc, digital inputs contact closures, and voltage level transitions and pulse accumulator inputs, and totlaized inputs. Digital outputs shall include contacxt closureand maintained operation of field devices. Analog outputs shall measure 0-20vdc, 0-20 ma control input.

All software shall be provided for the MCU and LCU.

K. User interface: Windows user text interface software; for time of day scheduling, alarm screen, trend screen, access, operator point groups, individual area/ space trends, provisions of holidays, and unoccupied periods, along with time reset and hold.

L. Software Programs: The types of programs used in this system are: 1.Time of day

scheduling
All software to be output indicated areas in engineering units.
All printouts shall be time dated. Provied PID control algorithms for all modulating devices. No floating or hunting of systems unless reset programs are reviewing and adjusting so as to not overheat or overcool areas.

M. Surge protection:
Provide power, data line, and modem surge protection for each MCU panels, and power and data line for all LCUs.

N. Power supplies: Provide and supply power supply trnasoformers for all LCUs and MCUs and smaller controllers used on valves from the power supplied by DIV 16.

O. Step Controllers: Provide step controllers for control sequencing or for control of electric heat power loads, of 6- or 10-stage type, with heavy-duty switching rated to handle loads, UL-listed and operated by electric motors of quality specified for valve and damper actuation.

P. Electronic Sensors: Provide electronic temperature and relative humidity sensors of supersensitive resistance type, which are vibration and corrosion-resistant, and of wall mounted immersion, duct mounting, averaging or bulb type as required for application.

Q. Electronic Controllers: Provide electronic controllers of "Wheatstone Bridge" amplifier type, designed as individual components and fully protected by steel enclosures. Provide individual controllers of multiple-input type with provisions for remote resistance type readjustment. Identify adjustments clearly on controllers, including proportional band, authority, etc.

1. Where single electronic controller is required for specific application, it can be built-in as integral part of control motor, but only where provided with easily accessible control readjustment potentiometer.
2. Provide 2-position of proportional electric controller power output as required by specified sequence of operations.

R. Water Flow Switches: Provide water flow switches of stainless steel or bronze paddle types. Where flow switches are used in chilled water applications, provide vapor-proof type to prevent condensation of electrical switch. Provide pressure-flow switches of bellows actuated mercury type or snap-acting type, with appropriate scale range and differential adjustment for service indicated.

S.Central (Master) Control Panels: Provide central control panels of fully-enclosed steel cubical type, with locking doors and/or locking removable backs. Match finish of panels and provide multi- color graphic displays, schematically showing system being controlled.

T. Control Relays: Relays shall be 24 vdc coils, and be provied with varistors across the coil, be DIN rail mounted, and be spade type.
Relays shall not be used for control of motors greater than 1/6 hp.
Starters with 120 v control pwer shall be controlled externally.

U. Conductors/conduit: Provide not less than a # 18 awg stranded copper plenum rated and high temp. wire for control and signal. Provide EMT conduit with compression type fittings below th ceiling and in exposed and in equipment compartments. Provide insulated ground bushings at conduit connections to all boxes and panels.Maximum liquid tite lengths are 6 -0 . All control wiring shall be home runs without any splices. Provide spare conductors for each conduit running to the main panel areas.

V. Temperature sensors: Use thermistors or rtds which are compatible with software. Thumb wheel range 50 degrees f to 85 degrees f.

W. Humidity sensors: Unit shall have 0 to 95% RH span with +/- 3 %.
Output shall be 0-20ma. Input 24 vdc. Unit shall have a lockable guard.

X. End switches: Provide and install end switches on valves, dampers, and areas which need minimum positioning and calibration of set points. Provide the units integral with the actuators.

Y. All valves, meters, drive output systems, miscellaneous

switches, and flow sensors have been specified in other Div 15 and DIV 16 sections. Belimo actuators and Bray valves are allowed on the project.

3.0 PART - EXECUTION

3.1 INSPECTION

A. Examine areas and conditions under which electric control systems are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 INSTALLATION OF ELECTRIC CONTROL SYSTEMS

A. General: Install systems and materials in accordance with manufacturer's instructions and roughing-in drawings, and details on drawings. Install electrical components and use electrical products complying with requirements of applicable Division-16 sections of these specifications. Mount controllers at convenient locations and heights.

B.Control Wiring: The term "control wiring" is defined to include providing of wire, conduit and miscellaneous materials as required for mounting and connecting electric control devices.

C. Wiring System: Install complete control wiring system for electric control systems. Conceal wiring except in mechanical rooms and areas where other conduit and piping are exposed. Provide multi- conductor instrument harness (bundle) in place of single conductors where number of conductors can be run along common path. Fasten flexible conductors bridging cabinets and doors, neatly along hinge side, and protect against abrasion. Tie and support conductors neatly.

D.Number-code or color-code conductors, excluding those used for local individual room controls, appropriately for future identification and servicing of control system.

E.Reset Limit Controls: Install manual-reset limit controls to be independent of power controllers; automatic duct heater resets may, at Contractor's option, be installed in interlock circuit of power controllers.

F.Unit-Mounted Equipment: Where control devices are indicated to be unit-mounted, ship electric relays, electric switches, valves, dampers, and damper motors to unit manufacturer for mounting and wiring at factory.

3.3 ADJUSTING AND CLEANING

A.Start-Up: Start-up, test, and adjust electric control systems in presence of manufacturer's authorized representative. Demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment.

B.Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

C.Final Adjustment: After completion of installation, adjust thermostats, control valves, motors and similar equipment provided as work of this section.

(1) Final adjustment shall be performed by specially trained personnel in direct employ of manufacturer of primary temperature control system.

3.4 CLOSEOUT PROCEDURES

A. Owner's Instructions: Provide services of manufacturer's technical representative for one 8-hour day to instruct Owner's personnel in operation and maintenance of electric control systems.

(1) Schedule instruction with Owner, provide at least 7-day notice to Contractor and Project Manager of training date.

END OF SECTION 15971

SECTION 15990 - TESTING, ADJUSTING, AND BALANCING 230593 CSI 2004

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

B. Related Sections:

1. General requirements for testing agencies are specified in the Division-1 Section Quality Control Services.
2. Other Division-15 Sections specify balancing devices and their installation, and materials and installations of mechanical systems.
3. Individual Division-15 system sections specify leak testing requirements and procedures.

1.2 SUMMARY

A. This Section specifies the requirements and procedures total mechanical systems testing, adjusting, and balancing. Requirements include measurement and establishment of the fluid quantities of the mechanical systems as required to meet design specifications, and recording and reporting the results. **Provide air readings and temperature readings for the Data/ UPS room ac systems only.**

B. Test, adjust, and balance the following mechanical systems:

1. Supply air systems, all pressure ranges; including variable volume systems:
2. Return air systems;
3. Verify temperature control system operation.

C. Test systems for proper sound and vibration levels.

D. This Section does not include:

1. testing boilers and pressure vessels for compliance with safety codes;
2. specifications for materials for patching mechanical systems;
3. specifications for materials and installation of adjusting and balancing devices. If devices must be added to achieve proper adjusting and balancing, refer to the respective system sections for materials and installation requirements.
4. requirements and procedures for piping and ductwork systems leakage tests.

1.3 DEFINITIONS

A. Systems testing, adjusting, and balancing is the process of checking and adjusting all the building environmental systems to produce the design objectives. It includes:

1. the balance of air and water distribution;
2. adjustment of total system to provide design quantities;
3. electrical measurement;
4. verification of performance of all equipment and automatic controls;
5. sound and vibration measurement.

B. Test: To determine quantitative performance of equipment.

C. Adjust: To regulate the specified fluid flow rate and air patterns at the terminal equipment (e.g., reduce fan speed, throttling).

D. Balance: To proportion flows within the distribution system (submains, branches, and terminals) according to specified design quantities.

