



**INVITATION FOR BID
IFB 17-2001OV
Chiller and Exhaust Fan Replacement at the
Water Treatment Lab
4751 65th Street West, Bradenton, FL 34210**

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 all prospective bidders, have sufficient information and understanding of County's needs, an **Information Conference** will be held at: **10:00 AM on October 3, 2017 at the Southwest Water Reclamation Facility, 5101 65th Street West, Bradenton, FL 34210.** **Attendance is not mandatory, but is highly encouraged.**

A Mandatory Visit / Inspection of the project site (Water Treatment Lab, 4751 65th Street West, Bradenton, FL 34210) shall take place immediately following the Information Conference.

DEADLINE FOR CLARIFICATION REQUESTS: **5:00 PM on October 13, 2017**
Reference Bid Article A.06

BID OPENING TIME AND DATE DUE: **3:00 PM on October 31, 2017**

FOR INFORMATION CONTACT:

Olga Valcich, CPPB, Contract Specialist
(941) 749-3055

Olga.valcich@mymanatee.org
Manatee County Financial Management Department
Procurement Division

AUTHORIZED FOR RELEASE: 

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SECTION A
INFORMATION TO BIDDERS

A.01 OPENING LOCATION

Sealed bids will be **publicly opened** at the **Manatee County Procurement 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 attend the sealed bid opening.

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 Procurement Division** for receipt on or before the stated time and date. Bidder shall be solely and strictly responsible for its timely delivery to the Procurement 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 **duplicate, one original (marked Original) and one copy/copies (marked Copy)** of your **signed bid** shall be submitted in one **sealed** package, clearly marked on the outside **"Sealed Bid IFB 17-2001-OV, Chiller and Exhaust Fan Replacement at the Water Treatment Lab, 4751 65th Street West, Bradenton, FL 34210** with your company name.

For your convenience, a mailing label is provided with this Invitation for Bid (IFB) package. Or, you may address the package as follows:

Manatee County Procurement Division
1112 Manatee Avenue West, Suite 803
Bradenton, Florida 34205

Sealed Bid **IFB 17-2001-OV, Chiller and Exhaust Fan Replacement at the Water Treatment Lab, 4751 65th Street West, Bradenton, FL 34210.**

All blank spaces on the bid form 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 thereupon. 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 the requirements of this IFB.

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 BID DOCUMENTS

IFB's 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 Procurement 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 announcing solicitation opportunities to the Chamber which are then passed to its members.

Manatee County may also use DemandStar to distribute bids. On the DemandStar website, <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 Procurement 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 EXAMINATION OF BID DOCUMENTS AND SITE(S)

It is the responsibility of each bidder before submitting a bid, to (a) examine the IFB documents thoroughly; (b) visit the Project 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 IFB documents; and (e) notify County of all conflicts, errors, or discrepancies in the IFB 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 Project 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 IFB 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 Project 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 successful bidder in performing the Work are identified in the IFB documents.

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

Inspection of the Project Site(s) is **a requirement** to be considered for award of this bid. Prior to submitting a bid, each bidder shall examine the Project Site(s) and all conditions thereon fully familiarizing themselves with the full scope of the Work. Failure to become familiar with Project 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 Project Plans and Specifications. Bidder shall acknowledge inspection of the Project Site(s) on his/her signed, submitted Bid Form.

A.05 MODIFICATION OF BID 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 IFB documents. 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.06 CLARIFICATION & ADDENDA

Each bidder shall examine all IFB documents and shall judge all matters relating to their adequacy and accuracy. Any inquiries, suggestions or requests concerning interpretation, clarification or additional information pertaining to this IFB shall be made through the Manatee County Procurement Division. County shall not be responsible for oral interpretations given by any County employee, representative, or others.

The deadline to submit to the Procurement Division, in writing, all inquiries, suggestions, or requests concerning interpretation, clarification or additional information pertaining to this IFB can be located on the cover page of this IFB document.

This deadline has been established to maintain fair treatment of all potential bidders, while maintaining progression of the Work.

If any addenda are issued to this IFB, County will post the documents on the Procurement Division's web page 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.

The issuance of a written addendum is the only official method whereby interpretation, clarification or additional information can be given.

It shall be the **responsibility of each bidder, prior to submitting a bid**, to contact the Procurement 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 CONFIDENTIALITY OF SECURITY RELATED RECORDS

(a) Pursuant to Florida Statutes § 119.071(3), the following records (hereinafter referred to collectively as "the Confidential Security Records") are confidential and exempt from the disclosure requirements of Florida Statutes § 119.07(1):

1. A Security System Plan or portion thereof for any property owned by or leased to the County or any privately owned or leased property held by the County.
2. Building plans, blueprints, schematic drawings, and diagrams, including draft, preliminary, and final formats, which depict the internal layout and structural elements of a building, arena, stadium, water treatment facility, or other structure owned or operated by the County.
3. Building plans, blueprints, schematic drawings, and diagrams, including draft, preliminary, and final formats, which depict the internal layout or structural elements of an attractions and recreation facility, entertainment or resort complex, industrial complex, retail and service development, office development, or hotel or motel development in the possession of, submitted to the County.

(b) Contractor/Vendor agrees that it shall not, as a result of a public records request or for any other reason disclose the contents of, or release or provide copies of the Confidential Security Records to any other party absent the express written authorization of the County's Property Management Director or to comply with a court order requiring such release or disclosure. To the extent Contractor/Vendor receives a request for such records, it shall immediately contact the County's designated Contract Manager who shall coordinate the County's response to the request. Notwithstanding the foregoing, the Contractor/Vendor may

1. Disclose or release Security System Plans to:

- (A) The property owner or leaseholder; or
- (B) Another state or federal agency to prevent, detect, guard against, respond to, investigate, or manage the consequences of any attempted or actual act of terrorism, or to prosecute those persons who are responsible for such attempts or acts.

2. Disclose or release building plans, blueprints, schematic drawings, and diagrams, including draft, preliminary, and final formats, which depict the internal layout and structural elements of a building, arena, stadium, water treatment facility, or other structure owned or operated by the County:

- (A) To another governmental entity if disclosure is necessary for the

receiving entity to perform its duties and responsibilities;

(B) To a licensed architect, engineer, or contractor who is performing work on or related to the building, arena, stadium, water treatment facility, or other structure owned or operated by the County and is contractually bound by the Contractor/Vendor to comply with this Article/Section; or

(C) Upon a showing of good cause before a court of competent jurisdiction.

(c) For purposes of this Article/Section, the term "Security System Plan" includes all:

1. Records, information, photographs, audio and visual presentations, schematic diagrams, surveys, recommendations, or consultations or portions thereof relating directly to the physical security of the facility or revealing security systems;
2. Threat assessments conducted by any agency or any private entity;
3. Threat response plans;
4. Emergency evacuation plans;
5. Sheltering arrangements; or
6. Manuals for security personnel, emergency equipment, or security training.

A.08 LOBBYING

After the issuance of any IFB, prospective bidders or their agents, representatives or persons acting at the request of such bidder shall not contact, communicate with or discuss any matter relating to the IFB with any officer, agent or employee of Manatee County other than the Purchasing Official or the contact identified in this IFB, pursuant to the Manatee County Code of Laws. This prohibition includes copying such persons on all written communication, including email correspondence. This requirement begins with the issuance of an IFB and ends upon execution of the final Agreement or when the IFB has been cancelled. Violators of this prohibition shall be subject to sanctions as provided in the Manatee County Code of Laws.

A.09 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.
- 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 nonresponsive any presumptive unbalanced bids where the bidder is unable to demonstrate the validity and/or necessity of the unbalanced unit costs.

A.10 FRONT LOADING OF BID PRICING PROHIBITED

Prices offered for performance and/or acquisition activities which 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 loaded. Front 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 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 nonresponsive any presumptive front loaded bids where the bidder is unable to demonstrate the validity and/or necessity of the front loaded costs.

A.11 WITHDRAWAL OF BIDS

Bidders may withdraw bids as follows:

- a. Mistakes discovered before the public bid opening may be withdrawn by written notice from the bidder submitting the bid. This request must be received in the Procurement Division 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 the bidder; or
- b. After the bids are opened or a selection has been determined, but before an Agreement is signed, a bidder alleging a material mistake of fact may be permitted to withdraw their bid if:
 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.12 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.13 BID EXPENSES

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

A.14 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.

To be responsive, a bidder shall submit a bid which conforms in all material respects to the requirements set forth in the IFB.

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.15 APPLICABLE LAWS

Bidder must be authorized to transact business in the State of Florida. All applicable laws and regulations of the State of Florida and ordinances and regulations of Manatee County will apply to any resulting Agreement. Any involvement with the Manatee County Procurement Division shall be in accordance with the Manatee County Procurement Ordinance as amended.

A.16 COLLUSION

By submitting a bid to this IFB, 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 Agreement to be entered into; and
- e. no person or agency has been employed or retained to solicit or secure the resulting Agreement 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.17 CODE OF ETHICS

With respect to this bid, if any bidder violates, directly or indirectly, the ethics provisions of the Manatee County Procurement Ordinance and/or Florida criminal or civil laws related to public procurement, including but not limited to Chapter 112, Part III, Code of Ethics for Public Officers and Employees, Florida Statutes, such bidder will be disqualified from eligibility to perform the Work described in this IFB, 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.

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 IFB, 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.18 PUBLIC CONTRACTING AND ENVIRONMENTAL CRIMES

A person or affiliate who has been placed on the convicted vendor list following a conviction for a public entity crime, as that term is defined in Section 287.133, Florida Statutes, 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 an agreement with any public entity; and may not transact business with any public entity in excess of the threshold amount provided in Section 287.017, Florida

Statutes, 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 of Laws prohibits the award of any bid 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 do business 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 attached herein for this purpose.

A.19 SCRUTINIZED COMPANIES

Florida Statutes § 287.135, as amended from time to time, may contain limitations on the part of a company to conduct business with the County. Submission of a response to this solicitation shall be subject to all procedural requirements contained within that statute including the submission of any required certification of eligibility to contract with the County. It shall be the responsibility of the company responding to this solicitation to concurrently review the current version of the statute and ensure it is compliant. To the extent a certification is required, it shall be provided on the form located at ***Attachment E Vendor Certification Regarding Scrutinized Companies Lists***.

A.20 BID FORMS

Bids must be submitted on the 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 bidder being deemed nonresponsive.

A.21 AGREEMENT FORMS

The Agreement resulting from the Acceptance of a bid shall be in the form of the Agreement stated in this IFB, which is attached herein.

A written notice confirming award or recommendation thereof will be forwarded to the successful bidder accompanied by the required number of unsigned counterparts of the Agreement. Within ten (10) days thereafter, successful bidder shall sign and deliver the required number of counterparts of the Agreement with any other required documents

to County. (Note: Agreement must be approved in accordance with Chapter 2-26 of the Manatee County Code of Laws and the Administrative Standards and Procedures Manual approved by the County Administrator).

A.22 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.23 DISCOUNTS

Any and all discounts must be incorporated in the prices contained in the bid and not shown separately. The prices indicated on the Bid Form shall be the prices used in determining award.

A.24 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.

The Contractor shall be responsible for the payment of taxes of any kind and character, including, but not limited to sales, consumer, use, and other similar taxes payable on account of the work performed and materials furnished under the award in accordance with the laws and Regulations of the place of the project which are applicable during the performance of the work. Nothing herein shall affect the bidder's normal tax liability.

A.25 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.26 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 Agreement, and shall constitute grounds for County's immediate termination of the resulting Agreement.

A.27 ROYALTIES AND PATENTS

The successful bidder shall pay all royalties and license fees for equipment or processes in conjunction with the equipment and/or services being furnished. Successful bidder 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.

A.28 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 IFB document at least twenty-four (24) hours in advance of either activity.

A.29 EQUAL EMPLOYMENT OPPORTUNITY

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 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.30 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.31 MATHEMATICAL ERRORS

Bid Forms without mathematical formulas:

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. In the event the dollar amount for contract contingency is omitted, it will be added to the total price of the bid.

Bid Forms with mathematical formulas:

Interactive Bid Forms that contain mathematical formulas may be used for automating lengthy and complex bid forms. In the event these forms are used and a multiplication/extension error(s) is discovered, the unit price entered by the vendor shall prevail. The vendor shall assume the responsibility and accuracy of the information

input in the bid form and therefore shall verify that the calculations are correct before submitting their bid.

Regardless of which type of bid form is used, all bids shall be reviewed mathematically and corrected, if necessary, using these standards, prior to additional evaluation.

A.32 SUBCONTRACTORS

The successful bidder will obtain prior written approval from the County for any subcontractor(s) and the work they will perform. A subcontractor is defined as any entity performing work within the scope of the project who is not an employee of the successful bidder.

Bidders subcontracting any portion of the work shall include a list of subcontractors along with their bid. The list shall include: name and address of subcontractor, type of work to be performed and the percent of the contract amount to be subcontracted.

Prior to the employment of any person under this contract, the successful bidder shall utilize the U.S. Department of Homeland Security's E-Verify system to verify the employment eligibility of (a) all persons employed during the contract term by the successful bidder to perform employment duties within Florida and (b) all persons, including subcontractors, assigned by the successful bidder to perform work pursuant to the contract with Manatee County. For more information on this process, please refer to United States Citizenship and Immigration Service site at: <http://www.uscis.gov/>.

Only those individuals determined eligible to work within the United States shall be employed under this contract.

By submission of a bid in response to this IFB, the successful bidder commits that all employees and subcontractors will undergo e-verification before placement on this contract.

If County has reasonable objection to any subcontractor, the County may request the successful bidder to submit an acceptable substitute without an increase in contract sum or contract time.

If successful bidder declines to make any such substitution, the County may award the resulting agreement to the next lowest qualified bidder that proposes to use acceptable subcontractors, who County does not make written objection to. In the event the successful bidder declines to make any such substitution post award, the County may exercise its right to terminate the agreement.

The successful bidder shall maintain sole responsibility for the actions of its employees and subcontractors. New employees brought in after contract award shall follow the same requirement stated above for the life of the contract.

A.33 DISCLOSURE

Upon receipt, all inquiries and responses to inquiries related to this IFB become "Public Records," and shall be subject to public disclosure consistent with Florida Statutes, 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 bids 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.

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 the County, Successful Bidder must:

- a. Keep and maintain public records required by public agency to perform the service.
- b. Upon request from the public agency's custodian of public records, provide the public agency with a copy of the requested records or allow the records to be inspected or copied within a reasonable time 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 for the duration of the contract term and following completion of the contract if the Successful Bidder does not transfer the records to the public agency.
- d. Upon completion of the contract, transfer, at no cost, to the public agency all public records in possession of contractor or keep and maintain public records required by the public agency to perform the service. If the Successful Bidder transfers all public records to the public agency upon completion of the contract, the Successful Bidder shall destroy any duplicate public records that are exempt or confidential and exempt from public records disclosure requirements. If the Successful Bidder keeps and maintains public records upon completion of the contract, the Successful Bidder shall meet all applicable requirements for retaining public records. All records stored electronically must be provided to the public agency, upon request from public agency's custodian of public records, in a format that is compatible with the information technology systems of the public agency.

IF THE SUCCESSFUL BIDDER HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO THE SUCCESSFUL BIDDER'S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO ANY RESULTING CONTRACT, CONTACT COUNTY'S CUSTODIAN OF PUBLIC RECORDS AT: (941) 742-5845, debbie.scaccianoce@mymanatee.org, Attn: Records Manager, 1112 Manatee Ave W., Bradenton, FL 34205.

A.34 LOCAL PREFERENCE

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.

Local preference shall not apply to the following categories of Agreements:

1. Purchases or Agreements 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.
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.

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 Procurement 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.

A.35 VENDOR REGISTRATION

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.

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 Procurement staff member assist you.

Quick steps to registration:

www.mymanatee.org/purchasing

A link to Vendor Registration is listed on the Procurement Division's web page under "Register as a Vendor." Click on "Vendor Registration Form" for on-line input.

Registration is not mandatory; however, by taking the time to register, you are helping County to provide timely notification of quotation, bid and proposal opportunities to your business.

A.36 ENVIRONMENTAL SUSTAINABILITY

All bidders are encouraged to use as many environmentally preferable "green" products, materials, supplies, etc. as possible in order to promote a safe and healthy environment. Environmentally preferable are products or services that have a reduced adverse effect on the environment.

Bidders shall acknowledge whether or not their organization has an environmental sustainability initiative by checking the appropriate box on the bid form. In addition, the bidder shall submit a summary of their environmental sustainability initiative along with their bid. This information will be used as a determining factor in the award decision when all other evaluative factors, including local preference policies are otherwise equal.

A.37 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.

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

NOTE: ANY OR ALL STATEMENTS CONTAINED IN THE FOLLOWING SECTIONS: SCOPE OF WORK, BID SUMMARY, CONSTRUCTION AGREEMENT FOR STIPULATED SUM, AND GENERAL CONDITIONS OF THE CONSTRUCTION AGREEMENT, WHICH VARY FROM THE INFORMATION TO BIDDERS, SHALL HAVE PRECEDENCE.

END OF SECTION A

SECTION B
SCOPE OF WORK

B.01 SCOPE OF WORK

The Work consists of the removal and replacement of one (1) air cooled chiller, chilled water pump and variable frequency drive (VFD), piping modifications and buffer tank.

The Work also consists of the removal and replacement of two (2) laboratory exhaust fans.

Chiller: Replacement of one (1) air cooled chiller, chiller water pump and Variable Frequency Drive (VFD), piping modifications and buffer tank.

- Prior to demolition of any equipment, the successful contractor shall provide new chilled water valves and auxiliary connections, and install a temporary chiller. An existing Automatic Transfer Switch (ATS) shall provide power for the chiller.
- One (1) existing air cooled chiller which shall be removed and scrapped. The new chiller shall be installed in a new configuration, assuring all service clearances. Set chiller on 6" beams and secure to concrete pad. Approved manufacturers are: Carrier, Trane, and York. Provide a five (5) year factory warranty as specified.
(For Carrier selection, Scott Rhule may be contacted (813) 326-4084).
- Concrete Work: The existing concrete pad for the chiller shall be lengthened to accommodate location of new chiller. A new pad shall be provided for the new buffer tank. Provide new bollard in new location.
- Provide chilled water pump piping modifications and appurtenances per plans and details. A new buffer tank shall be installed outside, per plans. Piping and buffer tank shall be provided with 2.5" insulation and aluminum jacket.
- Successful contractor shall also be required to Test and Balance: Rebalance the chilled water flow through chiller and each of the two Air Handler Units (AHU). Commissioning per specifications provided in the Contract Documents, note 9.
- Controls: Wire devices as specified on plans, successful contractor shall also confirm sequence of operation as specified and / or make required modifications. Controls work shall be by "Boyd Brothers Service, Inc.(Punta Gorda, FL)

- Electrical scope: Successful contractor shall also be required to complete all electrical scope of work including but not limited to:
- Connect / disconnect existing chiller, temporary chiller.
- Provide new conduit and service above grade from the electrical room to new chiller. Disconnect switches to be furnished by chiller manufacturer. Also provide conduit for control wiring.
- Disconnect service of existing chilled water pump to be removed and reconnect to new pump and VFD.