E. Procedure: Standardized approach and execution of sequence of work operations to yield reproducible results.

F. Report forms: Test data sheets arranged for collecting test data in logical order for submission and review. These data should also form the permanent record to be used as the basis for required future testing, adjusting, and balancing.

G. Terminal: The point where the controlled fluid enters or leaves the distribution system. These are supply inlets on water terminals, supply outlets on air terminals, return outlets on water terminals, and exhaust or return inlets on air terminals such as registers, grilles, diffusers, louvers, and hoods.

H. Main: Duct or pipe containing the system's major or entire fluid flow.

I. Submain: Duct or pipe containing part of the systems' capacity and serving two or more branch mains.

J. Branch main: Duct or pipe serving two or more terminals.

K. Branch: Duct or pipe serving a single terminal.

1.4 SUBMITTALS

A. Agency Data:

1. Submit proof that the proposed testing, adjusting, and balancing agency meets the qualifications specified below.

B. Engineer and Technicians Data:

1. Submit proof that the Test and Balance Engineer assigned to supervise the procedures, and the technicians proposed to perform the procedures meet the qualifications specified below.

C. Procedures and Agenda: Submit a synopsis of the testing, adjusting, and balancing procedures and agenda proposed to be used for this project.

D. Maintenance Data: Submit maintenance and operating data that include how to test, adjust, and balance the building systems. Include this information in maintenance data specified in Division 1 and Section 15010.

E. Sample Forms: Submit sample forms, if other than those standard forms prepared by the NEBB are proposed.

F. Certified Reports: Submit testing, adjusting, and balancing reports bearing the seal and signature of the Test and Balance Engineer. The reports shall be certified proof that the systems have been tested, adjusted, and balanced in accordance with the referenced standards; are an accurate representation of how the systems have been installed; are a true representation of how the systems are operating at the completion of the testing, adjusting, and balancing procedures; and are an accurate record of all final quantities measured, to establish normal operating values of the systems. Follow the procedures and format specified below:

1. Draft reports: Upon completion of testing, adjusting, and balancing procedures, prepare draft reports on the approved forms. Draft reports may be hand written, but must be complete, factual, accurate, and legible. Organize and format draft reports in the same manner specified for the final reports. Submit 2 complete sets of draft reports. Only 1 complete set of draft reports will be returned.
2. Final Report: Upon verification and approval of draft reports, prepare final reports, type written, and organized and formatted as specified below. Submit 2 complete sets of final reports.
3. Report Format: Report forms shall be those standard forms prepared by the referenced standard for each respective item and system to be tested, adjusted, and balanced. Bind report forms complete with schematic systems diagrams and other data in reinforced, vinyl, three-ring binders. Provide binding edge labels with the project identification and a title descriptive of the contents. Divide the contents of the binder into the below listed divisions, separated by divider tabs:

    a. General Information and Summary
    b. Air Systems
    c. Temperature Control Systems

4. Report Contents: Provide the following minimum information, forms and data:

   a. General Information and Summary: Inside cover sheet to identify testing, adjusting, and balancing agency, Contractor, Owner, Architect, Engineer, and Project. Include addresses, and contact names and telephone numbers. Also include a certification sheet containing the seal and name address, telephone number, and signature of the Certified Test and Balance Engineer. Include in this division a listing of the instrumentations used for the procedures along with the proof of calibration.
   b. The remainder of the report shall contain the appropriate forms containing as a minimum, the information indicated on the standard report forms prepared by the AABC and NEBB, for each respective item and system. Prepare a schematic diagram for each item of equipment and system to accompany each respective report form.

G. Calibration Reports: Submit proof that all required instrumentation has been calibrated to tolerances specified in the referenced standards, within a period of six months prior to starting the project.

1.5 QUALITY ASSURANCE

A. Test and Balance Engineer's Qualifications: A Professional Engineer (either on the installer's staff or and independent consultant), registered in the State in which the services are to be performed, and having at least 3-years of successful testing, adjusting, and balancing experience on projects with testing and balancing requirements similar to those required for this project.

B. Agency Qualifications:

   1. Employ the services of an independent testing, adjusting, and balancing agency meeting the qualifications specified below, to be the single source of responsibility to test, adjust, and balance the building mechanical systems identified above, to produce the design objectives. Services shall include checking installations for conformity to design, measurement and establishment of the fluid quantities of the mechanical systems as required to meet design specifications, and recording and reporting the results.
   2. The independent testing, adjusting, and balancing agency certified by National Environmental Balancing Bureau (NEBB) in those testing and balancing disciplines required for this project, and having at least one Professional Engineer registered in the State in which the services are to be performed, certified by NEBB as a Test and Balance Engineer.

C. Codes and Standards:

1. NEBB: "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems."
2. AABC: "National Standards For Total System Balance".
3. ASHRAE: ASHRAE Handbook, 1984 Systems Volume, Chapter 37, Testing, Adjusting, and Balancing.

D. Pre-Balancing Conference: Prior to beginning of the testing, adjusting, and balancing procedures, schedule and conduct a conference with the Architect/Engineer and representatives of installers of the mechanical systems. The objective of the conference is final coordination and verification of system operation and readiness for testing, adjusting, and balancing.

1.6 PROJECT CONDITIONS

A. Systems Operation: Systems shall be fully operational prior to beginning procedures.

1.7 SEQUENCING AND SCHEDULING

A. Test, adjust, and balance the air systems before hydronic, steam, and refrigerant systems.

B. Test, adjust and balance air conditioning systems during summer season and heating systems during winter season, including at least a period of operation at outside conditions within 5 deg. F wet bulb temperature of maximum summer design condition, and within 10 deg. F dry bulb temperature of minimum winter design condition. Take final temperature readings during seasonal operation.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PRELIMINARY PROCEDURES FOR AIR SYSTEM BALANCING

A. Before operating the system, perform these steps:

1. Obtain design drawings and specifications and become thoroughly acquainted with the design intent.
2. Obtain copies of approved shop drawings of all air handling equipment, outlets (supply, return, and exhaust) and temperature control diagrams.
3. Compare design to installed equipment and field installations.
4. Walk the system from the system air handling equipment to terminal units to determine variations of installation from design.
5. Check filters for cleanliness.

6. Check dampers (both volume and fire) for correct and locked position, and temperature control for completeness of installation before starting fans.
7. Prepare report test sheets for both fans and outlets. Obtain manufacturer's outlet factors and recommended procedures for testing. Prepare a summation of required outlet volumes to permit a crosscheck with required fan volumes.
8. Determine best locations in main and branch ductwork for most accurate duct traverses.
9. Place outlet dampers in the full open position.
10. Prepare schematic diagrams of system "as-built" ductwork and piping layouts to facilitate reporting.
11. Lubricate all motors and bearings.
12. Check fan belt tension.
13. Check fan rotation.

3.2 PRELIMINARY PROCEDURES FOR HYDRONIC SYSTEM BALANCING

A. Before operating the system perform these steps:

1. Open valves to full open position. Close coil bypass valves.
2. Remove and clean all strainers.
3. Examine hydronic systems and determine if water has been treated and cleaned.
4. Check pump rotation, adjust plant pumps with TCC contractor. .
5. Clean and set automatic fill valves for required system pressure.
6. Check expansion tanks to determine that they are not air bound and that the system is completely full of water.
7. Check air vents at high points of systems and determine if all are installed and operating freely (automatic type) or to bleed air completely (manual type).
8. Set temperature controls so all coils are calling for full flow.
9. Check operation of automatic bypass valves.
10. Check and set operating temperatures of chillers to design requirements.
11. Lubricate all motors and bearings.

3.3 MEASUREMENTS

A. Provide all required instrumentation to obtain proper measurements, calibrated to the tolerances specified in the referenced standards. Instruments shall be properly maintained and protected against damage.

B. Provide instruments meeting the specifications of the referenced standards.

C. Use only those instruments which have the maximum field measuring accuracy and are best suited to the function being measured.