Removal and Replacement of Exhaust Fans

Remove two (2) existing mounted exhaust fans set on a single curb, sharing an intake plenum. The entire assembly is to be removed and scrapped, including fans, discharge nozzles, intake plenums, and dampers.

The following items are to remain and to be reused:

- Roof curb
- Electrical service (120-volt convenience outlet above roof)
- Two (2) Variable Frequency Drives (VFD) in the mechanical room
- All ductwork and sensors below roof

A new exhaust fan assembly is to be installed onto existing roof curb. This includes two (2) fans (**MK Plastics AXCL2252 Fan Plenum**) with discharge nozzles, fan assembly with three (3) motorized dampers. Due to the highly corrosive environment, the basis of design for the fan assembly has been selected which offers plastic construction that will not rust with stainless steel hardware.

- Successful contractor and fan manufacturer shall be responsible for field verifying existing conditions including dimensions of curb.
- Structural engineering and wind load calculations and documentation for fan assembly and attachment to curb shall be provided by manufacturer of fan assembly.
- Successful contractor shall also be responsible for the Test and Balancing (T&B), rebalance of the exhaust fan to specified airflow.
- A Test and Balance report shall be submitted to the engineer for review and approval.
- Controls: Wire sensors and motorized dampers as specified on plans, confirm sequence of operation as specified and / or make required modifications.

- The successful contractor shall provide roof mounted service platform and stair compliant with Florida Mechanical Code 206.5.1. For basis of design, contact "Pitched Roof Service Platforms, Inc" (877-455-7577).
- Electrical scope: Successful contractor shall also be required to disconnect service with existing fans to be removed and reconnect to new fans.
- Disconnect switches to be furnished by fan manufacturer.
- Remove and reinstall lighting protection.

ELECTRICAL PLANS ARE MADE A PART OF THIS SOLICITATION

The Successful contractor shall furnish all shop drawings, working drawings, labor, materials, equipment, tools, services and incidentals necessary to complete all work required by these Specifications and as shown on the Contract Drawings.

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

The Contractor 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 Contract Documents or not.

CONTRACTS

All the Work shall be performed under one single contract.

B.02 SCHEDULE

Successful contractor shall coordinate the construction schedule with Manatee County Personnel to minimize disruption of laboratory operations. Downtime shall preferably occur over a weekend during un-occupied hours. The laboratory closes at 1:00 pm on Saturdays and Sundays. The significant period of downtime will be:

- Installation of new chilled water valves and auxiliary connections to start up the rental chiller.
- Replacement of the chilled water pump.
- Disconnect of temporary chiller and startup of new chiller.
- Replacement of the exhaust fan and startup.

All building HVAC systems shall be running and be operational before the start of the next business day. Construction may occur during business hours, however, operations that create excessive noise may need to occur after business hours.

If the proper and efficient prosecution of the work requires operations during the night or weekends, the written permission of the County shall be obtained prior to starting items of work.

Such permission, however, may be revoked at any time by the County if the contractor fails to maintain adequate equipment and supervision for the proper execution and control of the work at night.

B.03 PERMITTING

Successful contractor shall be responsible to pull and pay for any permitting required to perform a successful project. Manatee County personnel shall be available to the contractor should any assistance be required in obtaining the permit

B.04 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. One bid shall be considered, based on a completion time of 150 calendar days. Only one award shall be made.

B.05 LIQUIDATED DAMAGES

If the successful bidder fails to achieve Substantial Completion of the Work within the Contract Time and as otherwise required by the Contract Documents, the Owner shall be entitled to retain or recover from the successful bidder, as liquidated damages and not as a penalty, the sum of \$200.00 per calendar day, commencing upon the first day following expiration of the Contract Time and continuing until the actual date of Substantial Completion. Such liquidated damages are hereby agreed to be a reasonable estimate of damages the Owner will incur because of delayed completion of the Work. The Owner may deduct liquidated damages as described in this paragraph from any unpaid amounts then or thereafter due the successful bidder under this Agreement. Any liquidated damages not so deducted from any unpaid amounts due the successful bidder shall be payable to the Owner at the demand of the Owner, together with interest from the date of the demand at the maximum allowable rate.

B.06 CLEANUP

Successful contractor shall keep the construction site free of rubbish and waste materials and restore to their original condition those portions not designated for alteration by the scope of work. Clean up and restoration shall be accomplished on a continuing basis through the contract period and in such a manner as to maintain a minimum of nuisance and interference to the County.

It is the intent of this specification that any work areas and those other areas not designated for alteration by the scope of work be restored to their original condition or as nearly as possible.

B.07 REGULATIONS

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

B.08 DEMONSTRATION

After all adjustments, lubrications and clean up, the contractor shall demonstrate and instruct the proper operation and function of the chiller and exhaust fans.

B.09 PROJECT CLOSE-OUT

Clean construction site and remove all excess materials. Correct any damages to property that may have occurred because 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.

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
(As built drawings (SEPIAS) and AutoCAD files before final payment will be issued)
- 1 set Subcontractor Information (when applicable)

Service and Maintenance manuals – four (4) sets

Warranties / Bonds – Assemble warranties, bonds and service and maintenance contracts executed by each of the respective manufacturers, suppliers and subcontractors.

Submit original signed copies – two (2) each required.

Provide complete information for each item.

1. Product or work item.
2. Firm, with name of principal, address and telephone number.
3. Scope.
4. Date of beginning of warranty, bond or service and maintenance contract.
5. Duration of warranty, bond or service maintenance contract.
6. Provide information for County's personnel:
 - a. Proper procedure in case of failure.
 - b. Instances which might affect the validity of warranty or bond.
7. Contractor, name of responsible principal, address, telephone number and email address.

Submittals shall be made within ten (10) days after date of substantial completion and prior to final request for payment.

For items of work, where acceptance is delayed materially beyond the date of substantial completion, provide updated submittal within ten (10) days after acceptance, listing date of acceptance as start of warranty period.

Approval by the County of all documents is required a pre-requisite to requesting a final inspection and final payment.

B.10 CONTRACT CONTINGENCY WORK

Contract contingency is a monetary allowance used solely at Owner's discretion to handle unexpected conditions as required to satisfactorily complete the Work in accordance with the IFB documents. A Field Directive must be issued by an authorized Owner representative to authorize use of contract contingency funds.

The percentage for contract contingency is listed on the Bid Form. Bidder shall enter the dollar amount for contract contingency based on the percentage of the total base bid. The total contract award will include contract contingency.

Appropriate uses of contract contingency 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 Work 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 include anything that changes the initial scope of Work, including the Contract Sum and Contract Time, and adding bid items not previously contemplated that change the initial scope of Work.

END OF SECTION B

SECTION C
BID SUMMARY

C.01 MINIMUM QUALIFICATIONS OF BIDDERS

No person who is not certified or registered as a Mechanical Contractor pursuant to Chapter 489, Florida Statutes, 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 Work. In the event that a bidder is a business organization, including a partnership, corporation, business trust or other legal entity as set forth in Section 489.119(2), Florida Statutes, then the bidder shall only be qualified to bid on this Work 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 Section 489.119, Florida Statutes, 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.

C.02 BASIS OF AWARD

County may not make award to a bidder who is delinquent in payment of any taxes, fees, fines, contractual debts, judgments, or any other debts due and owed to the County, or is in default on any contractual or regulatory obligation to the County. By submitting this solicitation response, bidder attests that it is not delinquent in payment of any such debts due and owed to the County, nor is it in default on any contractual or regulatory obligation to the County. In the event the bidder's statement is discovered to be false, bidder will be subject to suspension and/or debarment and the County may terminate any award it has with bidder.

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 IFB. 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 IFB documents to County's satisfaction within the prescribed time.

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

NOTE: Inspection of the site is a prerequisite to be considered for award of this bid.

In evaluating bid, 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 are equal with respect to price, and all other evaluative factors are otherwise equal, including local preference policies, if the company provides documented environmentally preferable "green" products, materials, or supplies, they 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, and neither of these bids provides documented "green" products, the award shall be determined by a chance drawing, coin toss, or similar tie-breaking method conducted by the Procurement Division and open to the public.

END OF SECTION C

INSURANCE AND BOND REQUIREMENTS/SECTION D
IFB17-2001OV, Water Treatment Central Lab
Chiller and Exhaust Fan Replacement
4751 65th Street West, Bradenton, FL

The Successful Bidder will not commence work under the resulting Agreement until all insurance coverages indicated herein have been obtained. The Successful Bidder shall obtain and submit to the Procurement 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):

Insurance / Bond Type	Required Limits
1. <input checked="" type="checkbox"/> Automobile Liability:	<p>Coverage must be afforded under a per occurrence policy form including coverage for all owned, hired and non-owned vehicles.</p> <p>\$ <u>1,000,000</u> combined single limit, or \$ _____ bodily injury and \$ _____ property damage. Coverage must also include \$10,000 Personal Injury Protection (No Fault), \$ _____ Hired-Non Owned Liability and \$10,000 Medical Payments.</p> <p><i>This policy shall contain severability of interests' provisions.</i></p>
2. <input checked="" type="checkbox"/> Commercial General Liability: (Occurrence Form - patterned after the current ISO form)	<p>Coverage shall be afforded under a per occurrence policy form.</p> <p>\$<u>1,000,000</u> single limit per occurrence; \$<u>1,000,000</u> aggregate \$ _____ Products/Completed Operations Aggregate \$1,000,000 Personal and Advertising Injury Liability \$100,000 Fire Damage Liability \$10,000 Medical Expense, and \$ _____ Third Party Property Damage. \$ _____ Project Specific Aggregate (Required on projects valued at over \$10,000,000)</p> <p><i>This policy shall contain severability of interests' provisions.</i></p>
3. <input checked="" type="checkbox"/> Employer's Liability:	<p>\$<u>100,000</u> each accident \$ _____ disease each employee \$ _____ disease policy limit</p>
4. <input checked="" type="checkbox"/> Worker's Compensation:	<p>Statutory Limits of Chapter 440, Florida Statutes, and all Federal Government Statutory Limits & Requirements.</p> <p>If any operations are to be undertaken on or about navigable waters, coverage must be included for the US Longshoremen & Harbor Workers Act and Jones Act.</p> <p><u>Note:</u> Should "leased employees" be retained for any part of the project or service, the employee leasing agency shall provide evidence of workers' compensation coverage and</p>

Insurance / Bond Type	Required Limits
	<p>and in compliance with the above requirements.</p> <p><u>Note:</u> Workers' compensation coverage is a firm requirement. Elective exemptions are considered on a case-by-case basis and are approved in a very limited number of instances.</p>
<p>5. <input checked="" type="checkbox"/> Other Insurance, as noted:</p>	<p>a. <input type="checkbox"/> Aircraft Liability</p> <p style="padding-left: 40px;">\$ _____ per occurrence</p> <p style="padding-left: 40px;">Coverage shall be carried in limits of not less than \$5,000,000 each occurrence if applicable to the completion of the services under this Agreement.</p> <p>b. <input checked="" type="checkbox"/> Installation Floater</p> <p style="padding-left: 40px;">If the resulting Agreement does not include construction of or additions to above ground building or structures, but does involve the installation of machinery or equipment, Successful Bidder 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).</p> <p>c. <input type="checkbox"/> Pollution</p> <p style="padding-left: 40px;">\$ _____ per occurrence</p> <p>d. <input type="checkbox"/> Professional Liability and/or Errors and Omissions (E&O) Liability</p> <p style="padding-left: 40px;">Professional (E&O) Liability shall be afforded for the Bodily Injury and Property Damage for not less than \$ _____ Each Claim, \$1,000,000 Policy Aggregate.</p> <p>e. <input type="checkbox"/> Builder's Risk Insurance</p> <p style="padding-left: 40px;">When this contract or agreement includes the construction of roadways and/or the addition of a permanent structure or building, including the installation of machinery and/or equipment, the following insurance coverage must be afforded:</p> <p style="padding-left: 40px;">Coverage Form: Completed Value, All Risk (Roadways/Buildings and Machinery/Equipment) in an amount equal to 100% of the value upon completion or the value of the equipment to be installed.</p> <p style="padding-left: 40px;">Coverage should include, but not be limited to, storage and transport of materials, equipment, supplies of any kind whatsoever to be used on or incidental to the project, theft coverage, and Waiver of Occupancy Clause Endorsement, where applicable.</p> <p style="padding-left: 40px;">The policy shall not carry a self-insured retention/deductible greater than \$10,000.</p>

Insurance / Bond Type	Required Limits
	<p>f. <input type="checkbox"/> Cyber Liability</p> <p>Coverage must comply with Florida Statute 501.171 and must be afforded under a per occurrence policy form for limits not less than \$_____ Security Breach Liability, \$_____ Security Breach Expense (each occurrence), \$_____ Security Breach Expense (aggregate), \$_____ Replacement or Restoration of Electronic Data, \$_____ Extortion Threats, \$_____ Business Income and Extra Expense, and \$_____ Public Relations Expense.</p> <p>The policy must not carry a self-insured retention/deductible greater than \$_____.</p> <p>g. <input type="checkbox"/> Hazardous Materials Insurance</p> <p>Hazardous materials includes all materials and substances that are now designated or defined as hazardous by Florida or Federal law or by the rules of regulations of Florida or any Federal Agency.</p> <p><i>Pollution Liability</i></p> <p>Coverage must be afforded under a per occurrence policy form for limits not less than the value of the contract, subject to a \$_____ minimum, for Bodily Injury and Property Damage to include sudden and gradual release, each claim and aggregate.</p> <p><i>Asbestos Liability (If handling within scope of Contract)</i></p> <p>Coverage must be afforded under a per occurrence policy form for limits not less than the value of the contract, subject to a \$_____ minimum, for Bodily Injury and Property Damage to include sudden and gradual release, each claim and aggregate.</p> <p><i>Disposal</i></p> <p>Coverage must be afforded under a per occurrence policy form for limits not less than the value of the contract, subject to a \$_____ minimum, for Liability for Sudden and Accidental Occurrences, each claim and an aggregate and not less than the value of the contract, subject to a \$_____ minimum, for Liability for Non-Sudden Occurrences, each claim and aggregate.</p> <p><i>Hazardous Waste Transportation Insurance</i></p> <p>Coverage must be afforded under a per occurrence policy form for limits not less than the value of the contract, subject to a \$_____ minimum, per accident.</p> <p>The Successful Bidder shall designate the hauler and have the hauler furnish a Certificate of Insurance for Automobile Liability Insurance with Endorsement MCS-90 for liability arising out of the transportation of</p>

Insurance / Bond Type	Required Limits
	<p>hazardous materials.</p> <p>The Successful Bidder must also provide the EPA Identification Number.</p> <p>h. <input type="checkbox"/> Liquor Liability</p> <p>Coverage must be afforded under a per occurrence policy form for limits not less than \$_____ Each Occurrence and Aggregate.</p> <p>i. <input type="checkbox"/> Garage Keeper's Liability</p> <p>Coverage shall be required if the maintenance, servicing, cleaning or repairing of any County motor vehicles is inherent or implied within the provision of the contract.</p> <p>Coverage must be afforded under a per occurrence policy form for limits not less than equal to the full replacement value of the lot or garage.</p> <p>j. <input type="checkbox"/> Bailee's Customer</p> <p>Coverage must be afforded under a per occurrence policy form for limits not less than equal to the full replacement value of the lot or garage.</p> <p>k. <input type="checkbox"/> Watercraft</p> <p>\$_____ per occurrence</p>
<p>6. <input checked="" type="checkbox"/> Bid Bond:</p>	<p>A construction project over \$200,000 requires a Bid Bond in the amount of 5% of the total bid offer. Bid bond shall be submitted with the sealed bid and shall include project name, location, and / or address and project number.</p> <p>In lieu of the bond, the bidder may file an alternative form of security in the amount of 5% of the total offer, in the form of a money order, a certified check, a cashier's check, or an irrevocable letter of credit issued to Manatee County.</p>
<p>7. <input checked="" type="checkbox"/> Payment and Performance Bond:</p>	<p>A construction project over \$200,000 requires a Payment and Performance Bond be submitted by Successful Bidder for 100% of the award amount and shall be presented to Manatee County within ten (10) calendar days of issuance of the notice of intent to award.</p>

Reviewed by Risk Management WLK

INSURANCE REQUIREMENTS

I. THE POLICIES ARE TO CONTAIN, OR BE ENDORSED TO CONTAIN, THE FOLLOWING PROVISIONS:

Commercial General Liability and Automobile Liability Coverages

- a. **"Manatee County, a Political Subdivision of the State of Florida," is to be named as an Additional Insured in respect to:** Liability arising out of activities performed by or on behalf of the Successful Bidder, his agents, representatives, and employees; products and completed operations of the Successful Bidder; or automobiles owned, leased, hired or borrowed by the Successful Bidder. The coverage shall contain no special limitation(s) on the scope of protection afforded to the County, its officials, employees or volunteers.

In addition to furnishing a Certificate of Insurance, the Successful Bidder shall provide the endorsement that evidences Manatee County being listed as an Additional Insured. This can be done in one of two ways: (1) an endorsement can be issued that specifically lists "Manatee County, a Political Subdivision of the State of Florida," as Additional Insured; or, (2) an endorsement can be issued that states that all Certificate Holders are Additional Insured with respect to the policy.

- b. The Successful Bidder's insurance coverage shall be primary insurance with respect to the County, its officials, employees and volunteers. Any insurance or self-insurance maintained by the County, its officials, employees or volunteers shall be excess of Successful Bidder's insurance and shall be non-contributory.
- c. The insurance policies must be on an occurrence form.

Workers' Compensation and Employers' Liability Coverages

The insurer shall agree to waive all rights of subrogation against the County, its officials, employees and volunteers for losses arising from work performed by the Successful Bidder for the County.

II. GENERAL INSURANCE PROVISIONS APPLICABLE TO ALL POLICIES:

- a. Prior to the execution of contract or issuance of a Purchase Order, and then annually upon the anniversary date(s) of the insurance policy's renewal date(s) for as long as this contract remains in effect, Successful Bidder shall furnish the County with a Certificate(s) of Insurance (using an industry accepted certificate form, signed by the Issuer, with applicable endorsements, and containing the solicitation or contract number, and title or description) evidencing the coverage set forth above and naming "Manatee County, a Political Subdivision of the State of Florida" as an Additional Insured on the applicable coverage(s) set forth above.
- b. If the policy contains an aggregate limit, confirmation is needed in writing (letter, email, etc.) that the aggregate limit has not been eroded to procurement representative when supplying Certificate of Insurance.