D. Apply instrument as recommended by the manufacturer.

E. Use instruments with minimum scale and maximum subdivisions and with scale ranges proper for the value being measured.

F. When averaging values, take a sufficient quantity of readings which will result in a repeatability error of less than 5 percent. When measuring a single point, repeat readings until 2 consecutive identical values are obtained.

G. Take all reading with the eye at the level of the indicated value to prevent parallax.

H. Use pulsation dampeners where necessary to eliminate error involved in estimating average of rapidly fluctuation readings.

I. Take measurements in the system where best suited to the task.

3.4 PERFORMING TESTING, ADJUSTING, AND BALANCING

A. Perform testing and balancing procedures on each system identified, in accordance with the detailed procedures outlined in the referenced standards.

B. Cut insulation, ductwork, and piping for installation of test probes to the minimum extent necessary to allow adequate performance of procedures.

C. Patch insulation, ductwork, and housings, using materials identical to those removed.

D. Seal ducts and piping, and test for and repair leaks.

E. Seal insulation to re-establish integrity of the vapor barrier.

F. Mark equipment settings, including damper control positions, valve indicators, fan speed control levers, and similar controls and devices, to show final settings. Mark with paint or other suitable, permanent identification materials.

G. Retest, adjust, and balance systems subsequent to significant system modifications, and resubmit test results.

3.5 TESTING FOR SOUND AND VIBRATION

A. Test and adjust mechanical systems for sound and vibration in accordance with the detailed instructions of the referenced standards.

3.6 RECORD AND REPORT DATA

A. Record all data obtained during testing, adjusting, and balancing in accordance with, and on the forms recommended by the referenced standards, and as approved on the sample report forms.

B. Prepare report of recommendations for correcting unsatisfactory mechanical performances when system cannot be successfully balanced.

3.7 DEMONSTRATION

A. Training:

1. Train the Owner's maintenance personnel on troubleshooting procedures and testing, adjusting, and balancing procedures. Review with the Owner's personnel, the information contained in the Operating and Maintenance Data specified in Division 1 and Section 15010.
2. Schedule training with Owner through the Project Manager with at least 7 days prior notice.

END OF SECTION 15990

Division 16000 - SECTION 26 00 00 - ELECTRICAL SYSTEMS DESCRIPTIONS

A. PROJECT INCLUDES

1. Electrical Systems for the Following Applications:

   a. Power and distribution.
   b. Empty conduit system.
   c. Modifications to existing systems.

2. Preliminary Connected Loads:

   a. See electrical drawings for loads being disconnected.
   b. See electrical drawings for loads being added.

3. Additional Requirements:

   a. On site factory training for all switchboards, motor control centers, automatic transfer switches, and generators.
   b. All switchgear and equipment shall meet or exceed the Short Circuit Values on the drawings.
   c. Perform controls work for the generator. All controls shall work with the existing generator and possible portable generator. See signal diagrams and controls on the electrical drawings.

4. Additional information is included in the construction documents and shall be included in this project. It is the responsibility of the contractor to obtain the latest and most updated set of documents.

B. PRODUCTS

1. Systems, products, and standards are listed in individual specification sections, which follow.

END OF SECTION

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Division 16110 SECTION 26 05 00 – COMMON WORK RESULTS FOR ELECTRICAL: ELECTRICAL RACEWAYS, CABLE TRAYS, AND BOXES

A. PROJECT INCLUDES

1. Electrical conduit, tubing, surface raceways, wireways, cable trays, boxes, and cabinets for electrical power and signal distribution.

B. PRODUCTS

1. Wiring Methods:

   a. Exposed Indoor Wiring: Electrical metallic tubing, rigid nonmetallic conduit, and/or galvanized steel conduit.
   b. Concealed Indoor Wiring: Electrical metallic tubing, electrical nonmetallic tubing, or rigid nonmetallic conduit.
   c. Exposed Outdoor Wiring: GRC steel conduit.
   d. Concealed Outdoor Wiring: GRC steel conduit.
   e. Underground Wiring, Single Run: Rigid nonmetallic conduit.
   f. Underground Wiring, Grouped: Rigid nonmetallic conduit.
   g. Connection to Vibrating Equipment: Flexible liquidtight conduit.

2. Metal Conduit and Tubing:

   a. Rigid Steel Conduit: ANSI C80.1.
   b. PVC Externally Coated Rigid Steel Conduit and Fittings: ANSI C80.1 and NEMA RN 1.
   c. Electrical Metallic Tubing (EMT) and Fittings: ANSI C80.3.
   d. PVC Externally Coated Electrical Metallic Tubing and Fittings: ANSI C80.3 and NEMA RN 1.
   e. Liquidtight Flexible Metal Conduit and Fittings: UL 360.

3. Nonmetallic Conduit and Ducts:

   a. Electrical Nonmetallic Tubing (ENT): NEMA TC 13.
   b. Rigid Nonmetallic Conduit (RNC): NEMA TC 2 and UL 651, Schedule 40 or 80 PVC.
   c. Underground PVC and ABS Plastic Utilities Duct: NEMA TC 6, Type I for encased burial in concrete, Type II for direct burial.
   d. PVC and ABS Plastic Utilities Duct Fittings: NEMA TC9.
   e. Liquidtight Flexible Nonmetallic Conduit and Fittings: UL 1660.

4. Raceway Accessory Materials:

   a. Conduit Bodies: NEC requirements.
   b. Wireways: NEC requirements.
   c. Surface Raceways, Metallic: Galvanized steel, with snap-on covers.
   d. Surface Raceways, Nonmetallic: Rigid PVC, UL 94.

5. Boxes and Fittings:
   a. Cabinet Boxes: UL 50, sheet steel, NEMA 1 or NEMA 3 dependent on location.
   b. Pull and Junction Boxes: UL 50, steel boxes, NEMA 1 or NEMA 3 dependent upon location.
   c. Metal Outlet, Device and Small Wiring Boxes: UL 514A and OS 1.
   d. Nonmetallic Outlet, Device and Small Wiring Boxes: NEMA OS 2.

6. Identification of Electrical Systems: Systems shall have a clearly marked schedule, typed, and given to the Owner's Representative. All disconnects shall be clearly marked with an engraved type plastic placard as described in the electrical documents. The electrical input and output shall be clearly marked.
7. Specifications: The electrical drawings have specifications. Review all specifications on the electrical drawings.

END OF SECTION

Division 16120 SECTION 26 05 19 – ELECTRICAL WIRES AND CABLES

A. PROJECT INCLUDES

1. Wires, cables, and connectors for power, lighting, signal, control and related systems rated 600 volts and less.

B. QUALITY ASSURANCE

2. Compliance: National Electrical Code; UL 4, 83, 486A, 486B, 854; NEMA/ICEA WC-5, WC-7, WC-8; IEEE 82.

C. PRODUCTS

1. Wire Components:

   a. Conductors for Power and Lighting Circuits: Solid or Stranded conductors for No. 10 AWG and smaller; stranded conductors for No. 8 AWG and larger.

   b. Conductor Material: Copper.

   c. Insulation: THHN/THWN for conductors size 500MCM and larger and No. 8 AWG and smaller, THW, THHN/THWN or XHHW insulation for other sizes based on location.

   d. Jackets: Factory-applied nylon or PVC.

2. Cables:

   a. Portable Cord for Flexible Pendant Leads to Outlets and Equipment: UL Type SO.

   b. Control/Signal Transmission Media: Single conductor, coaxial type, or others as required by the equipment manufacture.

   c. Fiber Optic Cables: Single channel low-loss glass type, fiber optic multimode graded-index cables, including connectors, couples, transmitters, receivers, sources and detectors.

3. Connectors: UL listed connectors for the appropriate cable type with appropriate temperature ratings.

END OF SECTION

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Division 16140 SECTION 26 27 26 – ELECTRICAL WIRING DEVICES

A. PROJECT INCLUDES

1. Wiring devices for electrical service.

B. QUALITY ASSURANCE

1. Compliance: National Electrical Code, NEMA WD 1, and UL.

C. PRODUCTS

1. Wiring Devices and Components:

a. Receptacles: UL 498 and NEMA WD 1, exterior are NEMA 3 with covers.

b. Industrial Receptacles: UL 498 pin and sleeve type; UL 1010 at hazardous locations.

c. Ground-Fault Interrupter (GFI) Receptacles: Feed-thru type ground-fault circuit interrupter with integral duplex receptacles.

d. Plugs: 15 amperes, 125 volts, 3 wire, grounding, armored cap plugs.

e. Plug Connectors: 15 amperes, 125 volts, bakelite-body armored connectors, 3 wire, grounding with cord clamp.

f. Snap Switches: UL 20 and NEMA WD 1, AC switches.

g. Combination Switch and Receptacles: 3-way switch, 20 amperes, AC with toggle switch handle, 3 wire grounding receptacle, 15 amperes, 120 volts.

h. Wall Plates: Single and combination types, match existing types.

END OF SECTION

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Division 16400 SECTION 26 20 00 – ELECTRICAL SERVICE AND DISTRIBUTION

A. PROJECT INCLUDES

1. Electrical service and distribution including service entrance, switchboards, low-voltage power switchgear, grounding, transformers, busways, panelboards, overcurrent protective devices, and motor controllers.

B. PRODUCTS

1. Service Entrance: Service and Distribution Requirements: Refer to project “E” series drawings.

   a. Circuit Breakers: Solid-state trip circuit breakers.

   b. Meter Sockets: Acceptable to local utility company.

   c. Switches: Heavy-duty safety switches with NEMA Type 4X enclosure.

2. Switchboards:

   a. Refer to: SECTION 26 27 00 – LOW VOLTAGE GROUP MOUNTED DISTRIBUTION

3. Low-Voltage Power Switchgear:

   a. Refer to: SECTION 26 27 00 – LOW VOLTAGE GROUP MOUNTED DISTRIBUTION

4. Grounding:

   a. Grounding Equipment: UL 467; copper conductors; NEC Table 8, and article 250 wire and cable conductors; connectors.

   b. Grounding Electrodes: Copper-clad steel ground rods; copper plate electrodes.

5. Transformers if shown:

   a. Control and Signal Transformers: NEMA ST 1, UL 506, self-cooled, two-winding dry type; continuous duty rating.

6. Busways if shown:

   a. Busways: General-purpose plug-in type, ANSI/UL 857, NEMA BU 1, enclosed, non-ventilated, suitable for indoor installation, copper conductors.

b. Plug-In Devices: Circuit breaker plugs, fusible switch plugs, fuse plugs, combination starter plugs; compatible with connected busway.

7. Panelboards:

a. Panelboards: NEMA PB 1, UL 50, 61, with overcurrent protective devices, enclosure suitable for use, copper bus, compression type main and neutral lugs, IEEE C62.1 surge arresters.

b. Panelboard Type: Load-center-type panelboards; lighting and appliance branch circuit panelboards; distribution panelboards.

8. Overcurrent Protective Devices:

a. Overcurrent Protective Devices: Integral to panelboards, switchboards, and motor control centers.

b. Cartridge Fuses: NEMA FU 1, class suitable for use.

c. Fusible Switches: UL 98, NEMA KS 1, rating suitable for use.

d. Fused Power Circuit Devices: UL 977, operation suitable for use; ground fault protection; open fuse trip device; minimum fault current rating suitable for use.

e. Molded Case Circuit Breakers: UL 489, NEMA AB 1; combination circuit breaker and ground fault circuit interrupters type; current-limiting circuit breaker type; integrally fused circuit breaker type; solid-state trip device circuit breaker type; rating suitable for use.

f. Insulated Case Circuit Breakers: UL 489, NEMA AB 1; rating suitable for use.

9. Fuses:

a. Cartridge Fuses: ANSI/IEEE FU 1, nonrenewable cartridge type, non-interchangeable type.

10. Motor Controllers: (NOT USED)

END OF SECTION

Division 16402
SECTION 26 27 00-LOW VOLTAGE SWITCHBOARDS GROUP MOUNTED DISTRIBUTION

A. SECTION INCLUDES

1. Low Voltage, Front-Accessible and Front/Rear-Accessible switchboards with circuit breaker for mains and feeders and/or fusible switches for mains as specified below and shown on the contract drawings.

B. RELATED SECTIONS

1. 26 43 00 Transient Voltage Suppression Systems.

C. REFERENCES

1. The low voltage switchboards and protection devices in this specification are designed and manufactured according to latest revision of the following standards (unless otherwise noted).

a. ANSI 61

b. ANSI/NEMA PB 2, Deadfront Distribution Switchboards

c. ANSI/NEMA PB 2.1, General Instructions for Proper Handling, Installation, Operation, and Maintenance of Deadfront Distribution Switchboards Rated 600 Volts or Less

d. ANSI/NFPA 70, National Electrical Code

e. NEMA AB 1, Molded Case Circuit Breakers and Molded Case Switches

f. NEMA KS 1, Fused and Non - fused Switches

g. UL 489, Molded Case Circuit Breakers and Circuit Breaker Enclosures

h. UL 891, Dead Front Switchboards

i. UL 98, Enclosed and Dead Front Switches

j. UL 977, Fused Power Circuit Devices

D. DEFINITIONS

1. Front-Accessible only shall be as defined by UL 891 standard which requires that all line and load connections for phase, neutral, and ground conductors can be made and maintained from the front of the switchboard without access to the rear.

E. SYSTEM DESCRIPTION

1. The power system feeding the Switchboards is either 480/277 or 208/120 volts, 60 Hertz, 3 phase, 4-wire, solidly grounded Wye. All exterior switch boards shall be Nema 3R minimum.

2. Switchboard(s) shall have front access and rear alignment for mounting against a wall.

F. SUBMITTALS

1. Manufacturer shall provide 3 copies of the following documents to owner for review and evaluation in accordance with general requirements of Division 16.

   a. Product Data on specified product;

   b. Shop Drawings on specified product;

   c. Trip curves for each specified product.

G. INSTALLATION, OPERATION AND MAINTENANCE DATA

1. Manufacturer shall provide 3 copies of installation, operation and maintenance procedures to owner in accordance with general requirements of Division 16.

H. QUALITY ASSURANCE (QUALIFICATIONS)

1. Manufacturer shall have specialized in the manufacture and assembly of low voltage switchboards for 25 years or more.

2. Low voltage switchboards shall be listed and/or classified by Underwriters Laboratories in accordance with standards listed in Article C-1 of this specification.

3. Equipment shall be qualified for use in seismic areas as follows:

a. High seismic loading as defined in IEEE Std 693-1997, with 1.33 amplification factor.

I. DELIVERY, STORAGE, AND HANDLING

1. Contractor shall store, protect, and handle products in accordance with recommended practices listed in manufacturer's Installation and Maintenance Manuals.

2. Ship each switchboard section in individual shipping splits for ease of handling. Each section shall be mounted on shipping skids and wrapped for protection.

3. Contractor shall inspect and report concealed damage to carrier within 48 hours.

4. Contractor shall store in a clean, dry space. Cover with heavy canvas or plastic to keep out dirt, water, construction debris, and traffic. Heat enclosures to prevent condensation.

5. Contractor shall handle in accordance with manufacturer's recommendations to avoid damaging equipment, installed devices, and finish.

J. PROJECT CONDITIONS (SITE ENVIRONMENTAL CONDITIONS)

1. Follow (standards) service conditions before, during and after switchboard installation.

2. Low voltage switchboards shall be located in well - ventilated areas, free from excess humidity, dust and dirt and away from hazardous materials. Ambient temperature of area will be between minus 30 and plus 40 degrees C. Indoor locations shall be protected to prevent moisture from entering enclosure.