In addition, when requested in writing from the County, Successful Bidder will provide the County with a certified copy of all applicable policies. The address where such certificates and certified policies shall be sent or delivered is as follows:

**Manatee County, a Political Subdivision of the State of Florida
Attn: Risk Management Division
1112 Manatee Avenue West, Suite 969
Bradenton, FL 34205**

- c. The project's solicitation number and title shall be listed on each certificate.
 - d. Successful Bidder shall provide thirty (30) days written notice to the Risk Manager of any cancellation, non-renewal, termination, material change, or reduction in coverage of any insurance policies to procurement representative including solicitation number and title with all notices.
 - e. Successful Bidder agrees that should at any time Successful Bidder fail to meet or maintain the required insurance coverage(s) as set forth herein, the County may terminate this contract.
 - f. The Successful Bidder waives all subrogation rights against Manatee County, a Political Subdivision of the State of Florida, for all losses or damages which occur during the contract and for any events occurring during the contract period, whether the suit is brought during the contract period or not.
 - g. The Successful Bidder has sole responsibility for all insurance premiums and policy deductibles.
 - h. It is the Successful Bidder's responsibility to ensure that his agents, representatives and subcontractors comply with the insurance requirements set forth herein. Successful Bidder shall include his agents, representatives, and subcontractors working on the project or at the worksite as insured under its policies, or Successful Bidder shall furnish separate certificates and endorsements for each agent, representative, and subcontractor working on the project or at the worksite. All coverages for agents, representatives, and subcontractors shall be subject to all of the requirements set forth to the procurement representative.
 - i. All required insurance policies must be written with a carrier having a minimum A.M. Best rating of A- FSC VII or better. In addition, the County has the right to review the Successful Bidder's deductible or self-insured retention and to require that it be reduced or eliminated.
- III.** Successful Bidder understands and agrees that the stipulated limits of coverage listed herein in this insurance section shall not be construed as a limitation of any potential liability to the County, or to others, and the County's failure to request evidence of this insurance coverage shall not be construed as a waiver of Successful Bidder's obligation to provide and maintain the insurance coverage specified.
- IV.** The enclosed Hold Harmless Agreement shall be signed by the Successful Bidder and shall become a part of the contract.

- V. Successful Bidder understands and agrees that the County does not waive its immunity and nothing herein shall be interpreted as a waiver of the County's rights, including the limitation of waiver of immunity, as set forth in Florida Statutes 768.28, or any other statutes, and the County expressly reserves these rights to the full extent allowed by law.
- VI. No award shall be made until the Procurement Division has received the Certificate of Insurance and Hold Harmless Agreement in accordance with this section.

VII. BONDING REQUIREMENTS

Bid Bond/Certified Check. By submitting a bid, the bidder agrees should its bid be accepted, **to execute the form of Agreement 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 Agreement **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 an Agreement, 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 an agreement with a bidder, or if County rejects any and/or all bids, accompanying bond will be promptly returned.

Payment and Performance Bonds. Prior to commencing work, the Successful Bidder shall obtain, for the benefit of and directed to County, a Payment and Performance Bond satisfying the requirements of Section 255.05, Florida Statutes, covering the faithful performance by the Successful Bidder of its obligation under the Contract Documents, including but not limited to the construction of the project on the project site and the payment and obligations arising thereunder, including all payments to Subcontractors, laborers, and materialmen. The surety selected by the Successful Bidder to provide the Payment and Performance Bond shall be approved by County prior to issuance of such Bond, which approval shall not be unreasonably withheld or delayed provided that surety is rated A- or better by Best's Key Guide, latest edition.

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 Section 255.05, Florida Statutes, and must not contain notice, demand or other terms and conditions, including informal pre-claim meetings, not provided for in Section 255.05, Florida Statutes.

Bonds shall be in an amount equal to 100% of the contract price issued by a duly authorized and nationally recognized surety company, authorized to do business in the State of Florida, satisfactory to County. Surety shall be rated as "A-" or better by Best's Key Guide, latest edition. The attorney-in-fact who signs the bonds must file with the bonds, a certificate and effective dated copy of power-of-attorney. Payment and Performance Bonds shall be issued to Manatee County, a political subdivision of the State of Florida, **within ten (10) calendar days after issuance of notice of intent to award.**

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

Furnishing Payment and Performance Bonds shall be requisite to execution of an Agreement with County. Said Payment and Performance Bonds will remain in force for the duration of the Agreement with the premiums paid by the Successful Bidder. Failure of the Successful Bidder to execute such Agreement and to supply the required bonds shall be just cause for cancellation of the award. County may then contract with the next lowest, responsive and responsible bidder or re-advertise this IFB.

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

BIDDER'S INSURANCE STATEMENT

THE UNDERSIGNED has read and understands the aforementioned insurance and bond requirements of this IFB and shall provide the insurance and bonds required by this section within ten (10) days from the date of notice of intent to award.

Bidder Name: _____ Date: _____

Authorized
Bidder's Signature: _____

Print Name: _____

Insurance Agency: _____

Agent Name: _____ Agent Phone: _____

Surety Agency: _____

Surety Name: _____ Surety Phone: _____

Please return this completed and signed statement with your bid.

Manatee County, a Political Subdivision of the State of Florida

Indemnity and Hold Harmless

Respondent shall defend, indemnify and hold harmless the County and all of the County's officers, agents, employees, and volunteers from and against all claims, liability, loss and expense, including reasonable costs, collection expenses, attorneys' fees, and court costs which may arise because of the negligence (whether active or passive), misconduct, or other fault, in whole or in part (whether joint, concurrent, or contributing), of Respondent, its officers, employees, representatives and agents in performance or non-performance of its obligations under the Contract/Agreement. Respondent recognizes the broad nature of this indemnification and hold harmless clause, as well as the provision of a legal defense to the County when necessary, and voluntarily makes this covenant and expressly acknowledges the receipt of such good and valuable consideration provided by the County in support of these indemnification, legal defense and hold harmless contractual obligations in accordance with the laws of the State of Florida. This clause shall survive the termination of this Contract/Agreement. Compliance with any insurance requirements required elsewhere within this Contract/Agreement shall not relieve Respondent of its liability and obligation to defend, hold harmless and indemnify the County as set forth in this article of the Contract/Agreement.

Nothing herein shall be construed to extend the County's liability beyond that provided in section 768.28, Florida Statutes.

PROJECT NUMBER AND/OR NAME	
INSURANCE AGENT	
RESPONDENT SIGNATURE	DATE

Acknowledgement:

STATE OF _____ COUNTY OF _____

The foregoing instrument was acknowledged before me this ____ day of _____,

20____ by _____ [YOUR FULL LEGAL NAME], who is

personally known to me or who has produced _____ as

identification.

Notary Signature _____

Print Name: _____

(seal)

BID FORM

**For: IFB17-2001OV
Chiller and Exhaust Fan Replacement at the
Water Treatment Lab, 4751 65th Street West, Bradenton, FL 34210**

Total Offer _____
Based on a completion time of <u>150</u>calendar days

We, the undersigned, hereby declare that we have carefully reviewed the IFB Documents in their entirety and with full knowledge and understanding of the aforementioned herewith submit this bid, completely meeting each and every specification, term, and condition contained therein.

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

As bidder, we understand that the IFB documents, in its entirety, including but not limited to, all specifications, terms, and conditions shall be made a part of any resulting Agreement between Manatee County and the successful bidder. Failure to comply shall result in Agreement default, whereupon, the defaulting successful bidder 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: _____

A bid bond, certified check, or cashier's check in the amount of 5% of the total bid offer is attached herein.

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			
	IFB17-2001OV			
	Chiller and Exhaust Fan Replacement at the Water Treatment Lab, 4751 65th Street West, Bradenton, FL 34210			
NO.	DESCRIPTION	QTY / U/M	UNIT PRICE	EXTENDED TOTAL
1	Mobilization / Demobilization	1 LS	\$	\$
2	Demolition / Installation Exhaust Fans	1 LS	\$	\$
3	Roof Mounted Service Platform and Stair In accordance with Florida Mechanical Code 306.5.1	1 LS	\$	\$
4	Install new chilled water valves and auxiliary connections, and connection of temporary chiller to existing ATS	1 LS	\$	\$
5	Supply and Operation of 90 Ton Temporary Chiller for the Duration of Chiller Outage	1 LS	\$	\$
6	Existing Chiller shall be removed and scrapped. Concrete pad for the chiller shall be lengthened to accommodate location of new chiller. Add New Bollards Per Specifications and Plans	1 LS	\$	\$
7	Install 300 gallon buffer tank, chiller water piping modifications & appurtenances per plans and details. Install one (1) Carrier Chiller 30XV140 or pre-approved Trane Or York equal per plan specification. Provide name of manufacturer when submitting the bid.	1 LS	\$	\$
8	Install new chilled water pump that shall replace the existing pump and provide with new VFD, per specified plans, include Spare Pump	1 LS	\$	\$

BIDDER: _____

AUTHORIZED SIGNATURE: _____

Chiller and Exhaust Fan Replacement at the Water Treatment Lab, 4751 65th Street West, Bradenton, FL 34210				
NO.	DESCRIPTION	QTY / U/M	UNIT PRICE	EXTENDED TOTAL
9	Test, Adjusting and Balance Report. Rebalance of Exhaust Fan to Specified Airflow. Rebalance the chiller water flow through chiller and each of two (2) Air Handling Units	1 LS	\$	\$
10	Programming and Instrumentation. Automation Logic Controls Work by Boyd Brothers Services, Inc., Punta Gorda, FL (941) 627-8881)			\$16,360.00
	TOTAL BASE BID: (Based on a completion time of 150 calendar day).			\$
	Contract Contingency (Used only with County Approval (5%))			\$
	TOTAL BID OFFER WITH CONTRACT CONTINGENCY (Based on a completion time of 150 CALENDAR DAYS			\$

BIDDER: _____

AUTHORIZED SIGNATURE: _____

**MESUREMENT AND PAYMENT DEFINITION
FOR IFB 17-2001OV
Chiller and Exhaust Fan Replacement at the Water Treatment Lab
4751 65th Street West, Bradenton, FL 34210**

1. SCOPE

- a. The scope of this section 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.
- b. 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 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.

2. ESTIMATED QUANTITIES

The quantities shown are approximate and are given only as a basis of calculation upon which the award of the Contract is to be made. The County does not assume any responsibility for the final quantities, nor shall the Contractor claim misunderstanding because of such estimate of quantities. Final payment will be made only for satisfactorily completed quantity of each item.

3. WORK OUTSIDE AUTHORIZED LIMITS

No payment will be made for work constructed outside the authorized limits of work.

4. MEASUREMENT STANDARDS

Unless otherwise specified for the particular items involved, all measurements of distance shall be taken horizontally or vertically.

5. AREA MEASUREMENTS

In the measurement of items to be paid for on the basis of area of finished work, the lengths and/or widths to be used in the calculations shall be the final dimensions measured along the surface of the completed work within the neat lines shown or designated.

6. LUMP SUM ITEMS

Where payment for items is 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.

7. UNIT PRICE ITEM

Separate payment will be made for the items of work described herein and listed on the Bid Form. Any related work not specifically listed, but required for satisfactory completion of the work shall be considered to be included in the scope of the appropriate listed work items.

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 County until as-built (record) drawings have been submitted and approved by the County.

1. Shop Drawings, Working Drawings.
2. Cleanup and miscellaneous work.
3. Foundation and borrow materials, except as hereinafter specified.
4. Maintaining the existing quality of service during construction.
5. Maintaining or detouring of traffic except as hereinafter specified.
6. Appurtenant work as required for a complete and operable system.

BID ITEM #1 – Mobilization / Demobilization

Measurement and payment for this Bid Item shall include full compensation for the required 100 percent (100%) Performance Bond, 100 Percent (100%) payment Bond, all required insurance and permits for the project and the Contractor's mobilization and demobilization costs as shown in the Bid Form.

Mobilization shall be the preparatory work and operations in mobilizing for beginning work on the project; including, but not limited to, those operations necessary for the movement of personnel, equipment, supplies and incidentals to the project site, and for the establishment of temporary offices, storage buildings, safety equipment, first aid supplies, sanitary and other facilities, as required by the Contract and all applicable laws and regulations.

Demobilization shall be the work for removing temporary facilities from the project site and the approval of all as-built record drawings by the Project Manager.

Payment for the mobilization/demobilization Bid Item shall not exceed 10 percent (10%) of the total Contract amount. Partial payments for this Bid Item will be made in accordance with the following schedule:

Percent of Original Contract Amount:	Percent Allowable Payment of Mobilization/ Demobilization Bid Item Price:
5	25
10	35
25	45
50	50
75	75
100	100

These payments will be subject to the standard retainage provided in the Contract. Payment of the retainage will be made after completion of the work and demobilization.

BID ITEM #2 – Demolition / Installation Exhaust Fans

Payment for all work included under this Bid item shall be made at the Contract lump sum price Bid listed in the Bid Form and shall represent full compensation for all labor, materials, equipment necessary for the removal / demolition of existing fans and successful installation of new fans, ready for approval and acceptance by the County. Partial payment may be made for the new exhaust fans per Manatee County's stored material policy.

BID ITEM #3 – Roof Mounted Service Platform and Stairs

Payment for all work included under this Bid item shall be made at the Contract lump sum price Bid listed in the Bid Form and shall represent full compensation for all labor, materials, equipment necessary for the installation of platform, stairs and ladder, ready for approval and acceptance by the County. Partial payment may be made for fabricated sections per Manatee County's stored materials policy. Partial payment for installation of sections may be made per the contractor's Schedule of Values.

BID ITEM #4 – Install New Chiller Water Valves and Auxiliary Connections and Connection of Temporary Chiller to Existing ATS

Payment for all work included under this Bid item shall be made at the Contract lump sum price Bid listed in the Bid Form and shall represent full compensation for all labor, materials, equipment necessary for the installation of new chiller water valves and auxiliary connections and connection of temporary chiller to existing ATS, ready for approval and acceptance by the County

BID ITEM #5 – Supply and Operation of 90 Ton Temporary Chiller for the Duration of Chiller Outage

Payment for all work included under this Bid item shall be made at the Contract lump sum price Bid listed in the Bid Form and shall represent full compensation for all labor, materials, equipment necessary for the supply

and operation of 90 ton temporary chiller during the duration of the chiller outage, ready for approval and acceptance by the County.

BID ITEM #6 – Existing Chiller Shall be Removed and Scrapped. Concrete pad for the chiller shall be lengthened to accommodate location of new chiller. Add new bollards per specifications and plans

Payment for all work under this Bid shall be made at the Contract lump sum price Bid listed in the Bid Form and shall represent full compensation for all labor, materials, equipment necessary to remove and scrap the existing chiller, extend concrete pad to accommodate new chiller, add new bollards, ready for approval and acceptance by the County.

BID ITEM #7 – Install 300 gallon buffer tank, chiller water piping modifications & appurtenances per plans and details. Install one (1) Carrier Chiller 30XV140

Payment for all work under this Bid item shall be made at the Contract lump sum price Bid listed in the Bid Form and shall represent full compensation for all labor, materials, and equipment necessary for the installation of the chiller and appurtenances, ready for approval and acceptance by the County. Partial payment may be made for parts / equipment / materials per Manatee County's stored materials policy and for installed equipment and appurtenances per contractor's Schedule of Values.

BID ITEM #8 – Install new chilled water pump that shall replace the existing pump and provide with new VFD, per specified plans, include spare pump

Payment for all work under this Bid item shall be made at the Contract lump sum price Bid listed in the Bid Form and shall represent full compensation for all labor, materials and equipment required to install a new chilled water pump that shall replace the existing pump with new VFD, ready for approval and acceptance by the County. Partial payment may be made for parts / equipment / materials per Manatee County's stored materials policy and for installed equipment per contractor's Schedule of Values.

BID ITEM #9 – Testing, Adjusting and Balance Report

Payment for all work under this Bid item shall be made at the Contract lump sum price Bid listed in the Bid Form and shall represent full compensation for Testing, Adjusting and Balance Report, upon submission of a certified report (s), ready for approval and acceptance by the County.

BID ITEM #10 – Programming and Instrumentation

Payment for all work under this Bid item shall be made at the Contract lump sum price Bid item listed in the Bid Form and shall represent full compensation for all labor, materials and equipment necessary for the programming and instrumentation by Boyd Brothers Services, Inc., Punta Gorda, FL., ready for approval and acceptance by the County.

CONTRACT CONTINGENCY

Payment for all work under this Bid item shall be made only at the County's discretion. This Bid Item shall not exceed 5% of the Bidder's Total Base Bid. The Bidder shall calculate and enter a dollar amount for this Quote Item.

END OF THIS SECTION

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:

BIDDER: _____

INVITATION FOR BID No.: IFB17-2001OV

**BID TITLE: Chiller and Exhaust Fan Replacement at the Water
Treatment Lab**

Project Location 4751 65th Street West, Bradenton, FL 34210

ATTACHMENT A / IFB17-2001OV
Water Treatment Lab Chiller and Exhaust Fan Replacement
BIDDER'S QUESTIONNAIRE
(Submit in Duplicate)

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:

FEIN #: _____

License #: _____

License Issued to: _____

Date License Issued (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? _____

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

BIDDER: _____

7. Is this firm currently contemplating or in litigation? Provide summary details.

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 Work 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.

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

BIDDER: _____

12. If any, list MBE/DBE (with Agreement amount) 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:

ATTACHMENT B
PUBLIC CONTRACTING AND ENVIRONMENTAL CRIMES CERTIFICATION

SWORN STATEMENT PURSUANT TO ARTICLE V,
MANATEE COUNTY PROCUREMENT CODE

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

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

_____ [Print individual's name and title]

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

whose business 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 an Owner's Agreement for public improvements, procurement of goods or services (including professional services) or an Owner's lease, franchise, concession or management agreement, or shall receive a grant of Owner's monies unless such person or entity has submitted a written certification to Owner 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 Owner'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.

ATTACHMENT B

PUBLIC CONTRACTING AND ENVIRONMENTAL CRIMES CERTIFICATION

(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 Owner's Purchasing Official. Upon presentation of such satisfactory proof, the person or entity shall be allowed to contract with Owner.

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 AGREEMENT 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]

Notary Public Signature My commission expires _____

[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.

**ATTACHMENT 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.17-2001OV
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 Owner and Engineer, and any of their agents or employees from any claims arising from the failure to comply with said standard.
6. The undersigned has appropriated the following costs for compliance with the applicable standards:

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

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

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

(AUTHORIZED SIGNATURE / TITLE)

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

Notary Public, State of Florida: _____

My commission expires: _____



Angelina M. Colonnese

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

ATTACHMENT D: 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: September 30, 2015

“Pride in Service with a Vision to the Future”

Clerk of the Circuit Court – Clerk of Board of County Commissioners – County Comptroller – Auditor and Recorder

Attachment E
VENDOR CERTIFICATION REGARDING
SCRUTINIZED COMPANIES LISTS

I am an agent authorized by the company responding to this solicitation to make the following certification: I hereby certify that the company has reviewed Florida Statutes § 287.135, and that after such review, the company is not prohibited by the terms of that statute from entering into an agreement with Manatee County for the commodities and/or services which are the subject of this solicitation. I further acknowledge that my submission of a false certification may subject me and/or my company to civil penalties, attorney's fees, and/or costs.

Vendor Name: _____

Vendor FEIN: _____

Address: _____

City: _____ State: _____ Zip: _____

Certified by: _____

Who is authorized to sign on behalf of the company listed above.

Authorized Signature: _____

Print

Name: _____

Title: _____

Date: _____

SECTION 15000 - MASTER MECHANICAL SPECIFICATIONS

Division 15 - Index 10

15010 BASIC MECHANICAL REQUIREMENTS

15140 SUPPORTS AND ANCHORS

15170 MOTORS

15190 MECHANICAL IDENTIFICATION

15242 VIBRATION ISOLATION

15260 PIPING INSULATION

15280 EQUIPMENT INSULATION

15400 TESTING OF PIPING SYSTEMS

15510 HYDRONIC PIPING

15515 HYDRONIC SPECIALTIES

15540 HVAC PUMPS

15545 CHEMICAL (WATER) TREATMENT

15682 AIR COOLED PACKAGED WATER CHILLER (ROTARY SCREW TYPE)

15875 POWER ROOF VENTILATORS

15990 TESTING, ADJUSTING, AND BALANCING

SECTION 15010 - BASIC MECHANICAL REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Basic Mechanical Requirements specifically applicable to Division 15 Sections, in addition to Division 1 - General Requirements, General Conditions and Supplementary General Conditions.
- B. This Division of the specifications includes Mechanical:
 - 1. Heating, Ventilating, Air Conditioning (HVAC).
 - 2. Plumbing, and that Mechanical which applies to HVAC and plumbing.

1.02 INTENT

- A. It is the intention of these specifications and drawings to call for finished work, tested, and ready for operation. Wherever the word "provide" is used, it shall mean "furnish and install complete and ready for use."
- B. Minor details not usually shown or specified, but necessary for the proper installation and operation, shall be included in the work, the same as if herein specified or shown.

1.03 SURVEYS AND MEASUREMENTS

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

1.04 DRAWINGS

- A. Drawings are diagrammatic and indicate the general arrangement of systems and work included in the contract. Drawings are not to be scaled. The architectural drawings and details shall be examined for exact location of fixtures and equipment. Where they are not definitely located, this information shall be obtained from the Architect.
- B. If directed by the Engineer, the Contractor shall, without extra charge, make reasonable modifications in the layout as needed to prevent conflict with work of other trades or for proper execution of the work.
- C. At the time of each shop drawing submission, the Contractor shall call the Engineer's attention (in writing) to, and plainly mark on shop drawings, any deviations from the Contract Documents. (See paragraph 1.06, B.)

- D. Samples, drawings, specifications, catalogs, submitted for approval, shall be properly labeled indicating specific service for which material or equipment is to be used, location, section and article number of specifications governing, Contractor's name, and name of job. All equipment shall be labeled to match labeling on contract documents.
- E. Control systems: Submit description of operation and schematic drawings of the entire control system. Include bulletins describing each item of control equipment or component.
- F. Catalogs, pamphlets, or other documents submitted to describe items on which approval is being requested, shall be specific and identification in catalog, pamphlet, etc. of item submitted shall be clearly made in ink. Data of a general nature will not be accepted.
- G. Approval rendered on shop drawings shall not be considered as a guarantee of measurements or building conditions. Where drawings are approved, said approval does not mean that drawings have been checked in detail; said approval does not in any way relieve the Contractor from their responsibility or necessity of furnishing material or performing work as required by the contract drawings and specifications.
- H. All shop drawings shall be submitted to the Engineer by the Contractor no later than 30 days from the day of contract award.
- I. Failure of the Contractor to submit shop drawings in ample time for checking shall not entitle him to an extension of contract time, and no claim for extension by reason of such default will be allowed.
- J. Submit all Division 15 submittals at one (1) time in one (1) integral group. Piece-by-piece submission of individual items will not be acceptable. Engineer may check contents of each submittal set upon initial delivery; if not complete as set forth herein, submittal sets may be returned to Contractor without review and approval and will not be accepted until made complete.
- K. Routing and methods of support of piping shall be shown on shop drawings and shall have the review of the Engineer prior to fabrication and installation. Spacing of supports shall be as specified in Section 15140, or if not specified, shall not exceed the suggested maximum spacing recommended in ANSI B31.1 for each type of line. Supports shall be fabricated as detailed on reviewed shop drawings. Provide supports so located that temporary supports are not required during removal of valves or equipment. Insofar as possible, support lines directly from the building structure.
- L. At the close of the job, prior to final review, five (5) bound copies of the following shall be submitted by transmittal letter to the Engineer for review and acceptance.
 - 1. Equipment warranties
 - 2. Contractor's warranty

3. Parts list and manuals for all equipment
4. Test and Balance readings
5. Written operating instructions
6. Written maintenance instructions on care of the system

1.05 SUBMITTALS

- A. Submit Manufacturer's published technical data, catalog cuts, wiring diagrams, shop drawings, samples and testing and balancing logs for all elements of the HVAC work. Submit under provisions of General Conditions and Supplementary General Conditions.
- B. No equipment, piping, ductwork or components shall be fabricated, delivered, erected, or connected other than from shop drawings reviewed and approved by the Engineer.
- C. It shall be understood that review of shop drawings by the Engineer does not supersede the requirement to provide a complete and functioning system in compliance with the Contract Documents.
- D. Equipment Supports: Submit detailed shop drawings indicating equipment weight and dimensions, support material, connections, anchoring, and vibration isolation.
- E. Submittals shall include, but not be limited to the following:
 1. All equipment (i.e. cooling, heating, plumbing, electrical motors, starters, controls, etc.)
 2. Electrical Requirements (Voltage, phase, and amperage) of each electrical item, such as motors, etc.
 3. All auxiliary equipment.
 4. Pipe, ductwork, valves, insulation, etc.

1.06 SUBSTITUTIONS

- A. Materials and equipment are specified herein by a single or by multiple Manufacturers to indicate quality and performance required. The drawings are based upon equipment scheduled on drawings and specified. If another Manufacturer is considered for substitution during the bidding process, the Mechanical Contractor shall be responsible for coordinating all electrical, mechanical, structural, or architectural changes. Comparable equipment Manufacturers that are listed as equals shall be considered as substitutes. Manufacturers other than the basis of design shall submit cut sheets showing dimensional data, a 1/4" scale plan and a section drawings showing proper fit and all clearances for maintenance items.

- B. Substitutions of other Manufacturer's will be considered for use if, in the Engineers opinion, the item requested for substitution is equal to that specified. The Contractor shall provide to the Engineer a typed comparative list of the basis of design and the proposed substitute. The comparative shall list capacities, pressure drops, horsepower, electrical requirements, etc., (refer to paragraph 1.04, C and 1.06. C).

Request for approval of substitutions or equals prior to bid must be made in writing. The approval of any substitutions or equals prior to bid shall not be construed as a shop drawing approval. The substitute or equal must be submitted as described in the specifications and meet all the requirements of the specifications and drawings.

- C. All requests for substitutions shall be submitted as described in paragraph 1.06, B., and specifically indicate any and all differences or omissions between the product specified as basis of design and the product proposed for substitution. Differences shall include but shall not be limited to data as follows for both the specified and substituted products.
1. Principle of operation
 2. Materials of construction or finishes
 3. Thickness or gauge of materials
 4. Weight of item
 5. Deleted features or items
 6. Added features or items
 7. Changes in other Contractor's work caused by the substitution
 8. Physical dimensions
 9. Electrical requirements
- D. If the Contractor proposes to use equipment other than that specified or detailed on the drawing, which requires any redesign of the structure, partitions, foundations, piping, wiring, or any other part of the mechanical or electrical, then all such redesign, and all new drawings and detailing required therefore, shall be prepared by the Subcontractor at his own expense and submitted to the Engineer for approval.
- E. If such approved deviation requires quantity and arrangement of ductwork, piping, wiring, conduit, and equipment from that specified or indicated on the drawings, then the Contractor shall furnish and install any such ductwork, piping, structural supports, insulation, controllers, motors, starters, electrical wiring and conduit, and any other additional equipment required by the system, at no additional cost to the Owner.

1.07 COOPERATION WITH OTHER TRADES

- A. Give full cooperation to other trades and furnish in writing to the General Contractor, with copies to the Architect, any information necessary to permit the work of all trades to be installed satisfactorily and with the least possible interference or delay.

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

1.08 PROTECTION

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

1.09 SCAFFOLDING, RIGGING, HOISTING

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

1.10 REMOVAL OF RUBBISH

- A. This Contractor shall at all time keep premises free from accumulations of waste materials or rubbish caused by his employees or work. At completion of work he shall remove all his tools, scaffolding, materials, and rubbish from the building and site. He shall leave the premises and his work in a clean, orderly, and acceptable condition.
- B. All plaster, concrete, cement, etc. shall be removed from all pipe, hangers, and equipment prior to painting and/or concealment.

1.11 SAFETY

- A. This Contractor shall comply with Section 107 of the Contract work hours and safety standards act (40 U.S.C.333), Title 29 - Labor, Chapter XIII, Bureau of Standards, Department of Labor, Part 1518 - Safety and Health Regulations for construction; and that his housekeeping and equipment be maintained in such a manner that they comply with the Florida industrial commission safety code and regulations of the Federal Williams - Steiger Occupational Safety and Health Act

of 1970 (OSHA), wherein it states that the Contractor shall not require any laborer or mechanic employed in the performance of the contract to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his health and safety.

1.12 SUPERVISION

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

1.13 LUBRICATION

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

1.14 VALVE CHARTS, TAGS, AND NAME PLATES

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

1.15 WIRING DIAGRAMS

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

1.16 MATERIAL AND WORKMANSHIP

- A. All materials and apparatus required for the work, except as specifically specified otherwise, shall be new, of first-class quality, and shall be furnished, delivered,

erected, connected and finished in every detail, and shall be so selected and arranged as to fit properly into the building spaces. Where no specific kind or quality of material is given, a first-class standard article as approved by the Engineer shall be furnished. Refer to substitution requirements as outlined in this Section.

- B. Unless otherwise specifically indicated on the plans or specifications, all equipment and materials shall be installed with the approval of the Architect and Engineer in accordance with the recommendations of the Manufacturer. This includes the performance of such tests as the Manufacturer recommends.

1.17 QUIET OPERATION AND VIBRATION

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

1.18 ACCESSIBILITY

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

1.19 FOUNDATIONS, SUPPORTS, PIERS, ATTACHMENTS

- A. This Contractor shall furnish and install all necessary foundations, supports, pads, bases and piers required for all air conditioning equipment, piping, pumps, tanks, compressors, and for all other equipment furnished under this Division, and shall submit drawings to the Architect and Engineer for approval before purchase, fabrication or construction of same.

- B. Provide concrete pads for pumps, compressors, and other rotating machinery, and for all equipment where foundations are indicated. All pads shall be extended six inches (6") beyond machine base in all directions with top edge chamfered. Inset six inches (6") steel dowel rods into floors to anchor pads. Provide 3000 psi concrete. All pads shall have a minimum of 6x6 - W2.9/W2.9 welded wire mesh unless otherwise noted. For chillers provide thickened edge minimum 8" wide into the ground. The thickened edge shall be reinforced with continuous #5 reinforcing bar (Grade 60) top and bottom. The wire mesh should be installed to drop into thickened edge. Shop drawings of all foundations and pads shall be submitted to the Architect and Engineer for approval.
- C. Construction of foundations, supports, pads, bases, and piers where mounted on the floor, shall be the same materials and same quality of finish as the adjacent and surrounding flooring material.
- D. All equipment, unless shown otherwise, shall be securely attached to the building structure in an approved manner. Attachments shall be of a strong and durable nature and any attachments that are, in the opinion of the Architect and the Engineer, not strong enough shall be replaced as directed.

1.20 ACCESS DOORS FOR WALLS AND CEILINGS

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

1.21 VALVE BOXES

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

- B. Valve boxes shall be manufactured of reinforced fiberglass plastic or heavy duty PVC as approved by the Architect/Engineer.

1.22 WELDING

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

- K. Branch connections shall be fabricated by welding. Openings cut into pipe for welded connections shall be accurately made to give carefully matched intersections and welding fittings shall be carefully welded into the pipe system.
- L. Welding ells shall be used at all turns in welded pipelines; no mitred ells will be approved.
- M. Where branch piping is three times smaller than the main, branch connections shall be made up with the appropriate manufactured weld-on fitting. Welded tees shall be used for all other branch connections, unless otherwise approved by the Architect/Engineer for a specific case.
 - 1. Approved Manufacturers
 - a. Allied Piping Products.
 - b. Bonney Forge.
 - c. Branch Connections.
 - d. Branchlets.
 - e. Tube Turn.
 - f. Thread-O-Lets.
- N. Welds in piping shall be annealed after welding to remove the welding strains. The temperature need not exceed that causing a dull red, and shall be uniform around the pipe. Welds made in place shall be annealed, but the pipe shall be free to expand and shall be properly supported so as to avoid stresses. Slow cooling shall always follow annealing.

1.23 REGULATORY REQUIREMENTS

- A. Conform to applicable Codes and Standards as follows:

- (1) STANDARD

- (a) Certain standard materials and installation requirements are described by reference to standard specifications. These standards are as follows:

ADA Americans with Disabilities Accessibility Implementation Act

ASA American Standards Association.

ASTM American Society for Testing Materials.

ASME American Society of Mechanical Engineers Code of Unfired Pressure Vessels.

NEMA National Electrical Manufacturers Association.

UL Underwriters Laboratories.

ANSI American National Standards Institute.

ASHRAE American Society of Heating, Refrigerating and Air Conditioning Engineers.

SMACNA Sheet Metal and Air Conditioning Contractor's National Association.

AMCA Air Moving and Conditioning Association.

ARI Air Conditioning and Refrigeration Institute.

AMA Acoustical Materials Association.

For additional standards and requirements see other sections of the specifications.

Whenever a reference is made to a standard, installation and materials shall comply with the latest published edition at the time project is bid unless otherwise specified herein.

(2) CODES AND RULES

- (a) All material furnished and all work installed shall comply with the following codes as they apply to this project:

National Electric Code.

Regulations of the Florida Industrial Commission Concerning Safety.

Applicable County, State and Local Building Codes.

Local and State Fire Marshal Rules and Regulations and applicable NFPA Standards.

NFPA 10-2007, Standard for Portable Fire
Extinguishers

NFPA 11-2005, Standard for Low Expansion Foam

NFPA 11-2005, Standard for Medium and High Expansion Foam
System

NFPA 12-2008, Standard on Carbon Dioxide Extinguishing System

NFPA 12-A-2009, Standard on Halon
1301
Fire Extinguishing System

NFPA 13-2007, Standard for the Installation of Sprinkler Systems

NFPA 13D-2007, Standard for the Installation of Sprinkler Systems in One and Two- Family Dwellings and Manufactured Homes

NFPA 13R-2007, Standard for the Installation of Sprinkler Systems in Residential Occupancies up to and including Four Stories in Height

NFPA 14-2007, Standard for the Installation of Standpipe and Hose Systems, except 2-7 shall be omitted

NFPA 15-2007, Standard for Water Spray Fixed Systems for Fire Protection

NFPA 16-2007, Standard on Deluge Foam-Water Sprinkler and Foam-Water System

NFPA 17-2009, Standard for Dry Chemical Extinguishing Systems

NFPA 17A-2009, Standard on Wet Chemical Extinguishing Systems

NFPA 20-2007, Standard for the Installation of Stationary Pumps for Fire Protection

NFPA 22-2008, Standard for Water Tanks for Private Fire Protection

NFPA 24-2007, Standards for the Installation of Private Fire Service Mains and Their Appurtenances

NFPA 25-2008, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems, except that quarterly flow tests shall be required for those systems supplied by a municipal water supply.

NFPA 30-2008, Flammable and Combustible Liquids Code

NFPA 30A-2008, Automotive and Marine Service Station Code

NFPA 30B-2007, Code for the Manufacture and Storage of Aerosol Products

NFPA 31-2006, Standard for the Installation of Oil Burning Equipment

NFPA 32-2007, Standards for Drycleaning Plants

NFPA 33-2007, Standard for Spray Application Using Flammable and Combustible Materials

NFPA 34-2007, Standard for Dipping and Coating Processes Using Flammable or Combustible Liquids

NFPA 35-2005, Standard for the Manufacture of Organic Coatings

NFPA 36-2004, Standard for Solvent Extraction Plants

NFPA 37-2006, Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines

NFPA 40-2007, Standard for the Storage and Handling of Cellulose Nitrate Motion Picture Film

NFPA 45-2004, Standard on Fire Protection for Laboratories Using Chemicals

NFPA 50-2001, Standard for Bulk Oxygen Systems at Consumer Sites

NFPA 50B-2003, Standard for Liquid Hydrogen Systems at Consumer Sites

NFPA 51-2007, Standard for the Design and Installation of Oxygen-Fuel Gas Systems for Welding, Cutting and Allied Processes

NFPA 51A-2006, Standard for Acetylene Cylinder Charging Plants

NFPA 51B-2009, Standard for Fire Prevention During Welding, Cutting and Other Hot Work

NFPA 52-2006, Vehicular Fuel Systems Code

NFPA 54-2009, National Fuel Gas Code

NFPA 55-2005, Standard for the Storage, Use, and Handling of Compressed Gases and Cryogenic Fluids in Portable and Containers, Cylinders and Tanks

Stationary

NFPA 57-2002, Liquefied Natural Gas Vehicular Fuel Systems Code

NFPA 58-2008, Liquefied Petroleum Gas Code

NFPA 59-2008, Standard for Storage and Handling of Liquefied Petroleum Gases at Utility Gas Plants

NFPA 59A-2009, Standard for the Production, Storage and Handling of Liquefied Natural Gas

NFPA 61-2008, Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Products Facilities

NFPA 69-2008, Standard on Explosion Prevention Systems

NFPA 70-2008, National Electrical Code

NFPA 72-2007, National Fire Alarm Code

NFPA 75-2009, Standard for the Protection of Electronic Computer/Data Processing Equipment

NFPA 80-2007, Standard for Fire Doors and Fire Windows

NFPA80A-2007, Recommended Practice for Protection of Building from Exterior Fire Exposures

NFPA 82-2004, Standard on Incinerators and Waste and Linen Handling Systems and Equipment

NFPA 85-2007, Boiler and Combustion Systems Hazards Code

NFPA 86-2007, Standard for Ovens and Furnaces

NFPA 88A-2007, Standard for Parking Structures

NFPA 88B-1997, Standard for Repair Garages

NFPA 90A-2009, Standard for the Installation of Air Conditioning and Ventilating Systems

NFPA 90B-2009, Standard for the Installation of Warm Air Heating and Air Conditioning Systems

NFPA 91-2004, Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Noncombustible Particulate Solids

NFPA 92A-2009, Recommended Practice for Smoke-Control Systems

NFPA 92B-2009, Guide for Smoke Management Systems in Malls, Atria, and Large Area

NFPA 96-2008, Standard for Ventilation Control and Fire Prevention of Commercial Cooking Operations. Subdivision 7-2.2 of NFPA 96 applies prospectively only. Existing installations are permitted to remain in place subject to the approval of the authority having jurisdiction.