K. WARRANTY

1. Manufacturer warrants equipment to be free from defects in materials and workmanship for 1 year from date of installation or 18 months from date of purchase, whichever occurs first.

L. FIELD MEASUREMENTS

1. Contractor shall make all necessary field measurements to verify that equipment shall fit in allocated space in full compliance with minimum required clearances specified in National Electrical Code.

M. MANUFACTURER

1. General Electric Company products have been used as the basis for design. Other manufacturers' products of equivalent quality, dimensions and operating features may be acceptable, at the Architect’s/ Engineer's discretion, if they comply with all requirements specified or indicated in these Contract documents.

N. EQUIPMENT

1. The equipment shall contain the following components and features.

a. Refer to Contract Drawings for actual layout and location of equipment and components; current ratings of devices, bus bars, and components; voltage ratings of devices, components and assemblies; interrupting and withstand ratings of devices, buses, and components; and other required details.

b. Furnish GE Type Spectra Bolt-On™ Switchboards (or approved equal).

c. Switchboards shall be fully self-supporting structures with 90 inch tall vertical sections (excluding lifting eyes and pull boxes) bolted together to form required arrangement.

d. Switchboard frame shall be die formed, 12 gauge steel with reinforced corner gussets. Frame shall be rigidly bolted to support cover plates (code gauge steel), bus bars and installed devices during shipment and installation.

e. All sections may be rolled, moved or lifted into position. Switchboards shall be capable of being bolted directly to the floor without the use of floor sills.

f. All switchboard sections shall have open bottoms and removable top plate(s) to install conduit.

g. Front-Access only switchboard sections shall be rear aligned for placement against a wall.

h. Switchboards shall be UL listed, and MSB-3 shall be Service Entrance rated.

i. Switchboards that are series rated to short circuit requirements shall be appropriately labeled. Tested UL listed combination ratings shall be included in UL recognized Component Directory (DKSY2).

j. All covers shall be fastened by hex or standard screw head bolts. No special tools shall be required to access this equipment.

k. Provide hinged doors over metering compartments and individually mounted device compartments. All doors shall have concealed hinges and be fastened by hex or standard screw head bolts.

l. Switchboard protective devices shall be furnished as listed on drawings and specified herein, including interconnections, instrumentation and control wiring. Switchboards and devices shall be rated for the voltage and frequency listed on the drawings.

m. Switchboard current ratings, including all devices, shall be based on a maximum ambient temperature of 25 degree C per UL Standard 891. With no derating required, temperature rise of switchboards and devices shall not exceed 65 degrees C in a 25 degree C ambient environment.

n. Switchboard Service Entrance sections shall comply with UL Service Entrance requirements including a UL service entrance label, incoming line isolation barriers, and a removable neutral bond to switchboard ground for solidly grounded Wye systems.

o. The group mounted feeder breaker and/or main devices within switchboards shall be circuit breakers only. Mounting for the group mounted devices shall be by bolted connections. No plug-in type connections shall be used for current carrying components.

2. Incoming Section

a. Incoming section shall be direct cable connection to main breaker.

b. Furnish switchboard arranged for bottom entry of incoming cable.

c. Provide mechanical lugs in the quantity and size required per the contract drawings. All lugs shall be tin-plated aluminum and UL listed for use with copper cable. Lugs shall be rated for 75 degree C. Cable.

3. Bus Bars

a. All bus bars shall be silver plated copper. The bus bars shall have sufficient cross sectional area to meet UL 891 temperature rise requirements. Phase and neutral bus ampacity shall be as shown on the plans. The neutral bus shall have the same ampacity as the phase bus.

b. Bus bars shall be mounted on high impact, non-tracking insulated supports. Joints in the vertical bus are not permitted.

c. Bus bars shall be braced to withstand mechanical forces exerted during short circuit conditions as indicated in drawings, but in no case less than 100KA RMS SYM.

d. Bus joints shall be bolted with high tensile steel Grade 5 bolts. Belleville type washers shall be provided with aluminum bus. Welded connections are unacceptable.

e. Ground Bus shall be sized to meet UL 891. Ground bus shall extend full length of switchboard. Ground bus shall be copper.

f. A-B-C bus arrangement left to right, top to bottom, front to rear shall be used throughout to assure convenient and safe testing and maintenance. Where special circuitry precludes this arrangement, bus bars shall be labeled.

g. All feeder device line and load connection straps shall be rated to carry current rating of device frame (not trip rating).

h. The main incoming bus bars shall be rated for the main protection device frame size or main incoming conductors, if there is no main device.

i. Main horizontal bus bars shall be fully rated and arranged for future extensions.

4. Enclosure

a. Switchboard shall be NEMA 1 non walk-in deadfront construction or as indicated on drawings.

5. User Metering

a. Provide a UL listed and digital multifunction power monitor. The monitor case shall be fully enclosed and shielded

b. The monitor shall accept a voltage monitoring range of up to 600 volts, phase to phase. Monitor shall withstand 200% rated current continuously. It shall withstand 10X rated current for at least 3 seconds. Isolation shall be no less than 2500V AC. Surge withstand shall conform to IEEE C37.90.1,62.41 and IEEE 1000-4Shall have a standard ANSI C39.1 case mount.

c. The Monitor shall provide true RMS measurements of voltage, phase to neutral and phase to phase; current, per phase and neutral; real power, reactive power, apparent power, power factor and frequency. The Monitor must be capable of providing readings for both instantaneous and average readings.

1. The Monitor must also be capable of providing all single phase real, apparent, reactive power and power factor values.

2. The Monitor shall record and store total bi-directional energy. It shall include separate registers for positive and negative energy.

3. The Monitor shall record and store total bi-directional accumulated energy and total accumulated apparent energy.

4. The Monitor shall monitor max/min average demand values for all current and power readings. The demand interval shall be user programmable. Meter shall be model EPM6000 or approved equal.

6. Main Devices

   a. Main device shall be individually mounted, draw out type, insulated case or AIR type circuit breaker, and 100% rated.

   b. Tie device(s), if included, shall be the same as the main device.

   c. Where indicated provide the following with the main device:

      1. Electronic ground fault detection

      2. Shunt trip

      3. Undervoltage release

      4. Auxiliary contacts

7. Feeder devices

   a. Feeder devices shall be group mount molded case circuit breakers or when larger than 1200 amps shall be individually mounted insulated case circuit breakers. Provide devices as indicated on drawings.

   b. All circuit protective devices shall have the following minimum symmetrical current interrupting capacity: 100kA, or as listed on the contract drawings. Provide and install a circuit breakers as required.

   c. Where indicated provide the following with the feeder device(s):

      1. Shunt trip

      2. Undervoltage release

      3. Auxiliary contacts

      4. Bell alarm

8. Molded Case Circuit Breakers

   a. Furnish GE Spectra RMS™ Molded Case Circuit Breakers. Thermal magnetic molded case circuit breakers may be provided for trip ratings 150 amps and below.

b. Group mounted breakers shall be connected to the vertical bus by bolted connections.

c. Individually mounted molded case circuit breakers shall be stationary mounted.

d. Circuit breaker frames shall be constructed of a high-strength, molded, glass-reinforced polyester case and cover. Breakers shall have an overcenter, toggle handle-operated, trip free mechanism with quick make, quick break action independent of the speed of the toggle handle operation. The design shall provide common tripping of all poles. Breakers shall be suitable for reverse feeding.

e. Breakers shall have ON and OFF position clearly marked on escutcheon. Breakers shall include a trip-to-test means on the escutcheon for manually tripping the breaker and exercising the mechanism and trip latch.

f. Breakers shall include factory installed mechanical lugs. Lugs shall be UL listed and rated 75 or 60/75 degrees C as appropriate. Breakers shall be standard, or 80 percent rated.

g. Breakers larger than 400 amps shall use digital true RMS sensing trip units and a rating plug to determine the breaker trip rating. The breaker shall be adjusted to the proper trip settings by electrical contractor to meet the inrush of the largest piece of equipment. The time and trip settings shall be obtained from the manufacturer of the equipment by the electrical contractor.

h. Each main, feeder, and tie breaker with a frame size 400 amps and larger shall have digital electronic trip units.

i. Where indicated on the drawings, circuit breakers with trip ratings greater than 250 amperes to 1000 amperes shall be UL listed as 100 percent continuous duty rated.