NFPA 99-2005, Standard for Health Care Facilities

NFPA 101A-2007, Guide, on Alternative Approaches to Life Safety

NFPA 102-2006, Standard for Grandstands, Folding and Telescoping Seating, Tents and Membrane Structures

NFPA 105-2007, Recommended Practice for the Installation of Smoke-Control Door Assemblies

NFPA 110-2005, Standard for Emergency and Standby Power Systems

NFPA 111-2005, Standard on Stored Electrical Energy Emergency and Standby Power Systems

NFPA 120-2004, Standard for Coal Preparation Plants

NFPA 140-2008, Standard for Motion Picture and Television Production Studio Soundstages and Approved Production Facilities

NFPA 150-2007, Standard on Fire safety in Racetrack Stables

NFPA 160-2006, Standard for Flame Effects Before an Audience

NFPA 211-2006, Standard for Chimneys, Fireplaces, Vents and Solid Fuel Burning Appliances

NFPA 214-2011, Standard on Water-Cooling Towers

NFPA 220-1999, Standard on Types of Building Construction

NFPA 221-2009, Standard on Fire Walls and Fire Barrier Walls

NFPA 230-2003, Standard for the Fire Protection of Storage

NFPA 231D-1998, Standard for Storage of Rubber Tires

NFPA 232-2007, Standard for the Protection of Records

NFPA 232-2007, Standard for Fire Protection for Archives and
Record Centers

NFPA 241-2004, Standard for Safeguarding Construction,
Alteration and
Demolition Operations

NFPA 251-2006, Standard Methods of Tests of Fire Endurance of
Building
Construction and Materials

NFPA 252-2008, Standard Methods of Fire Tests of Door
Assemblies

NFPA 253-2006, Standard Method of Test for Critical Flux of Floor
Covering Systems Using a Radiant Heat Energy Source

NFPA 255-2006, Standard Method of Test of Surface Burning
Characteristics of Building Materials

NFPA 256-2003, Standard Methods of Fire Tests of Roof
Coverings

NFPA 257-2007, Standard on Fire Tests for Window and Glass
Block Assemblies

NFPA 259-2008, Standard Test Method for Potential Heat of
Building Materials

NFPA 260-2009, Standard Method of Test and Classification
System for
Cigarette Ignition Resistance of Components of Upholstered
Furniture

NFPA 261-2009, Standard Method of Test for Determining
Resistance of Mock-Up Upholstered Furniture Material
Assemblies to Ignition by Smoldering Cigarettes

NFPA 265-2007, Standard Method of Test for Evaluating Room
Fire Growth Contribution of Textile Wall Coverings

NFPA 266-2001, Standard Method of Test for Characteristics of
Upholstered Furniture Exposed to Flaming Ignition Sources

NFPA 267-1998, Standard Method of Test for Fire Characteristics of
Mattresses and Bedding Assemblies Exposed to Flaming Ignition
Sources

NFPA 286-2006, Standard Method of Fire Test for Evaluating
Contribution of Wall and Ceiling Interior Finish to Room Fire
Growth

NFPA 303-2006, Fire Protection Standards for Marinas and
Boatyards

NFPA 418-2006 edition, Standard for Heliports

NFPA 1561-2008, Standard on Emergency Services Incident
Management System

NFPA 1962-2008, Standard for the Care, Use, and Service
Testing of Fire Hose Including Couplings and Nozzles

NFPA 1963-2003, Standards for Fire Hose Connections

NFPA 2001-2008, Standard on Clean Agent Fire Extinguishing
Systems

NFPA 8501-1997, Standard for Single Burner Operation

NFPA 8502-1999, Standard for the Prevention of Furnace
Explosions/Implosions in Multiple Burner Boilers

NFPA 8503-1997, Standard for Pulverized Fuel Systems

Florida Building Code 2010

Florida Existing Building Code 2010

Florida Building Code Mechanical Code 2010

Florida Building Code Plumbing Code 2010

Florida Building Code Gas Code 2010

Zones, Florida Building Code Test Protocols for High Velocity Hurricane
2010

Florida Fire Prevention Code 2010

Applicable codes shall be those adopted by the authority having
jurisdiction at the time project is bid.

(3) PERMITS, FEES AND INSPECTIONS

- (a) The Contractor shall give all necessary notices, obtain all permits and pay all government fees, sales taxes and other costs, including utility connections or extensions, in connection with this work; file all necessary approvals of all governmental departments having jurisdiction.**
- (b) Obtain all required certificates of inspection for his work and deliver to the Owner/Engineer the same certificates before request for acceptance and final payment for the work.**
- (c) The Contractor shall include in the work, without extra cost to the Owner, any labor, materials, services, apparatus and drawings required to comply with all applicable laws, ordinances, rules and regulations.**
- (d) The Contractor shall inform the Engineer of any work or materials which conflict with any of the applicable codes, standards, laws and regulations before submitting his bid.**

1.24 SCOPE OF WORK

- A. The scope of the work included under this Division of the Specifications shall include complete mechanical Medical Gas, Fire Protection and plumbing systems as shown on the plans and as specified herein. The General Conditions and Special Conditions of these specifications shall form a part and be included under this Section of the Specifications. Provide all supervision, labor, material, equipment, machinery, plant, and any and all other items necessary to complete the mechanical systems. All items of equipment are specified in the singular; however, provide and install the number of items of equipment as indicated on the drawings, and as required for complete systems.**
- B. Systems shall include all appurtenances as required to achieve the operating conditions as shown and specified and shall result in a superior installation.**
- C. Scope of work shall include, but not be limited to, the following:**
 - 1. Demolition**
 - a. Remove air handling units, fan coil units and exhaust fans in the renovated areas and their respective chilled water piping valves, controls, supports, pads, ductwork, etc... Heating hot water pipes, valves, etc... shall be removed and modified to accommodate new equipment ductwork, new chilled water pipes, etc...**
 - b. Remove all existing supply, return and exhaust ductwork within renovated areas. (Refer to drawing for extent of renovated areas.)**

- c. Remove existing control system as directed in renovated areas.
- 2. New Work
 - a. Provide one (1) new 40 ton waste heat recovery (water to water) chiller and one (1) new 175 ton air cooled chiller, complete with starter, disconnect, piping controls, supports, pumps, etc.
 - b. Provide air handling systems and split system DX units, complete with coils, filters, variable volume boxes with heating coils, ductwork, controls, etc.
 - c. Provide a new building management and automatic temperature control system.
 - d. Insulate all new chilled water, heating and domestic hot water piping. Replace all insulation on existing piping system where it has been removed or damaged. Insulate all new and existing equipment with exposed hot and cold surfaces.
 - e. Provide a new primary-secondary pumping system.
 - f. Provide rough balancing of air and water systems.
 - g. Provide sanitary and roof drainage systems as shown on drawings.
 - h. Modify existing gas, domestic hot and cold water system as shown on drawings. Provide new water heaters where indicated on drawings. Provide Fire Protection System and Equipment as indicated on the drawings.
 - i. Provide new plumbing fixtures as indicated on drawings.
 - j. Provide Medical Gas Piping System and Equipment as indicated on the drawings.
 - k. Provide fume hood supply and exhaust air systems complete with ductwork, supply and exhaust fans, controls, etc.
 - l. Final connections of ductwork, piping (domestic, chilled, make-up, and hot) to equipment and plumbing fixtures.
 - m. Complete water chemical treatment systems.
- D. All electrical work required to support mechanical equipment or is otherwise necessary to operate mechanical equipment, shall be the responsibility of the Mechanical Contractor (including, but not limited to) electrical motors for all motor-operated equipment required under this Division, motor controllers, all starters not provided by the electrical Contractor (coordinate with Electrical Contractor), pilot lights and relays, line and low voltage control wiring, raceways,

connections to switches, and other electrical devices furnished with temperature control systems except as otherwise provided for in other Divisions of this Specification.

- E. All starters furnished by the Mechanical Contractor shall meet all requirements specified in Section 16480.
- F. Any equipment submitted for prior approval shall be submitted with the following written information specifically for the submitted project application: Specific model numbers, dimensional data, performance data and other data as requested by the Engineer. General or ambiguous submittals will not be considered for prior approval.

1.25 REMOVALS, RELOCATIONS, RECONNECTIONS, AND RESTORATIONS

- A. Demolition of existing piping, equipment, etc., shall be done as indicated on the Drawings. Existing piping and/or equipment to be removed shall be offered to the Owner. If the Owner wishes to utilize the existing equipment elsewhere, this Contractor shall move the equipment to a site designated by the Owner. All material to be removed shall be discarded by the Contractor and they shall not be used again.
- B. All demolition work shall be completely coordinated with the Owner. Demolition and reconnections requiring shut-down of existing systems shall be scheduled with the Owner/Engineer. If shutdown can only be accommodated on the weekend, or after normal working hours, such work shall be done at no additional cost to the Owner.
- C. Location, capacity, size, etc. of existing equipment, piping, etc., was obtained from field survey and as built drawings. Verify all conditions at site prior to commencing with work. Notify Engineer of any discrepancies prior to starting work or ordering material.
- D. Survey existing facilities and utilities as necessary to determine location of shut-off or disconnect devices, drains, vents, etc. Drain, refill, and purge existing water piping circuits to make new piping connections.
- E. Temporarily store all items to be relocated, if required. Contractor shall be responsible for safe storage of all such items and shall replace any items lost or damaged during storage removal or reinstallation.

1.26 PROJECT/SITE CONDITION

- A. Install Work in locations shown on Drawings, unless prevented by Project conditions.

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

1.27 AS BUILT DRAWINGS

- A. This Contractor shall provide as built drawings (SEPIAS) and AutoCAD files before final payment will be issued.

END OF SECTION

SECTION 15140 - SUPPORTS AND ANCHORS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Pipe, duct, and equipment hangers, supports, and associated anchors.
- B. Equipment bases and supports.
- C. Sleeves and seals.
- D. Flashing and sealing equipment and pipe stacks.

1.02 RELATED WORK

- A. Section 15010 - Basic Mechanical Requirements.
- B. Section 15260 - Piping Insulation.
- C. Section 15510 - Hydronic Piping.
- D. Section 15540 - HVAC Pumps.
- E. Section 15682 - Air Cooled Packaged Water Chiller.

1.03 SPECIAL REQUIREMENTS

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

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. B-Line Systems.
- B. Grinnel.
- C. F and S.

2.02 PIPE HANGERS AND SUPPORTS

- A. Hangers for Pipe Sizes 1/2 to 2 Inch: Carbon steel, adjustable swivel, split ring (copper plated for copper pipe, dura green epoxy coating on non-copper pipe).

- B. Hangers for Pipe Sizes 2 to 4 Inches and Cold Pipe Sizes 6 Inches and Over: Carbon steel, adjustable, clevis (copper plated for copper pipe, dura green epoxy coating on non-copper pipe).
- C. Hangers for Hot Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron roll, double hanger (dura green epoxy coating).
- D. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods; cast iron roll and stand for hot pipe sizes 6 inches and over.
- E. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
- F. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp; adjustable steel yoke and cast iron roll for hot pipe sizes 6 inches and over. Refer to drawings for special support details.
- G. Vertical Support: Steel riser clamp (at each floor or 12'-0").
- H. Floor Support for Pipe Sizes to 4 Inches and All Cold Pipe Sizes: Cast iron adjustable pipe saddle, locknut nipple, floor flange, and concrete pier or steel support.
- I. Floor Support for Hot Pipe Sizes 6 Inches and Over: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.
- J. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- K. Shield for Insulated Piping 2 Inches and Smaller: 18 gage galvanized steel shield over insulation in 180 degree segments, minimum 12 inches long at pipe support.
- L. Shield for Insulated Piping 2-1/2 Inches and Larger (Except Cold Water Piping): Pipe covering protective saddles.
- M. Shields for Insulated Cold Water Piping 2-1/2 Inches and Larger: Hard block non-conducting saddles in 90 degree segments, 12 inch minimum length, block thickness same as insulation thickness.
- N. Shields for Vertical Copper Pipe Risers: Sheet lead.
- O. Refer to drawings for additional supports.

2.03 HANGER RODS

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

2.04 INSERTS

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

2.05 FLASHING

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

2.06 SLEEVES

- A. Sleeves for Pipes Through Non-fire Rated Floors: Form with 18 gage galvanized steel.
- B. Sleeves for Pipes through Non-fire Walls or Footings: Form with steel pipe or 18 gage galvanized steel.
- C. Sleeves through outside walls: Refer to drawings.
- D. Sleeves for pipes through Fire Rated and Fire Resistive Floors and Walls, and Fireproofing: Prefabricated Fire Rated Sleeves including Seals, UL Listed.
- E. Sleeves for Round Ductwork: Form with galvanized steel.
- F. Sleeves for Rectangular Ductwork: Form with galvanized steel.
- G. Caulk: Silicone sealant of top quality.

2.07 FABRICATION

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

2.08 FINISH

- A. Steel pipe hangers, steel supports, miscellaneous steel supports, bolts, screws, etc., not specified to be plated or coated shall be hot dipped galvanized with a minimum of 1.50 oz/ft² on all sides and all field cuts shall be zinc coated.

PART 3 EXECUTION

3.01 INSERTS

- A. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
- B. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
- C. Where concrete slabs form finished ceiling, provide inserts to be flush with slab surface.

3.02 PIPE HANGERS AND SUPPORTS

- A. Support horizontal piping as follows:

	MAX. HANGER SPACING	HANGER ROD DIAMETER
1/2 to 1-1/4 inch	6'-6"	3/8"
1-1/2 to 2 inch	10'-0"	3/8"
2-1/2 to 3 inch	10'-0"	1/2"
4 to 6 inch	10'-0"	5/8"
8 to 12 inch	14'-0"	7/8"
14 inch and Over	20'-0"	1"
PVC (All Sizes)	4'-0"	3/8"

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

3.03 EQUIPMENT BASES AND SUPPORTS

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

3.04 FLASHING

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

3.05 SLEEVES

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

END OF SECTION 15140

SECTION 15170 - MOTORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Single phase electric motors.
- B. Three phase electric motors.

1.02 RELATED WORK

- A. Section 15010 - Basic Mechanical Requirements.
- B. Section 15540 - HVAC Pumps.
- C. Section 15682 - Air Cooled Packaged Water Chiller
- D. Section 16480 - Motor Control.

1.03 REFERENCES

- A. AFBMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
- B. AFBMA 11 - Load Ratings and Fatigue Life for Roller Bearings.
- C. **ANSI/IEEE 112 - Test Procedure for Polyphase Induction Motors and Generators.**
- D. ANSI/NEMA MG 1 - Motors and Generators.
- E. ANSI/NFPA 70 - National Electrical Code.

1.04 OPERATION AND MAINTENANCE DATA

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

PART 2 PRODUCTS

2.01 MANUFACTURERS

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

2.02 GENERAL CONSTRUCTION AND REQUIREMENTS

- A. Electrical Service: Refer to Section 16480 for required electrical characteristics.

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

2.03 SINGLE PHASE POWER - SPLIT PHASE MOTORS

- A. **Starting Torque:** Less than 150 percent of full load torque.
- B. **Starting Current:** Up to seven times full load current.
- C. **Breakdown Torque:** Approximately 200 percent of full load torque
- D. **Drip-proof Enclosure:** Class A (50 degrees C temperature rise) insulation, NEMA Service Factor, prelubricated sleeve or ball bearings.
- E. **Enclosed Motors:** Class A (50 degrees C temperature rise) insulation, 1.0 Service Factor, prelubricated ball bearings.

2.04 SINGLE PHASE POWER - PERMANENT-SPLIT CAPACITOR MOTORS

- A. **Starting Torque:** Exceeding one fourth of full load torque.
- B. **Starting Current:** Up to six times full load current.
- C. **Multiple Speed:** Through tapped windings.
- D. **Open Drip-proof or Enclosed Air Over Enclosure:** Class A 50 degrees C temperature rise) insulation, minimum 1.0 Service Factor, prelubricated sleeve or ball bearings, automatic reset overload protector.

2.05 SINGLE PHASE POWER - CAPACITOR START MOTORS

- A. **Starting Torque:** Three times full load torque.
- B. **Starting Current:** Less than five times full load current.
- C. **Pull-up Torque:** Up to 350 percent of full load torque.
- D. **Breakdown Torque:** Approximately 250 percent of full load torque.

- E. Motors: Capacitor in series with starting winding; capacitor-start/capacitor-run motors shall have two capacitors in parallel with run capacitor remaining in circuit at operating speeds.
- F. Drip-proof Enclosure: Class A (50 degrees C temperature rise) insulation, NEMA Service Factor, prelubricated sleeve ball bearings.
- G. Enclosed Motors: Class A (50 degrees C temperature rise) insulation, 1.0 Service Factor, prelubricated ball bearings.

2.06 THREE PHASE POWER - SQUIRREL CAGE MOTORS

- A. Starting Torque: Between one and one and one-half times full load torque
- B. Starting Current: Six times full load current.
- C. Power Output, Locked Rotor Torque, Breakdown or Pullout Torque: NEMA Design B characteristics
- D. Design, Construction, Testing, and Performance: Conform to ANSI/NEMA MG 1 for Design B motors.
- E. Insulation System: NEMA Class B or better.
- F. Testing Procedure: In accordance with ANSI/IEEE 112, Test Method B. Load test motors to determine freedom from electrical or mechanical defects and compliance with performance data.
- G. Motor Frames: NEMA standard T-frames of steel, aluminum, or cast iron with end brackets of cast iron or aluminum with steel inserts.
- H. Bearings: Grease lubricated anti-friction ball bearings with housings equipped with plugged provision for relubrication, rated for minimum AFBMA 9, L-10 life of 20,000 hours. Calculate bearing load with NEMA minimum V-belt pulley with belt centerline at end of NEMA standard shaft extension. Stamp bearing sizes on nameplate.
- I. Sound Power Levels: To ANSI/NEMA MG 1.
- J. Nominal Efficiency: Meet or exceed values in Schedules at full load and rated voltage when tested in accordance with ANSI/IEEE 112.
- K. Nominal Power Factor: Meet or exceed values in Schedules at full load and rated voltage when tested in accordance with ANSI/IEEE 112.
- L. Motors with frame sizes 184T (5HP) and larger shall be energy efficient type.
- M. All motors shall be energy efficient type according to the following schedule:

Minimum Motor HP Efficiency

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1-2	84.0
3-5	86.5
7.5	89.5
10	90.2
15	91.0
20-25	92.0
30	92.4
40-50	93.0
60	93.6
75-100	94.1
125-150	94.5
200	95.0

PART 3 EXECUTION

3.01 APPLICATION

- A. Motors drawing less than 250 Watts and intended for intermittent service need not conform to these specifications.
- B. Motors shall be open drip-proof type, except where specifically noted otherwise
- C. Single phase motors for shaft-mounted fans shall be split phase type.

END OF SECTION 15170

SECTION 15190 - MECHANICAL IDENTIFICATION

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Identification of mechanical products installed under Division 15.

1.02 RELATED WORK

- A. Section 15010 - Basic Mechanical Requirements.
- B. Section 15260 - Piping Insulation.
- C. Section 15280 – Equipment Insulation.
- D. Section 15510 - Hydronic Piping.
- E. Section 15515 - Hydronic Specialties.
- F. Section 15540 – HVAC Pumps.
- G. Section 15682 – Air Cooled Packaged Water Chiller.

1.03 REFERENCES

- A. ANSI/ASME A13.1 - Scheme for the Identification of Piping Systems.

1.04 SUBMITTALS

- A. Submit product data under provisions of Section 15010.
- B. Submit list of wording, symbols, letter size, and color-coding for mechanical identification.
- C. Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number. Refer to Section 15010, Paragraph 1.14.
- D. Submit manufacturer's installation instructions under provisions of Section 15010 and Division 1.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Brady, Seton or approved equal.

2.02 MATERIALS

- A. Color: Unless specified otherwise, conform to ANSI/ASME A13.1
- B. Metal Tags: 18-gauge brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.
- C. Stencils: With clean-cut symbols and letters of following size:

OUTSIDE DIAMETER OF INSULATION OR PIPE LETTERS	LENGTH OF COLOR FIELD	SIZE OF
3/4" - 1-1/4"	8"	1/2"
1-1/2" - 2"	8"	3/4"
2-1/2" - 6"	12"	1-1/4"
8" - 10"	24"	2-1/2"
Over 10"	32"	3-1/2"

- D. Stencil Paint: In accordance with Section 09900, semi-gloss enamel.
- E. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and fluid being conveyed.
- F. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.
- B. Prepare surfaces in accordance with Section 09900 for stencil painting.

3.02 INSTALLATION

- A. Metal Tags: Install with heavy brass hook or chain.
- B. Stencil Painting: Apply in accordance with Section 09900.
- C. Plastic Pipe Markers: Install in accordance with manufacturer's instructions.
- D. Plastic Tape Pipe Markers: Install complete around pipe in accordance with manufacturer's instructions.
- E. Equipment: Identify air handling units, pumps, heat transfer equipment, tanks, and water treatment devices with stencil painting. Small devices, such as in-line pumps, may be identified with metal tags

- F. Controls: Identify control panels and major control components outside panels with plastic nameplates.
- G. Valves: Identify valves in main and branch piping with tags.
- H. Piping: Identify piping, concealed or exposed, with plastic pipe markers or stenciled painting. Tags may be used on small diameter piping. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and "T", at each side of penetration of structure or enclosure, and at each obstruction.
- I. Ductwork: Identify ductwork with stenciled painting. Identify as to air handling unit number. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.
- J. Provide signage for gas vent where located on drawings to indicate the following: "Warning: Flammable Gas Vent".
- K. Identify locations of equipment above ceiling such as valves, VAV boxes, fans, filter etc... Provide a color coded label with the equipment tag number at the ceiling.

3.03 VALVE CHART AND SCHEDULE

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

END OF SECTION 15190

SECTION 15242 - VIBRATION ISOLATION

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Vibration isolation

1.02 RELATED WORK

- A. Section 15010 - Basic Mechanical Requirements.
- C. Section 15510 - Hydronic Piping.
- D. Section 15540 - HVAC Pumps.
- E. Section 15682 - Air Cooled Packaged Water Chiller.

1.03 REFERENCES

- A. ASHRAE - Guide to Average Noise Criteria Curves.

1.04 QUALITY ASSURANCE

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

1.05 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 15010, General Conditions, and Supplementary General Conditions.
- B. Indicate vibration isolator locations, with static and dynamic load on each, on shop drawings and described on product data.
- C. Submit manufacturer's installation instructions under provisions of Section 15010, General Conditions, and Supplementary General Conditions.

1.06 CERTIFICATES

- A. Submit manufacturer's certificate under provisions of General Conditions, and Supplementary General Conditions that isolators are properly installed and properly adjusted to meet or exceed specified requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

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

2.02 VIBRATION ISOLATORS

- A. Amber Booth: Model numbers listed are included for identification. Refer to Paragraph 2.01 for additional Manufacturers.
- B. Type BSR - A combination spring and rubber hanger consisting of a rectangular steel box, coil spring, spring retainers, and elastomeric mounting designed for approximately 1/2" deflection.
- C. Type 3000- A fabric-reinforced rubber hose connector having integral flanges with galvanized steel back-up rings. Stainless steel braided wire restraints shall be built into the connector to limit elongation to 2% at full rated pressure. The connectors shall have minimum lengths as follows: 1-1/2" & 2" Dia. - 12"; 2-1/2" to 5" Dia. - 18"; 6" Dia. - 24"; 8" to 10" Dia. - 30"; 12" Dia. - 36".
- D. Type SP-NRE - A pad-type mounting consisting of two layers of 3/8" thick ribbed or waffled Neoprene pads bonded to a 16 gage galvanized steel separator plate. Pads shall be sized for approximately 20 to 40 psi load and a deflection of 0.12" to 0.16".

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install vibration isolators and flexible connectors for the following motor driven equipment.
 - 1. Pumps - Type 3000 - Flexible Connector (mount on supply and return piping).
 - 2. Chillers and Condensing Units - Type SP-NRE.
 - 3. Split System Air Handling Unit and Power Ventilators - Type BSR.
- B. Set steel bases for one-inch clearance between housekeeping pad and base. Adjust equipment level.
- C. Provide spring isolators on piping connected to isolated equipment as follows: Up to 4 inch diameter, first three points of support; 5 to 8 inch diameter, first four points of support; 10 inch diameter and over, first six points of support. Static deflection of first point shall be twice deflection of isolated equipment.

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END OF SECTION 15242

SECTION 15260- PIPING INSULATION

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Piping insulation.
- B. Jackets and accessories.

1.02 RELATED WORK

- A. Section 15010 - Basic Mechanical Requirements.
- B. Section 15140 - Supports and Anchors.
- C. Section 15190 – Mechanical Identification.
- D. Section 15400 – Testing of Piping System.
- E. Section 15510 - Hydronic Piping.
- F. Section 15515 - Hydronic Specialties.
- G. Section 15540 - HVAC Pumps.

1.03 REFERENCES

- A. ASTM C552-79 - Cellular Glass Block and Pipe Thermal Insulation.
- B. ANSI/ASTM C195 - Mineral Fiber Thermal Insulation Cement.
- C. ANSI/ASTM C547 - Mineral Fiber Preformed Pipe Insulation.
- D. ASTM B209 - Aluminum and Aluminum-alloy Sheet and Plate.
- E. ASTM C449 - Mineral Fiber Hydraulic-setting Thermal Insulating and Finishing Cement.
- F. ASTM E84, NFPA 255 and UL 723 - Surface Burning Characteristics of Building Materials.

1.04 QUALITY ASSURANCE

- A. Applicator: Company specializing in piping insulation application with three (3) years minimum experience.
- B. Materials: Flame spread/smoke developed rating of 25/50 in accordance with ASTM E84, UL 723, and NFPA 255 x (2000).

1.05 SUBMITTALS

- A. Submit product data under provisions of Section 15010, General Conditions, and Supplementary General Conditions.
- B. Include product description, list of materials and thickness for each service, and locations.
- C. Submit manufacturer's installation instructions.

PART 2 PRODUCTS

2.01 INSULATION

- A. Type A:
 - 1. Impermeable, noncombustible, closed cellular glass insulation, conforming to ASTM C 552-79, "Specification for Cellular Glass Block and Pipe Thermal Insulation."
 - 2. Conductivity (k) equals approximately 0.29 (BTU-IN/HR, SF, degrees F) at 75 degrees F.
 - 3. Joint sealants and coatings shall be as approved by the insulation manufacturer for the intended application and service temperature range.
 - 4. Jacketing shall be approximately 125 mils thick, consisting of a bituminous resin reinforced with a woven, glass fabric, an integral aluminum foil layer, and a protective plastic film coating.
 - 5. Approved Manufacturers and trade names:
 - a. Pittsburgh Corning Corp. - "Foam glass Super K" with Pittseal, Pittcote, and Pittwrap.
 - b. Approved Equal.
- B. Type B:
 - 1. Closed cell, flexible foamed plastic conforming to ASTM C177 or ASTM C518, "Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form."
 - 2. Conductivity (k) equals approximately 0.27 (BTU-IN/HR, SF, Degree F) at 75 degrees F.
 - 3. Approved Manufacturers and trade names:
 - a. Armstrong - " AP Armaflex".

- b. B.F. Goodrich - "Flexible Insulation Tubing and Sheeting".
 - c. Manville Corp. - "Aero tube".
 - d. Rubetex Corp. "Rubetex"
- C. Type C:
 - 1. Glass fiber, rigid molded sectional pipe covering conforming to ASTM C547, Class II, and Mineral Fiber Preformed Pipe Insulation.
 - 2. Conductivity (k) equals approximately 0.23 (BTU-IN/HR, SF, Degree F) at 75 degrees F.
 - 3. Approved Manufacturers and trade names:
 - a. Manville Corp. - "Micro-Lok 650-AP-T".
 - b. Owens-Corning Fiberglass Corp. - "One Piece 25 ASJ/SSL-II".
 - c. Knauf Fiberglass Knauf Piep Insulation, 850F".
 - d. Certain-Teed - "500 Degree Snap-On".

2.02 JACKET

- A. Interior Applications:
 - 1. Vapor Barrier (ASJ) Jackets: Kraft reinforced foil vapor barrier with double self-sealing adhesive joints.
- B. Exterior Applications: (Exterior and other exposed areas such as equipment/mechanical rooms)
 - 1. Aluminum Jackets: ASTM B209; 0.016 inch thick, smooth finish with factory applied integral moisture barrier.

2.03 ACCESSORIES

- A. Insulation Bands: 3/4 inch wide; 0.020 thick aluminum.
- B. Metal Jacket Bands: 3/8 inch wide; 0.020-inch thick aluminum.
- C. Insulation Bonding Adhesive (to metal)
 - 1. Benjamin Foster 85-15
 - 2. Chicago Mastic 17-460
 - 3. Insul-Coustic IC 201

- D. Insulating and Finishing Cement
 - 1. Armco Corp .
 - 2. Rockwool Corp.
 - 3. Manville Corp.
- E. Vapor Barrier Lap Adhesive
 - 1. Benjamin Foster 82-07
 - 2. Chicago Mastic 17-465
 - 3. Insul-Coustic IC 501
- F. Vapor Seal Mastic
 - 1. Benjamin Foster 30-35
 - 2. Chicago Mastic 17-475
 - 3. Insul-Coustic IC 501
- G. Lagging Adhesive
 - 1. Benjamin Foster 30-36
 - 2. Chicago Mastic 16-400
 - 3. Insul-Coustic IC 102
- H. Glass Cloth Jacket
 - 1. Benjamin Foster
 - 2. Chicago Mastic
 - 3. Insul-Coustic
- I. PVC Fittings Covers
 - 1. Certain-Teed - "Snap Form"
 - 2. Manville Corp. - "Zeston"
 - 3. Approved Equal

PART 3 EXECUTION

3.01 PREPARATION

- A. Install materials after piping has been tested, cleaned, and approved, as required by Section 15400.
- B. All surfaces to be insulated shall be dry and free of loose scale, rust, dirt, oil or water.

3.02 APPLICATION

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

3.03 INSTALLATION

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

3.04 TYPE A INSULATION INSTALLATION

- A. Interior
 - 1. Butter joints of Foamglass insulation with Pittseal 444 or Childers CP-76. Apply insulation to pipe and fittings with all joints tightly fitted. Secure with stainless steel wire so that each length of insulation shall be secured with two wires. Insulation shall be applied with all joints fitted to eliminate voids. Voids shall be eliminated by refitting or replacing insulation. Do not fill voids with joint sealer.
 - 2. Finish with metalized polyester/scrim/bleached white Kraft or approved foil/scrim/bleached white Kraft, all service jacket (ASJ). Finish elbows and fittings with Pittcote 404 or Childers CP-30 Low Odor reinforced with white open weave membrane with maximum mesh opening of 10 x 10 per inch
- B. Exterior and Mechanical Equipment/Storage Rooms
 - 1. Apply insulation as noted above and apply vapor barrier with Pittcote 404 or Childers CP-30 Low Odor reinforced with white open weave membrane with maximum mesh opening of 10 x 10 per inch. Then apply a second coat of Pittcote 404 or Childers CP-30 Low Odor and finish with .016 inch thick

aluminum jacket. Elbows and tees shall be finished with preformed 0.024 inch thick aluminum fitting covers.

3.05 TYPE B INSULATION INSTALLATION

A. Interior

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

B. Exterior and Mechanical Equipment/Storage Rooms

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

3.06 TYPE C INSULATION INSTALLATION

A. Interior

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

B. Exterior and Mechanical Equipment/Storage Rooms

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

3.07 HANGERS

- A. Continue insulation through pipe hangers. Provide either rigid insulation inserts or sheet metal inserts at all outside pipe hangers. Provide rigid insulation inserts for piping operating below 60 degrees F and sheet metal inserts for piping above 60 degrees F.
- B. Rigid insulation or wood inserts between the pipe and pipe hanger shall be of a thickness equal to the adjoining insulation and shall be provided with vapor

barrier where required. Insulation insert shall not be less than the following lengths:

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

- C. Inserts for cold piping shall have a vapor barrier facing of the same material as the adjacent pipe insulation. Seal inserts into insulation with vapor seal mastic.
- D. Where insulation is a load bearing material of sufficient strength to support the weight of the piping, pipe shields one-third the circumference of the insulation and of a length not less than three times the diameter of the insulation (maximum length 24") shall be provided. An all service jacket shall be applied between shields and insulation. Follow insulation manufacturer's recommendations for use of pipe insulation in conjunction with outside installed hangers.
- E. Where insulation is not of sufficient strength to support the weight of the piping, a saddle, or section of calcium silicate insulation such as "Kaylo" shall be provided. Vapor barrier and finish shall be applied as required to match adjoining insulation. In addition, shields shall be furnished as specified above.

3.08 PIPE SLEEVES

- A. Pipe insulation and vapor barrier shall be continuous through sleeves in walls and floors.
- B. Type B insulation shall not be used in sleeves through firewalls or fire rated (2 hour) floor systems. Use Type A or Type C through the sleeve instead and vapor seal the joint between the two (2) insulations.
- C. Provide 26 gauge galvanized steel or 0.020 inch aluminum jacket over insulation on pipe passing through sleeves where sealant is required.
- D. Where penetrating interior walls, extend the metal jacket 2 inches out either side of the wall and secure each end with a metal band compressing the insulation slightly.
- E. Where penetrating floors, extend the metal jacket 2 inches below the floor and 5 inches above the floor. Secure with metal bands.

3.09 INSULATION SCHEDULE (ABOVE GRADE PIPING)

A.	SERVICE PIPE SIZE	INSULATION TYPE AND THICKNESS
	Exterior (including unconditioned spaces) Chilled Water,	All 2-1/2" Type A

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CHILLER AND FAN REPLACEMENT

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Interior Chilled Water (Including Domestic)	2" or Less	1-1/2" Type A
Interior Chilled Water	2-1/2" or More	2" Type A
Refrigerant Suction Pipes Coil Condensate Lines (except in plenums or fire wall penetrations)	All	3/4" Type B
Refrigerant Suction Pipe Coil Condensate Lines (in plenums or firewall or floor penetrations)	All	1" Type A
Heating Hot Water	All	2" Type A
Domestic Hot Water, Tempered Water, Recirculated Hot Water, and Service Hot Water	2" or Less	1-1/2" Type C
Domestic Hot Water, Tempered Water, Recirculated Hot Water, and Service Hot Water	2-1/2" or More	1-1/2" Type C
Roof Drain Bodies	All	1-1/2" Type C
Horizontal Rain Water Conductors	All	1-1/2" Type C

B. Refer to Section 15510, Hydronic Piping, for description of underground piping system.

END OF SECTION 15260

SECTION 15280 - EQUIPMENT INSULATION

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Equipment insulation.
- B. Covering.

1.02 RELATED WORK

- A. Section 15010 - Basic Mechanical Requirements.
- B. Section 15190 - Mechanical Identification.
- C. Section 15260 - Piping Insulation.
- D. Section 15400 - Testing of Piping Systems.
- E. Section 15515 - Hydronic Specialties.
- F. Section 15540 - HVAC Pumps.
- G. Section 15682 - Air Cooled Packaged Water Chiller.

1.03 REFERENCES

- A. ANSI/ASTM C552 - Cellular Glass Block and Pipe Thermal Insulation.
- B. Elastomeric Foam Insulation.
- C. ASTM E84 - Surface Burning Characteristics of Building Materials.
- D. NFPA 255 - Surface Burning Characteristics of Building Materials.
- E. UL 723 - Surface Burning Characteristics of Building Materials.

1.04 QUALITY ASSURANCE

- A. Applicator: Company specializing in insulation application with three years minimum experience.
- B. Insulation and Covering: Flame spread/smoke developed rating of 25/50 in accordance with ASTM E84. UL 723.

1.05 SUBMITTALS

- A. Submit product data under provisions of Section 15010, General Conditions, and Supplementary General Conditions.
- B. Include product description, list of materials and thickness for equipment scheduled.
- C. Submit manufacturer's installation instructions under provisions of these specifications.

1.06 ENVIRONMENTAL REQUIREMENTS

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

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

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

2.02 INSULATION

- A. Type A: Cellular glass; ANSI/ASTM C552; 'k' value of .35 at 75 degrees F; 8.5lb/cu ft density. ASTM 84 flame spread.
- B. Type B: Elastomeric foam insulation; 'k' value of .27 at 75 degrees F lb/cu ft density. ASTM 84 flame spread: less than 25; smoke developed: less than 50.