9. Insulated Case Circuit Breakers

a. Insulated case circuit breakers shall be individually mounted.

b. Main and tie breakers shall be manually operated, draw out type mounting. Feeder breakers (larger than 1200 amps) shall be manually operated, stationary mounted.

c. Breakers shall be constructed of a high dielectric strength, glass reinforced insulating case. The interrupting mechanism shall be arc chutes. Steel vent grids shall be used to suppress arcs and cool vented gases. Interphase barriers shall be furnished as to isolate completely each pole.

d. Breakers shall contain a true two-step stored energy operating mechanism, which shall provide quick make, quick break operation with a maximum five-cycle closing time. Breakers shall be trip free at all times. Common tripping of all poles shall be standard.

e. Insulated Case circuit breakers shall be rated to carry 100 percent of their frame ampacity continuously.

f. A charging handle, close push-button, open push-button, and Off/On/Charge indicator shall be located on the breaker escutcheon and shall be visible with the breaker compartment door closed.

g. Where drawout breakers are specified, the drawout design shall permit the breaker to be withdrawn from an engaged position, to a test position, and to a disengaged position.

h. Breaker digital electronic trip units shall be as described in Article 10 below.

10. Digital Electronic Trip Unit For Circuit Breakers

a. Furnish GE MicroVersaTrip® Plus, or PM, or approved equal, digital electronic trip units as specified below.

b. Each main, feeder, and tie circuit breaker shall be equipped with a digital electronic trip unit. The trip unit shall provide protection from overloads, short circuits and ground faults (for Main circuit breaker). The protective trip unit shall consist of a solid state, microprocessor

based programmer, tripping means, current sensors, power supply and other devices as required for proper operation.

c. As a minimum, the trip unit shall have the following protective functions:

1. Adjustable current setting or long time pickup;

2. Adjustable long time delay;

3. Adjustable instantaneous pickup;

4. Adjustable ground fault pickup and delay for main.

5. Adjustable short time pickup and delay.

d. As a minimum, the trip unit shall include the following features:

1. Long time and short time protective functions, if provided, shall have true RMS sensing technology.

2. Ground fault protective function, if provided, shall contain a memory circuit to integrate low level arcing fault currents with time, to sum the intermittent ground fault spikes.

3. High contrast liquid crystal display (LCD) unit shall display settings, trip targets, and the specified metering displays.

4. Multi-button keypad to provide local setup and readout of all trip settings on the LCD.

5. UL Listed interchangeable rating plug. It shall not be necessary to remove the trip unit to change the rating plug.

6. An integral test jack for testing via a portable test set and connection to a battery source.

7. A mechanism for sealing the rating plug and the trip unit.

8. Noise immunity shall meet the requirements of IEEE C37.90.

9. Display trip targets for long time, short time, and ground fault, if included.

10. The trip unit shall include the following metering functions, which shall be displayed on the LCD (if the manufacturers trip unit can not incorporate the specified functions, separate device(s) with equal function shall be provided for each breaker): Current, RMS, each phase.

11. Finish

a. All steel surfaces shall be chemically cleaned prior to painting.

b. Exterior paint color shall be ANSI 61 Light Gray over phosphate - type rust inhibitor.

12. Accessories

a. Provide the following UL listed accessories:

1. Integral, self-powered ground fault protection relay with mechanical ground fault indicator, test function, adjustable current pick - up and time delay, and current sensors as required. Ground fault relay shall have an internal memory circuit that integrates intermittent arcing ground faults with time.

2. Furnish nameplates for each device as indicated in drawings.
Color schemes shall be as indicated on drawings.

3. Provide Transient Voltage Surge Suppression system as specified in Section 16479.

13. EXAMINATION

a. The following procedures shall be performed by the Contractor.

1. Examine installation area to assure there is enough clearance to install switchboard.

2. Check concrete pads for uniformity and level surface.

3. Verify that Spectra Series™ switchboards are ready to install.

4. Verify field measurements that are as shown on Drawings and instructed by manufacturer.

5. Verify that required utilities are available, in proper location and ready for use.

6. Beginning of installation means installer accepts conditions.

14. INSTALLATION

a. Installation shall be performed by the Contractor.

1. Install per manufacturer's instructions.

2. Install required safety labels.

END OF SECTION

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SECTION 16441 DIVISION 26 36 00 QUICK-CONNECT GENERATOR DOCKING STATIONS

PART 1 GENERAL

1.01 SCOPE

A. The Contractor shall furnish and install the low-voltage docking station as specified herein and as shown on the contract drawings.

1.02 RELATED SECTIONS

1.03 REFERENCES

A. The switches and all components shall be designed, manufactured and tested in accordance with the latest applicable standards:
   1. NEMA KS-1
   2. UL 98

1.04 SUBMITTALS – FOR REVIEW/APPROVAL

A. The following information shall be submitted to the Engineer:
   1. Dimensioned outline drawing
   2. Conduit entry/exit locations
   3. Switch ratings including:
      a. Short-circuit rating
      b. Voltage
      c. Continuous current
   4. Cable terminal sizes
   5. Product data sheets

1.05 SUBMITTALS – FOR CONSTRUCTION

A. The following information shall be submitted for record purposes:
   1. Final as-built drawings and information for items listed in Paragraph 1.04, and shall incorporate all changes made during the manufacturing process

1.06 QUALIFICATIONS

A. The manufacturer of the assembly shall be the manufacturer of the major components within the assembly.

B. For the equipment specified herein, the manufacturer shall be ISO 9001 or 9002 certified.

C. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of two (2) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

1.07 REGULATORY REQUIREMENTS

A. The connection docking system shall bear a UL label.

1.08 DELIVERY, STORAGE AND HANDLING

A. Equipment shall be handled and stored in accordance with manufacturer's instructions. One (1) copy of these instructions shall be included with the equipment at time of shipment.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Eaton / Cutler-Hammer products

B. ·Trystar

C. ·Siemens

The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety. Products in compliance with the specification and manufactured by others not named will be considered only if pre-approved by the Engineer and Owner's Representative ten (10) days prior to bid date.

2.02 HEAVY-DUTY DOCKING STATION

A. Provide switches as shown on drawings, with the following ratings:
   1. See drawings for details on amperage.
   2. 480 volts ac, dc; 600 volts ac
   3. 4 poles.
   4. Mechanical lugs suitable for aluminum or copper conductors.

B. Construction
   1. Docking Station shall be equipped with a separate interlocked receptacle compartment containing receptacles for quick-connection and disconnection of portable cord-connected equipment.
      a. Interlock shall prevent the lower generator switch from being closed while cable compartment door is open, and shall prevent the door from being opened while the switch is closed.
      b. Compartment shall be equipped with a spring-assisted door to allow portable cords to exit the compartment while in use, but shall close when not in use to effectively seal the compartment to prevent insects and small animals from entry.
      c. Compartment shall be equipped with receptacles for sufficient cable connection for the ampacity of the switch.
      d. Receptacles for switches 200 amps and greater shall be of the single cable per phase design – utilizing quarter turn cam type connections.

e. Receptacles shall be: Either *Posi-Lok* or *Cam-Lok* type. 800 amp switches shall employ parallel receptacles.