2.03 ACCESSORIES

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

PART 3 EXECUTION

3.01 INSTALLATION

- A. Refer to Section 15260, Paragraph 3.04 for additional instructions.
- B. Install materials in accordance with manufacturer's instructions.
- C. Do not insulate factory-insulated equipment.
- D. Apply insulation as close as possible to equipment by grooving, scoring, and beveling insulation, if necessary. Secure insulation to equipment with stainless steel wires or bands.
- E. Fill joints, cracks, seams, and depressions with bedding compound to form smooth surface. On cold equipment, use vapor barrier cement.
- F. Cover insulation with metal mesh and finish with heavy coat of insulating cement.
- G. Do not insulate over nameplate or ASME stamps. Bevel and seal insulation around such.
- H. When equipment with insulation requires periodical opening for maintenance, repair, or cleaning, install insulation in such a manner that it can be easily removed and replaced without damage.
- I. Flat or irregular equipment insulation shall be cut to fit the shape and contour of the equipment. All voids between equipment surface and insulation shall be packed with light density fiberglass.

3.02 SCHEDULE

- A. Chiller Cold Surfaces - Type 'B' - 3/4" thick (not factory insulated).
- B. Chilled Water Pump Surfaces - Type 'A' - 2" thick.
- C. Air Separators, Strainers, Valve Bodies etc. - Type 'A' - 2" thick.
- D. All Equipment Operating Below Ambient Dew Point - Type 'A' - 2" thick.
- E. Body of Roof Drains - Type 'A' - 1" thick.
- F. Duct Mounted Coils - Refer to Section 15290.
- G. Air Terminal Units (VAV) - Refer to Section 15290.
- H. Air Inlets and Outlets - Refer to Section 15290.

END OF SECTION 15280

SECTION 15400 - TESTING OF PIPING SYSTEMS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Domestic Water Piping.

1.02 RELATED WORK

- A. Section 15010 - Basic Mechanical Requirements.
- B. Section 15260 - Piping Insulation.

PART 2 EXECUTION

2.01 INSTALLATION

- A. Furnish all labor, materials, and equipment required for testing procedures.
- B. Insulation shall not be applied until pressure testing has been completed. Joints of any type shall not be painted or varnished prior to testing.
- C. Lines containing check valves shall have the test pressure source located upstream of the valves, or the valve discs shall be removed until after the testing. Control valves shall be set in the open position, unless directed otherwise.
- D. Pipe testing shall be performed after flushing, except for buried lines.
- E. Any equipment that has a pressure rating not as high as the testing pressure shall be valved off during the test.
- F. The tabulated results of all tests shall be submitted to the A/E.
- G. Piping Systems: Test all pipe lines installed with a water pressure test of 1-1/2 times it's operating pressure, but not less than 100 psi for a period of 4 hours, during which time the pressure shall remain constant without pumping. If leaks or defects develop, new tests shall be made and repeated until all defects are remedied. Pipes or joints, which leak, shall be taken apart and remade. Caulking will not be permitted. Pipes which will be concealed may be tested separately before the distribution system is installed in order that these lines may be covered and furred in and thus, not delay the work of other trades.

END OF SECTION 15400

SECTION 15510 - HYDRONIC PIPING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Pipe and pipefittings.
- B. Valves.
- C. Chilled water piping system
- D. Underground piping system
- E. Vents and drains.

1.02 RELATED WORK

- A. Section 15010 - Basic Mechanical Requirements.
- B. Section 15140 - Supports and Anchors.
- C. Section 15260 - Piping Insulation.

1.03 REFERENCES

- A. ANSI/ASME - Boiler and Pressure Vessel Code.
- B. ANSI/ASME Sec 9 - Welding and Brazing Qualifications.
- C. ANSI/ASME B16.3 - Malleable Iron Threaded Fittings Class 150 and 300.
- D. ANSI/ASME B31.9 - Building Services Piping.
- E. ANSI/AWS A5.8 - Brazing Filler Metal.
- F. ANSI/AWS D1.1 - Structural Welding Code.
- G. ASTM A53 - Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless.
- H. ASTM A120 - Pipe, Steel, Black and Hot-Dipped Zinc Coated (Galvanized), Welded and Seamless, for Ordinary Uses.
- I. ASTM A234 - Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.
- J. ASTM B32 - Solder Metal.
- K. ASTM B88 - Seamless Copper Water Tube.

1.04 REGULATORY REQUIREMENTS

- A. Conform to ANSI/ASME B31.9.

1.05 QUALITY ASSURANCE

- A. Valves: Manufacturer's name and pressure rating marked on valve body.

1.06 SUBMITTALS

- A. Submit product data under provisions of Section 15010 and Supplementary General Conditions.
- B. Include data on pipe materials, pipefittings, valves, and accessories.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 15010, General Conditions, and Supplementary General Conditions.
- B. Store and protect products under provisions of Section 15010, General Conditions, and Supplementary General Conditions.
- C. Deliver and store valves in shipping containers with labeling in place.

PART 2 PRODUCTS

2.01 MATERIALS - PIPE ABOVE GRADE

- A. Chilled water, condenser water, heating hot water, make-up water, drains, and vents:

Sizes (Inches)	Materials
Pipe: 2-1/2" and Larger : 2" and Smaller	Carbon steel, butt-weld, Schedule 40 pipes Type L, Hard Temper Copper Tubing
Fittings: Lines 2-1/2" Schedule 40	Carbon steel, butt-weld, and Larger
Fittings: 2" and Smaller	Wrought copper sweat
Unions: 2" and Smaller	Brass
Flanges: 2-1/2" and Larger and	Carbon steel, slip on, raised face, 150 lbs. 250 lbs.
Gaskets: or	"Graphoil", full face, 1/16", Union Carbide, approved equal

Air Conditioning Condensate Drain

Type L, Hard Temper Copper Tubing

2.02 CHILLED WATER AND HEATING WATER BELOW GRADE

A. General

1. Underground chilled water supply and return shall be a system composed of integral sealed units of PVC plastic outer jacket, PVC plastic carrier pipe and insulated with polyurethane foam, completely filling the annular space between the pipe and jacket.

B. Carrier Pipe

1. Carrier pipe shall be carbon steel, butt weld, standard weight.
2. All pipe cut to length in the field and fittings shall be protected from water and dirt damage by installing rubber end seals or factory fabricated PVC caps over the casing and carrier pipe sealing the ends completely from exposure. In no case shall open ends of fittings or pipes be left exposed to the environment either in the field or en route.

C. PVC Casing Pipe

1. High impact, seamless Poly Vinyl Chloride (PVC), Class 12454-B compound casing pipe shall be of virgin PVC resin meeting the minimum classification requirements of ASTM D1784, Type 1, and Grade 1.
2. Minimum jacket thickness shall be in accordance with insulation thickness table.
3. All pipe cut to length in the field and fittings shall be protected from water and dirt damage by installing rubber end seals or factory fabricated PVC caps over the casing and carrier pipe sealing the ends completely from exposure. In no case shall open ends of fittings or pipes be left exposed to the environment either in the field or en route.

D. Insulation

1. Insulation shall be Polyurethane foam and shall meet the following specifications:
 - a. Type: Two-component urethane
 - b. Compressive Strength: 25-psi parallel min. at 5% comp.
 - c. Shrinkage: None at 70 F.

- d. Free Rise Density: 2-lbs/cubic foot.
- e. Aged "K" (70 F - 72 hrs): 0.13 BTU per inch per hour, per degree Fahrenheit, per square foot.
- f. Closed Cell Content: 90-95% in conformance with ASTM 1784 completely filling the annular space between carrier pipe and jacketing.
- g. Minimum thickness shall be per insulation thickness table.

E. Casing Coupling

- 1. The casing coupling shall be of virgin PVC Resin meeting classification requirements of ASTM D1784. The coupling shall be SDR 51 or heavier in accordance with ASTM D2241. Insulate at each coupling with polyurethane foam to fill annular space between carrier pipe and casing.
- 2. Method of sealing the couplings shall be as follows:
 - a. Slip the casing coupling over the joined pipe sections. The casing coupling shall then be wrapped with heat shrink material in the field to provide a watertight seal (minimum thickness of exterior wrap shall be 60 mils).

F. Fittings

- 1. Fittings shall be pre-insulated by the piping system manufacturer using the same insulation thickness and casing as the pipe.
- 2. All fittings and expansion fittings shall be fabricated as detailed on drawings.

G. Penetration Sleeves

- 1. Provide where piping passes through masonry or concrete walls, floors, and roofs.
- 2. Sleeves in outside walls below and above grade, in floor, or in roof slabs, shall be schedule 40 or standard weight coated black steel pipe.
- 3. Space between piping or insulation casing, and the sleeve shall be sufficient to allow proper water tight sealing, but never less than 1/2".
- 4. Sleeves shall be held securely in proper position and location during construction.

5. Sleeves shall be of sufficient length to pass through entire thickness of walls or slabs. Sleeves in floor slabs shall extend 1 inch above the finished floor.

6. Refer to drawings for details.

H. Penetration Seals

1. All penetrations shall be sealed to prevent water from entering the building. (Refer to Section 15140 and details on drawings.)

I. Insulation Thickness Table

1. Minimum thickness of insulation for pre-fabricated insulated pipe and fittings shall be as follows:

Nominal Pipe Size (Inches)	Insulation Thickness (Inches)	Jacket Size (Inches)	Jacket Thickness (Mils)
3/4	1.16	3-1/2	60
1	1.03	3-1/2	60
1-1/4	1.17	4	60
1-1/2	1.05	4	60
2	1.81	6	70
2-1/2	1.56	6	70
3	1.25	6	70
4	1.75	8	80
5	1.21	8	80
6	1.68	10	100
8	1.68	12	120
10	1.64	14	140
12	1.46	16	160

J. Dimensions

1. The pre-fabricated insulated piping shall be furnished in 20' random lengths.

K. The pre-fabricated insulated piping system shall be as manufactured by Rovanco Corp., Thermal Pipe Systems, Inc., Ricwil, or Perma Pipe.

L. Anchors: Anchors shall be 1/4" thick plate steel and extend 2-1/2" beyond the casing diameter. Anchors shall be pre-fabricated and sealed to pipe jacketing with pipe manufacturers standard anchor insulation kit. Location of anchors shall be a part of shop drawing submittal for approval by the Engineer. Anchor assembly shall be poured in concrete block by Contractor in field. Concrete blocks shall generally extend 12" in all directions from the anchor and rest on undisturbed earth.

- M. Provide shop drawings of underground piping system, calculate, provide and show all expansion loops required for expansion and contraction of piping system. Shop drawings shall indicate depth of pipes required for system. Coordinate depth with all other trades and show on shop drawings all locations of underground utilities, which may pose a conflict or require special care during installation.

2.03 ACCEPTABLE MANUFACTURERS - VALVES

- A. Stockham, Crane, Jenkins, Nibco, Milwaukee (unless noted otherwise).
- B. Substitutions: Under provisions of Section 15010, General Conditions, and Supplementary General Conditions.

2.04 GATE VALVES

- A. Up to 2 Inches: Bronze body, bronze trim, non- rising stem, handwheel, inside screw, single wedge or disc, solder ends.

2.05 GLOBE VALVES

- A. Up to 2 Inches: Bronze body, bronze trim, rising stem and handwheel, inside screw, renewable composition disc, solder ends, with backseating capacity.

2.06 BALL VALVES

- A. Up to 2 Inches: Bronze two piece body, stainless steel ball, teflon seats and stuffing box ring, lever handle, and balancing stops, solder ends.

2.07 PLUG COCKS

- A. Up to 2 Inches: Bronze body, bronze tapered plug, non-lubricated, Teflon packing, threaded ends, with one wrench operator for every ten plug cocks.

2.08 BUTTERFLY VALVES ABOVE GROUND

- A. 2-1/2" thru 4": 150 psi SWP iron body; butterfly valve; EPDM seat with phenolic resin hard backing; to have range of 300F; bronze disc; lug type; 304 stainless steel stem; luberized bronze reinforced teflon bushing; infinite throttling handle with memory stop; suitable for dead-end service.
- B. 5" thru 10": 150 psi SWP iron body; butterfly valve; EPDM seat with phenolic resin hard backing; to have range of 300F; bronze disc; lug type; 304 stainless steel stem; luberized bronze reinforced teflon bushing; series DG worm screw operator with handwheel suitable for deadend service.
- C. Valves installed over 7'-0" above finished floor shall be provided with a chain wheel.
- D. Gear operators exposed to weather shall have weatherproof cover.

- E. Valves shall be Series LT as manufactured by CenterLine, Marlin Valve Co., or approved equal.

2.09 BUTTERFLY VALVES BELOW GROUND OR SUBMERGED

- A. 3" through 24": 150 psi tight-closing , rubber seated type conforming to the design standards of ANSI/AWWA C504. Valves shall be bubble tight at the rated pressure in either direction and shall be suitable for throttling service and/or operation after long periods of inactivity in buried soil and/or submerged up to 10 feet below water.
- B. Manufacturer shall have manufactured this product and have proof of satisfactory installed history for a minimum of five (5) years and show proof of compliance with ANSI/AWWA C504. All valves shall be hydrostatic and leak tested in accordance with ANSI/AWWA C504.
- C. Valve body shall be constructed of cast iron ASTM A126, Class B, with ANSI B16.1 drilled flange. Disc shall be concentric design with aluminum bronze ASTM B148 UNS C95400, Grade C up to 8" and ductile iron ASTM A536, Grade 65-45-12 with 316 stainless edge above 8". Shaft shall be one piece through shaft of 18-8 stainless steel, corresponding to the requirements of AWWA C504, latest revision, and shall be fastened by a threaded disc pin and provide a positive leak proof connection of the shaft to the disc. Shaft bearings shall be of the self-lubricating, corrosion-resistant, sleeve type and be designed for horizontal and/or vertical shaft load. Packing shall be self adjusting and suitable for vacuum or pressure service.
- D. Valve seats shall be located in the body only and shall be of a synthetic rubber compound suitable for the service and shall be designed so that no adjustments or maintenance is required.
- E. Valves shall be coated per AWWA C550 and in full compliance with NSF-61.
- F. Provide gear operators furnished with AWWA 2 inch nut and sealed housing designed for buried and submerged service for depths up to 10 feet below water for valves over 6 inches. Provide buried extension shaft with AWWA nut, removable cover, and buried shaft cover and 1 inch extension shafts as necessary for the buried/submerged depth (up to 10 feet) of the valve operator. Contractor to cut shaft and provide buried shaft cover as necessary. Provide two (2) t-handle valve wrenches for the project. Refer also to valve box detail on the drawings for further requirements.

2.10 CHECK VALVES

- A. Up to 2 Inches: Bronze 45 degree swing disc, solder ends. 2-1/2" and Larger: Iron body, flanged ends (horizontal piping).
- B. 2-1/2" and larger: iron body, bronze disc, stainless steel stem, stainless steel springs, Buna-N seat with 320F range, threaded lug type valves shall be Style T as manufactured by the Marlin Valve Co. or approved equal.

PART 3 EXECUTION

HYDRONIC PIPING

SECTION 15510 - 7

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections to equipment with flanges or unions.
- D. After completion, fill, clean, and treat systems.

3.02 INSTALLATION

- A. Ream pipe and tube ends. Remove burrs.
- B. Route piping in orderly manner, plumb and parallel to building structure, and maintain gradient.
- C. Install piping to conserve building space, and not interfere with use of space and other work.
- D. Group piping whenever practical at common elevations.
- E. Install piping to allow for expansion and contraction without stressing pipes, joints, or connected equipment.
- F. Provide clearance for installation of insulation, and access to valves and fittings.
- G. Install valves where they are easily accessible.
- H. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.
- I. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- J. Prepare pipe, fittings, supports, and accessories for finish painting.
- K. Install valves with stems upright or horizontal, not inverted.
- L. Use dielectric unions or flanges between ferrous and non-ferrous metals to prevent corrosion reaction. Use insulated bolts on flanges.
- M. Establish elevations of buried piping outside the building to ensure not less than 3 feet of cover and as coordinated with all other buried services, either existing or being installed.
- N. Excavate and backfill in accordance with sections on excavation and backfilling and as further described herein.

3.03 APPLICATION

- A. Install flanges/unions downstream of valves and at equipment or apparatus connections.
- B. Install brass male adapters each side of valves in copper piped system. Sweat solder adapters to pipe.
- C. Install gate or ball or butterfly valves for shut-off and to isolate equipment, part of systems, or vertical risers. (Above grade)
- D. Provide manual air vents at the high point of piping and where indicated on drawings.
- E. Provide 3/4-inch gate or ball drain valves at main shut-off valves, low points of piping, bases of vertical risers, and at equipment.
- F. Cleaning of piping systems.
 - 1. Conform to applicable codes for addition of non-potable chemicals to building mechanical systems, and for delivery to public sewage systems.
 - 2. System Cleaner
 - a. Liquid alkaline compound with emulsifying agents and detergents to remove grease and petroleum products.
 - b. Algaecide; chlorine release agents such as sodium hypochlorite or calcium hypochlorite, or microbiocides such as quarternary ammonia compounds, tributyl tin oxide, methylene bis, or isothiazolones.
 - 3. Preparation
 - a. Systems shall be operational, filled, started, and vented prior to cleaning.
 - b. Place terminal control valves in open position during cleaning.
 - 4. Cleaning Sequence
 - a. Add cleaner to closed systems at concentration as recommended by manufacturer of water contained in the system; of one pound per 100 gallons of water for hot systems and one pound per 50 gallons of water for cold systems.
 - b. Hydronic Water Systems: Contractor shall rent a pump with strainer and pipe to new system. Contractor shall circulate for 48 hours, then drain systems as quickly as possible. Refill with clean water, circulate for 24 hours, then drain. Refill with clean water and repeat until system cleaner is removed. After cleaning and flushing, the Contractor shall connect new piping to existing system as shown on drawings.

- c. Use neutralizer agents on recommendation of system cleaner supplier and approval of Architect/Engineer.
- d. Flush open systems with clean water for one hour minimum. Drain completely and refill.
- e. Remove, clean, and replace strainer screens.
- f. Inspect, remove sludge, and flush low points with clean water after cleaning process is completed. Include disassembly of components as required.