2. Renewal parts data shall be shown on the inside of the door

C. Enclosures

1. All enclosures shall be NEMA 3R rainproof
2. Paint color shall be ANSI 61 gray or “Owner’s Representative’s” Choice.

D. ∫The following factory modifications are to be included:

1. *Plastic* or *Phenolic* nameplates
2. Special paint color as request by “Owner’s Representative.”
3. Lock ON provisions
4. Key interlock system
5. Factory installed neutral assemblies
6. Factory installed copper lugs
7. Factory installed auxiliary contacts
8. Cover mounted controls *indicating lights, selector switches, or pushbuttons.
9. Factory installed UL listed switching neutral bonding kit for 3 or 4pole systems that require a switching neutral.

PART 3 EXECUTION

3.01 FACTORY TESTING

A. Standard factory tests shall be performed on the equipment provided under this section. All tests shall be in accordance with the latest version of UL and NEMA standards.

3.02 INSTALLATION

A. The equipment shall be installed per the manufacturer’s recommendations and all NEC and local code requirements.

End of Section 16441 Division 26 36 00

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Division 16442 Section 26 36 22 Manual Transfer Switches

PART 1 GENERAL

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

B. Related Sections: Separate electrical components and materials required for field installation and electrical connections are specified in Division 16 (26).

1.01 Scope

Furnish and install manual transfer switches (MTS) with number of poles, amperage, voltage, and withstand current ratings as shown on the plans. Each manual transfer switch shall consist of an inherently double throw power transfer switch. All transfer switches and control panels shall be the product of the same manufacturer.

1.02 Acceptable Manufacturers

Automatic transfer switches shall be ASCO, General Electric, Liebert/Emerson, Siemens, Baldor, Caterpillar, or Square D. See general and supplementary conditions and Division-1 Specification sections for the way to provide alternates and the way to provide documentation for approvals.

1.03 Codes and Standards

The transfer switches and accessories shall conform to the requirements of:

A. UL Standard for Transfer Switches
B. NFPA 70 - National Electrical Code
C. NFPA 110 - Emergency and Standby Power Systems
D. IEEE Standard 446 - IEEE Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications
E. NEC Articles 700, 701, 702
F. International Standards Organization ISO 9001

PART 2 PRODUCTS

2.01 Mechanically Held Transfer Switch

A**.** The transfer switch unit shall be electrically operated and mechanically held. The electrical operator shall be a single-solenoid mechanism, momentarily energized. Main operators which include overcurrent disconnect devices will not be accepted. The switch shall be mechanically interlocked to ensure only one of two possible positions, normal or emergency.

B**.** The switch shall be positively locked and unaffected by momentary outages so that contact pressure is maintained at a constant value and temperature rise at the contacts is minimized for maximum reliability and operating life.

C. All main contacts shall be silver composition. Switches rated 600 amperes and above shall have segmented, blow-on construction for high withstand current capability and be protected by separate arcing contacts.

D**.** Inspection of all contacts shall be possible from the front of the switch without

disassembly of operating linkages and without disconnection of power conductors. A manual operating handle shall be provided for maintenance purposes. The handle shall permit the operator to manually stop the contacts at any point throughout their entire travel to inspect and service the contacts when required.

E. Designs utilizing components of molded-case circuit breakers, contactors, or parts thereof which are not intended for continuous duty, repetitive switching or transfer between two active power sources are not acceptable.

F. Where neutral conductors must be switched, the MTS shall be provided with fully rated neutral transfer contacts.

G. Where neutral conductors are to be solidly connected, a neutral terminal plate with fully-rated Copper pressure connectors shall be provided.

2.02 Enclosure

A. The MTS shall be furnished in a NEMA type 3R enclosure unless otherwise shown on the plans.

B. Provide strip heater, if required, with thermostat for Type 3R enclosure requirements.

C. Controller shall be flush-mounted display with LED indicators for switch position and source availability. It shall also include test and time delay bypass switches.

PART 3 OPERATION

3.01 Voltage and Frequency Sensing

A. The voltage of each phase of the normal source shall be monitored, with pickup adjustable to 95% of nominal and dropout adjustable from 70% to 90% of pickup setting.

B. Single and three-phase voltage and frequency sensing of the emergency source shall be provided.

C. All settings shall be adjusted prior to final review of MTS.

3.02 Time Delays

A. An adjustable time delay shall be provided to override momentary normal source outages and delay all transfer and engine starting signals.

B. An adjustable time delay shall be provided on transfer to emergency, adjustable from 0 to 5 minutes for controlled timing of transfer of loads to emergency.

C. A 5-minute cooldown time delay shall be provided on shutdown of engine generator.

D. All adjustable time delays shall be field adjustable without the use of tools.

3.03 Additional Features

A. A set of gold-flashed contacts rated 10 amps, 32 VDC shall be provided for a low voltage engine start signal. The start signal shall prevent dry cranking of the engine by requiring the generator set to reach proper output, and run for the duration of the cool down setting, regardless of whether the normal source restores before the load is transferred.

B.. Terminals shall be provided for a signal to show main and emergency power options.

C. Auxiliary contacts, rated 10 amps, 480 VAC shall be provided consisting of one contact, closed when the MTS is connected to the normal source and one contact, closed, when the MTS is connected to the emergency source.

D. Indicating lights shall be provided, one to indicate when the MTS is connected to the normal source (green) and one to indicate when the MTS is connected to the emergency source (red). Also provide indicating lights for both normal and emergency source availability.

E. Terminals shall be provided to indicate actual availability of the normal and emergency sources, as determined by the voltage sensing pickup and dropout settings for each source.

F. Engine Exerciser - An engine generator exercising timer shall be provided, including a selector switch to select exercise with or without load transfer. A remote generator start switch shall be provided with the unit.

G. Phase Monitor - A Phase monitor shall be inherently built into the controls.
The monitor shall control transfer so that motor load inrush currents do not exceed normal starting currents, and shall not require external control of power sources. The phase monitor shall be specifically designed for and be the product of the ATS manufacturer.

<u>Optional Accessories (Options have to be approved by Owner's Representative)</u>
H. Communications Interface - A full duplex RS485 interface to provide remote monitoring and control by communications products.

I. Programmable Engine Exerciser - A seven day electronic time switch for automatic weekly testing of the engine - generator set. The exerciser shall be fully programmable and backed up by a permanent battery.

J. Enclosure Heater - A 125 watt enclosure heater with transformer and thermostat (adjustable from 30°□to 140 °□F).

K. Networked Computer Monitoring System
A PC based Manual Transfer Switch (MTS) monitoring system designed to communicate with other ATSs located in remote locations shall be provided. System shall utilize serial communications capability inherent with the MTS microprocessor-based control panel product offering.

PART 4 ADDITIONAL REQUIREMENTS

4.01 Withstand and Closing Ratings

A. The MTS shall be rated to close on and withstand the available rms symmetrical short circuit current at the ATS terminals with the type of overcurrent protection shown on the plans. WCR MTS ratings as be as follows when used with specific circuit breakers or fuses, all breakers shall be included on the MTS:

	MTS Size Withstand & Closing	
Rating MCCB	**AIC Rating**	**W/CLF**
30 – 200A	22,000A	200,000
225 – 400A	42,000A	200,000
600 – 1200A	65,000A	200,000
1600 – 2000A	85,000A	200,000
2600 – 3000 A	100,000A	200,000

4.02 Tests and Certification

A. The complete MTS shall be factory tested to ensure proper operation of the individual components and correct overall sequence of operation and to ensure that the operating transfer time, voltage, frequency and time delay settings are in compliance with the specification requirements.

B. Upon request, the manufacturer shall provide a notarized letter certifying compliance with all of the requirements of this specification including compliance with the above codes and standards, and withstand and closing ratings. The certification shall identify, by serial number(s), the equipment involved. No exceptions to the specifications, other than those stipulated at the time of the submittal, shall be included in the certification.

C. The MTS manufacturer shall be certified to ISO 9001 International Quality Standard and the manufacturer shall have third party certification verifying quality assurance in design/development, production, installation and servicing in accordance with ISO 9001.

4.03 Service Representation

A. The MTS manufacturer shall maintain a national service organization of company employed personnel located throughout the contiguous United States. The service center's personnel must be factory trained and must be on call 24 hours a day, 365 days a year.

B. The manufacturer shall maintain records of each switch, by serial number, for a minimum of 20 years.

C**.** For ease of maintenance and parts replacement, the switch nameplate shall include drawing numbers, part numbers for main coil and control.
End of Section

Division 16443 Section 26 36 23 - Disconnect Switches

Introduction

Disconnect switches shall be used where required to meet OSHA standards for a disconnecting means within line of sight and no more than fifty feet of the actual piece of equipment being controlled.

1. All disconnect switches shall be heavy duty motor rated switches.
2. All disconnect switches required for compliance with OSHA shall be lockable.
3. A disconnect switch is not to be used as a substitute for a motor starter but should be used in conjunction with all motor starters where required as a disconnecting means.

Part 1 - General

• Acceptable manufacturer's should include GE, Square D, Cutler Hammer, Allen Bradley and approved equal. Try to accommodate the County by matching existing manufactured products.

Part 2 - Products

• Safety switches shall be heavy-duty motor rated with fuses provided to protect downline equipment where required.
• Switches shall be fused, if required.
• The extra fuses (minimum of 2 per phase) shall be supplied by the contractor.
• The neutral shall be switched.
• NEMA 3R Environments shall be specified as NEMA 3R/12 gasketed.

Part 3 - Execution

• The maximum mounting height for safety switches should be 6'0" to the top. Safety switches should be rigidly mounted in place.
• Must be *readily* accessible per NEC
• Label per NEC Requirements and specification documents.

End of Section 16443

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Division 16479 SECTION 26 43 00 – TRANSIENT VOLTAGE SURGE SUPPRESSION (SPD/TVSS/SSD)

A. SECTION INCLUDES

1. Transient voltage surge suppression systems integrated into electrical distribution equipment.

B. RELATED SECTIONS

1. 26 20 00 (16400) Low Voltage Switchgear

2. 26 27 00 (16402) Low Voltage Group Mounted Switchboards

3. 26 29 19 Motor Control Centers (Not Used)

C. REFERENCES

1. The equipment and components in this specification shall be designed and manufactured according to latest revision of the following standards (unless otherwise noted).

   a. ANSI/IEEE C62.41.1-2002, Guide on the Surge Environment in Low Voltage AC Power Circuits.

   b. ANSI/IEEE C62.41.2-2002, Recommended Practice on Characterization of Surges in Low Voltage AC Power Circuits.

   c. ANSI/IEEE C62.45-2002, Recommended Practice on Surge Testing for Equipment Connected to Low Voltage AC Power Circuits.

   d. UL 1449, Third Edition - Transient Voltage Surge Suppressors

   e. UL 1283, Electromagnetic Interference Filters

   f. UL 67, Panelboards

   g. UL 891, Dead-Front Switchboards

   h. NEMA LS-1 (1992), Low Voltage Surge Protective Devices

i. NFPA 70 National Electrical Code – Article 285

D. SYSTEM DESCRIPTION

1. Transient voltage surge suppression devices shall be applied on a 277/ 480 volt or 120/208 volt, 60 Hertz, 3 phase, 4- wire, solidly grounded WYE system, as indicated on drawings.

E. SUBMITTALS

1. Manufacturer shall provide 3 copies of the following documents to owner for review and evaluation.

a. Product Data on specified product:

1. Maximum surge current rating
2. Repetitive surge current rating
3. UL1449 Third Edition Suppressed Voltage Ratings

b. Upon request, provide copies of third party test reports for maximum surge current rating and repetitive surge current rating.

F. INSTALLATION, OPERATION AND MAINTENANCE DATA

1. Manufacturer shall provide 3 copies of installation, operation and maintenance procedures to owner.

2. Transient voltage surge suppression systems shall be listed/or recognized by Underwriters Laboratories in accordance with the applicable standards found in Section C-1 of this specification. UL recognized TVSS assemblies are allowed provided they have been investigated by UL as suitable for use within the specified electrical panel or gear and do not require additional testing or field investigation to maintain the equipment’s UL listing.

3. Manufacturer warrants equipment to be free from defects in materials and workmanship for 5 years from date of purchase.

G. PRODUCTS

1. General Electric Company products have been used as the basis for design. Other manufacturers' products of equivalent quality, dimensions and operating

features may be acceptable, at the Engineer's discretion; if they comply with all requirements specified or indicated in these Contract documents.

2. Furnish General Electric internally or equal external mounted TVSS systems as indicated in drawings.

3. Refer to Drawings for: actual layout and location of equipment and components; current ratings of devices, bus bars, and components; voltage ratings of devices, components and assemblies; and other required details.

   a. Electrical Requirements

      1. The maximum surge current rating shall be based on testing of a complete TVSS unit including fuses and all components that make up the TVSS system. Devices that derive a maximum surge current rating by adding test results of individual components are not acceptable.

      2. The TVSS device repetitive surge current capacity shall be tested utilizing an 8x20us, 10kA short circuit Category C High test waveform (as defined by ANSI/IEEE C62.41.2-2002) at one-minute intervals. A failure is defined as either performance degradation or more than 10% deviation of clamping voltage at the specified surge current

      3. Maximum surge current and repetitive surge current ratings shall be as follows:

         For Switchgear and switchboards rated 1600A and greater:

         a. Maximum surge current rating: 150/300kA per mode.
         b. Repetitive surge current rating: 20,000 C High impulses.

         For Motor Control Centers rated 1200A and below:

         a. Maximum surge current rating: 150 kA SCCR.
         b. Repetitive surge current rating: 5,000 C High impulses

         For Lighting panels rated 1200A and below:

         a. Maximum surge current rating: 65 kA per mode.
         b. Repetitive surge current rating: 5,000 C High impulses

4. The Suppression Voltage Rating (SVR) shall be tested in accordance with UL-1449, Third Edition. Where an integral disconnect is provided, the TVSS SVR shall be determined with the integral disconnect. The SVR values shall not exceed the following: L-N, N-G, L--G-800; L-L--1500.

5. The TVSS fault current rating shall be marked on the TVSS in accordance with the requirements of UL1449 and NEC Article 285.

6. The use of electronic grade MOV's is not acceptable. Systems using gas tubes, silicon avalanche diodes, selenium rectifiers, or printed circuit board technology in surge current path are not acceptable.

7. The TVSS shall provide protection in each of the following modes: L-N, L-G, N-G, and L-L for WYE Systems. L-G and L-L for Delta Systems.

8. The Maximum Continuous Operating Voltage (MCOV) for all voltage configurations shall be at least 115% of nominal on 480/277 volt systems and 125% of nominal on 240-208/120 volt systems.

9. The fusing system shall be capable of allowing the rated maximum surge current to pass through without fuse operation. Systems utilizing a fusing system that opens below the maximum surge current level are unacceptable. The complete TVSS fusing system shall be included in the surge current testing.

10. TVSS systems shall include integral fusing for all suppression components. TVSS designs that rely solely on an electrical panel’s main breaker to interrupt phase currents resulting from a shorted suppression component are not allowed.

11. Use of plug-in modules, gas discharge devices or selenium rectifiers is unacceptable.

12. TVSS installed in switchgear, switchboards, and power panels shall have an integral non-fused disconnect, tested to the maximum surge current rating of the device. TVSS installed in lighting panels shall be direct connected to the main bus.

13. Standard Monitoring features
    a. One operational status indicating light per each protected phase.
    b. Audible alarm and alarm indicating light and test switch, enabled via a front panel pushbutton switch.
    c. Dry contacts for remote monitoring purposes, 1NO & 1NC contact. Change in state on MOV failure.
    d. Transient voltage surge counter with battery backup.

b. Mounting

1. TVSS shall be mounted integral or external, and shall not violate the equipment manufacturer’s UL label.

END OF SECTION

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