3.04 UNDERGROUND PIPE INSTALLATION

A. General

- 1. Installation of exterior buried factory-prefabricated preinsulated chilled water piping systems shall be in accordance with manufacturer's installation manual. Welding of steel piping including qualification of welders shall be in accordance with ASME B31.1, metallic arc process. Install piping straight and true to bear evenly on sand bedding material.
- 2. Installation Drawings: The system supplier shall provide engineered drawings of the piping layout indicating anchor locations and provisions for expansion and/or contraction. The system manufacturer upon receipt shall provide computerized stress calculations including anchor forces from the installing contractor approved drawings complete with field-measured dimensions. Drawing shall be signed and sealed by a P.E. employed by the piping manufacturer.
- 3. All units shall be part-numbered and dimensionalized for proper installation of the system.
- 4. Insulate and jacket field joints as indicated on the drawings.
- 5. Pipe handling: Pipe and accessories shall be handled in a manner to ensure delivery to the trench in an undamaged condition. Particular care shall be taken not to injure the pipe jacket and insulation. If any pipe or fitting is damaged, the Contractor at his expense shall make the repair in an approved manner. The interior of pipe and accessories shall be cleaned before being lowered into the trench for welding connection operations.
- 6. Cleaning of Piping: Keep interior and ends of new piping and existing piping affected by the Contractor's operations, cleaned of water and foreign matter during installation by means of plugs or other approved methods. When work is not in progress, securely close open ends of pipe and fittings to prevent entry of water and foreign matter. Inspect piping before placing into position.

7. Demolition: Remove materials so as not to damage materials, which are to remain. Replace existing work damaged by the Contractor's operations with new work of the same construction.

B. Field Joints

1. Carrier Piping Joints Without Concrete Anchor: Pressure test and approve piping joints. Provide joints with polyurethane insulation of same type and thickness as insulation on carrier piping. Provide waterproof shrink sleeves to cover insulation and overlap not less than 6 inches of each end of conduit section. Seal joint jacket watertight to adjacent jacketing to withstand 20 feet of hydrostatic water pressure.
2. Carrier Piping Joints With Concrete Anchor: Pressure test and approve piping joints. Provide each tee with concrete anchors (thrust blocks). Provide waterproof end seals between carrier piping and conduit. Encase carrier pipefitting and conduit with a minimum of 6 inches of concrete or as otherwise shown in details or per manufacturer's calculations.

- C. Assembly and Alignment: Assemble carrier pipe and fittings according to manufacturer's installation manual. Maintain proper alignment during assembly of welded joints and flanged joints.

- D. Bedding: Accurately grade trench bedding with a minimum of 6 inches of manufactured or natural sand. Backfill sand to a minimum of 4 inches below conduit. Lay bedding to firmly support conduit along entire length.

- E. Concrete: Thrust Blocks: Encase each tee of carrier pipe in thrust block against undisturbed soil. Disturbed soil under and around thrust blocks shall be compacted. Pour concrete anchor blocks where shown on installation drawings. After all anchor blocks are poured and cured, a hydrostatic test shall be required as specified under Section 15990. No leakages shall be allowed.

F. Field Quality Control

1. Before final acceptance of work, test each system to demonstrate compliance with contract requirements. Thoroughly flush and clean piping before placing in operation. Flush piping at minimum velocity of 8 fps. Correct defects in the work and repeat tests until work is in compliance with contract requirements. Furnish potable water, electricity, instruments, connecting devices, and personnel for tests.
2. The services of a factory trained field service instructor directly employed by the system manufacturer (not a sales agent or representative) shall be required during all stages of the installation and testing. The contractor must obtain a daily written report from the installation instructor of the system supplier. The written report shall be presented to the contractor on the same day it is prepared and one copy shall be forwarded to manufacturer's office and the Contracting Officer. The report shall state whether or not the condition and quality of materials used and the

- installation of the system are in accordance with the manufacturer's approved drawing and published literature and is satisfactory in all respects. A final report shall be signed by an officer of the manufacturer and duly notarized certifying the materials are installed in accordance with the manufacturers requirements and recommendations and will satisfactorily serve the intended use, including maintaining an insulation barrier between the pipe and surrounding soil, for the anticipated service life of the pipe.
3. Immediately after the system is installed in the ditch, a partial backfill shall be made in the middle of each unit leaving the joints exposed for inspection prior to the hydrostatic tests. The initial backfill is to be 12" of select materials, hand tamped in 6" layers above the jacket. Do not use frozen fill, sod, cinders or stones greater than 1/4" as backfill.
 4. Field Tests of Carrier Piping: Do not cover carrier piping joints with insulation or concrete anchors (thrust blocks), until carrier piping joints pass field tests.
 5. Hydrostatic Pressure Test: Test piping system in accordance with the requirements of Section 15990. Valve off piping system and disconnect method of piping system pressurization before starting tests. During hydrostatic pressure test, examine piping system for leaks. Repair leaking joints, replace damaged and porous pipe and fittings with new materials, and repeat tests. The piping shall be tested in sections as required by the Contracting Officer to coordinate with disruption of utilities and traffic patterns. Contractor shall provide the necessary flanges, blank-off plates and valves for sectionalized testing.
 6. After hydrostatic testing, backfill all remaining exposed pipe as instructed. Final backfill of selected earth shall be hand-placed and tamped in 12" layers over the top of the initial backfill. Remainder of the backfill shall be free of large boulders, rocks over 6" in diameter, frozen earth, or foreign matter. The backfill operation shall now be completed by any convenient means. Do not use wheeled or tracked vehicles for tamping.
 7. Thrust Blocks: Place bedding and backfill around center portion of piping system, leaving thrust blocks and field joints clear for observation. After successful completion of hydrostatic pressure test, cast concrete thrust blocks.
 8. Field Inspections: Prior to initial operation, inspect piping system for compliance with drawings, specifications, and manufacturer's submittals.

END OF SECTION 15510

SECTION 15515 - HYDRONIC SPECIALTIES

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Air Vents.
- B. Strainers.
- C. P/T Plugs.
- D. Balancing Devices.
- E. Relief Valves.
- F. Suction Diffusers.
- G. Thermometers.
- H. Pressure Gauges.

1.02 RELATED WORK

- A. Section 15010 - Basic Mechanical Requirements.
- B. Section 15260 - Piping Insulation.
- C. Section 15400 - Testing of Piping Systems.
- D. Section 15510 - Hydronic Piping.
- E. Section 15540 - HVAC Pumps.

1.03 QUALITY ASSURANCE

- A. Manufacturer: For each product specified, provide components by same manufacturer throughout.

1.04 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 15010, General Conditions, and Supplementary General Conditions.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of General Conditions and Supplementary General Conditions.

- B. Store and protect products under provisions of Section 15010, General Conditions, and Supplementary General Conditions.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS - AIR VENTS

- A. Amtrol.
- B. Armstrong.
- C. TACO.

2.02 AIR VENTS

- A. Manual Type: Short vertical sections of pipe to form air chamber, with 1/8 inch brass needle valve at top of chamber. Vertical Section of pipe shall be same diameter as pipe served up to 1-1/2"; larger pipes shall have a minimum of 2" in diameter.
- B. Automatic Type: Air vent shall have a pilot operated elimination mechanism, 1/4" orifice and have a self-cleaning mechanism. Air vent shall be Model No. 720, as manufactured by Amtrol.

2.03 ACCEPTABLE MANUFACTURERS - STRAINERS

- A. Spirax/Sarco
- B. Mueller
- C. Watts Regulator

2.04 STRAINERS

- A. Strainers for pipe sizes 2" and smaller, shall be Sarco, Type BT, screwed and sizes 2-1/2" and larger shall be Type AF-125 flanged. Type BT strainers shall have screens having 0.033" openings, and Type AF-125 strainers shall be furnished with Monel screens. Provide strainers to protect all automatic controls, valves, and pumps not equipped with integral strainers. Provide a disposable fine mesh start-up screen, which shall be removed after thirty (30) days of operation.
- B. Strainer shall be sized for a maximum of 1.5 psi pressure drop. Enlarge pipe to limit pressure drop if required.

2.05 RELIEF VALVES

- A. Bronze body, Teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labeled.

2.06 CALIBRATED BALANCING VALVE

A. CBV-T (½" through 2" NPT threaded type):

- 1 Furnish and install, as shown on plans and with manufacturer's recommendations, Model CBV-T threaded type circuit balancing valves.
- 2 Each valve shall have metering ports incorporating Nordel check valves on both sides of the seat.
- 3 All valves shall be "Y" pattern, equal percentage, globe style, designed either for presetting with a balance schedule or for proportional balancing. All metal parts are bronze copper alloy. Each valve shall provide four functions:
 - a) precise flow measurement;
 - b) precision flow balancing;
 - c) positive shutoff with a no-drip soft seat; and
 - d) diagnostic point for system analysis.
- 4 A ¼" NPT tapped drain port shall be provided on each side of valve seat.
- 5 Valves shall have four (4) full 360 degree adjustment turns of the handwheel (1,440 degrees) with a micrometer-type indicator and hidden memory feature to program the valve for a precise, tamper-proof, balanced setting. When installed, the handwheel and metering ports shall not be located on the bottom of the valve to prevent sediment deposits. Handwheel scale must be able to be positioned so that it may be clearly read without the use of mirrors or any special tools. Metering ports shall be interchangeable with drain ports to allow for read-out flexibility when installed in tight piping locations.
- 6 Each threaded CBV-T to be shipped with a pre-formed insulation to meet or exceed ASTM D1784/Class 14253-C, MEA #7-87, ASTM E84, and ASTM E136 with a flame spread rating of 25 or less and a smoke development rating of 50 or less.

B. CBV-G (2½" through 12" Grooved/Flanged):

- 1 Furnish and install, as shown on plans and with manufacturer's recommendations, Circuit Balancing Valves.
- 2 The valve body shall be ductile iron with grooved ends or with Armgrip(tm) non-rotating ductile iron flange adapters. Valves shall be suitable for the working pressures and temperatures as shown on drawings.
- 3 Each valve shall have metering ports incorporating Nordel check valves, on both sides of the seat.
- 4 All valves shall be "Y" pattern, modified equal percentage, globe style, designed either for presetting with a balance schedule or for proportional balancing. Each valve shall perform four functions:

- a) precise flow measurement
 - b) precision flow balancing
 - c) positive shutoff with a no-drip soft seat; and
 - d) diagnostic point for system analysis.
- 5 Valves shall have five, (2½" and 3") six, (4" through 6") twelve, (8") ten, (10") or fourteen (12") full 360 degree adjustment turns of the handwheel with a micrometer-type indicator and hidden memory feature to program the valve for a precise, tamper-proof balanced setting. When installed, the handwheel and metering ports shall not be located on the bottom of the valve to prevent sediment deposits. Handwheel scale must be able to be positioned so that it may clearly read without the use of mirrors or any special tools.
- 6 Circuit balancing valves shall be installed at least five pipe diameters downstream from any fitting and at least ten pipe diameters downstream from any pump. Two pipe diameters downstream of the CBV shall be free of any fitting.
- 7 The valve shall be furnished with pre-formed insulation to meet or exceed ASTM D1784/Class 14253-C, MEA #7-87, ASTM E84, and ASTM E136 with a flame spread rating of 25 or less and a smoke development rating of 50 or less.
- C. Acceptable manufacturers shall be Armstrong, Tour & Andersson, or preapproved equal.
- D. Provide an Armstrong, Model CBVM-135/60 or equal, meter kit. Kit shall have two (2) meter, 5 foot hose each, and shall have a range of 0'-60'.

2.07 THERMOMETERS

- A. Provide thermometers where indicated, specified, and required. They shall be installed so that they can be clearly read from the floor.
- B. Industrial stem thermometers shall have a scale not less than 9" long and shall be red-reading mercury type with white background and black etched graduations and numerals. Casing materials shall be aluminum on all products installed outdoors.
- C. Thermometers shall be suitable for the service intended and the range shall be selected to span from approximately 10 degrees below through 10 degrees above the operating range of the fluid.
- D. Thermometers shall have a guaranteed accuracy of within 1% of the range scale and shall be provided with 1-degree graduations. Thermometers shall be provided with brass separable socket wells.

- E. Provide thermometer wells and necessary fittings where specified or indicated. Wells installed in insulated piping shall be provided with lagging extensions of appropriate length to accommodate insulation.
- F. Thermometers shall be as manufactured by Marsh Instrument Co., Weksler Instrumentation, Terice, or approved equal.

2.08 PRESSURE GAUGES

- A. Pressure and compound pressure gauges shall be installed so that they can be clearly read from the floor and shall be Bronze Bourdon tube type with minimum 6" dials and snubbers. Dials shall be white with black numerals, graduations, and pointers, and shall be set in iron, steel, or aluminum cases having a baked enamel finish. Cases shall have safety blowout plugs.
- B. Pressure gauges shall have a range of approximately twice the operating pressure and all gauges shall have an accuracy of 1/2 of 1% of full-scale reading. Gauges shall be provided with brass shutoff cocks.
- C. Provide compound pressure gauges in pump suction pipe (30" Hg vac. to 100 psi).
- D. Provide gauges where indicated, specified, or required.
- E. Gauges shall be manufactured by Marshalltown Instrument, Weksler Instrumentation, Terice, or approved equal.

2.09 P/T/PLUGS

- A. Provide, in locations shown on drawings, a 1/2 inch MPT fitting for pipeline and 1/4 inch for valve body locations to receive either a temperature or pressure probe 1/8 inch OD. Fitting shall be solid brass with two valve cores of Neoprene capable of withstanding a maximum temperature of 200 deg. F at 500 psi, fitted with a color coded and marked cap with gasket, and shall be rated at 1000 psig at 140 deg. F.
- B. Provide Owner with pressure gauge adaptors with 1/8" O.D. probe and 5 inch testing thermometers for chilled water with a 25 - 125 F range.
- C. Supply and present to the Owner upon completion of testing, two (2) pressure and temperature test kits. Each shall consist of one dual scale (0-100 psi, 0-230 feet of water) pressure gauge with a No. 500 gauge adaptor attached, one 25-125 F pocket testing thermometer, one 0-220 F pocket testing thermometer, one 500 gauge adaptor, and one protective carrying case.
- D. Acceptable manufacturers shall be Peterson, Sisco, or approved equal.

2.10 SUCTION DIFFUSER

- A. Provide a suction diffuser at inlet of each base mounted pump. Unit shall consist of angle type body with inlet vanes and combination Diffuser-Strainer-Orifice cylinder with 3/16" diameter openings for pump protection. Unit shall be equipped with disposable fine mesh start-up strainer, which shall be removed after thirty (30) days of operation. Strainer free area shall be no less than five (5) times the section area of the pump connection. Unit shall be provided with adjustable support foot to carry weight of suction piping.
- B. Suction diffusers shall be as manufactured by Bell and Gossett, TACO, or Armstrong.

2.11 EXPANSION TANK

- A. Tank shall be pressurized diaphragm type. (Refer to drawings for model number.)
- B. Tank shall be constructed of welded steel, furnished with automatic fill valve, and ASME rated for 175 psig.
- C. Tank shall be as manufactured by Armstrong, TACO, Amtrol, Inc., or Bell & Gossett.

2.12 AIR PURGER

- A. Units shall be in-line type constructed of cast iron or steel and shall contain a low velocity chamber for air elimination. Unit shall be suitable for 125 psi working pressure and shall contain air vent connection and drain connection.
- B. Air purger shall be manufactured by Armstrong, Amtrol, or Bell & Gossett.

2.13 AIR SEPARATOR

- A. Units shall be flanged inlet and outlet type constructed of cast iron and shall contain a low velocity chamber for air elimination. Unit shall be suitable for 125 psi working pressure at 350°F and shall contain air vent connection and drain connection.
- B. Air separator shall be manufactured by Armstrong, Amtrol, Taco, or Bell & Gossett.

PART 3 EXECUTION

3.01 INSTALLATION AND APPLICATION

- A. Install specialties in accordance with manufacturer's instructions to permit intended performance.
- B. Where large air quantities can accumulate, provide enlarged air collection standpipes.
- C. Provide manual air vents at system high points and as indicated.

- D. Provide valved drain and hose connection on strainer blow down connection.
- E. Flow switches, temperature sensors, sensor sockets, wells gage taps, and etc. shall be furnished under controls section of these specifications and installed under this Section. Locations of all sensor sockets flow switches, and taps shall be coordinated with and supervised by the Controls Contractor.
- F. Motorized control valves shall be furnished by the Controls Contractor, installed by the Mechanical Contractor.

END OF SECTION 15515

SECTION 15540 - HVAC PUMPS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Base mounted end suction.

1.02 RELATED WORK

- A. Section 15010 - Basic Mechanical Requirements.
- B. Section 15170 - Motors.
- C. Section 15260 - Piping Insulation.
- D. Section 15510 - Hydronic Piping.
- E. Section 15515 - Hydronic Specialties.
- F. Section 16480 - Motor Control.

1.03 REFERENCES

- A. ANSI/UL 778 - Motor Operated Water Pumps.

1.04 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacture, assembly, and field performance of pumps with minimum three years experience.
- B. Alignment: Base mounted pumps shall be aligned and first time energized by the pump manufacturer's trained representative at the job site. The Contractor shall submit to the Engineer a statement from the Manufacturer's Representative certifying that such services were completed and the installation is per the Manufacturer's requirements.
- C. Qualifications: The Manufacturer shall have a local, trained representative with a full field service support office within 100 miles of the job site. The service support office shall have stock inventory items and service personnel specifically trained to install, checkout, align, and service pumps produced by the manufacturer.

1.05 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 15010, General Conditions, and Supplementary General Conditions.

- B. Submit certified pump curves showing performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.
- C. Submit manufacturer's installation instructions under provisions of Section 15010, General Conditions, and Supplementary General Conditions.

1.06 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data under provisions of Section 15010, General Conditions, and Supplementary General Conditions.
- B. Include installation instructions, assembly views, lubrication instructions, and replacement parts list.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 15010, General Conditions, and Supplementary General Conditions.
- B. Store and protect products under provisions of Section 15010, General Conditions, and Supplementary General Conditions.

1.08 EXTRA PARTS

- A. Provide one extra set of mechanical seals for pumps.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Aurora (Basis of Design).
- B. Armstrong (Approved to bid).
- C. Bell & Gossett (Approved to bid).
- D. Weinman (Approved to bid).

2.02 GENERAL CONSTRUCTION REQUIREMENTS

- A. Balance: Rotating parts, statically and dynamically.
- B. Construction: To permit servicing without breaking piping or motor connections.
- C. Pump Motors: Operate at 1750 rpm unless specified otherwise on drawings.
- D. Pump Connections: Flanged - Provide flat faced matching flanges as required.
- E. Pump motors installed outdoors shall be furnished with totally enclosed enclosures.

- F. All HVAC pump motors shall be IEEE rated energy efficient, high efficiency motors and shall comply with Specification Section 15170, Paragraph 2.06(M.).

2.03 Base Mounted Pumps

- A. The pump shall be centrifugal horizontal flexible coupled end suction back pullout. For suction piping diameters of 2" or less and discharge piping diameters of 1.5" or less, the suction and discharge connections shall be NPT threaded. For suction piping diameters of 2" or greater, the suction inlet shall be a flat-faced flange connection and the discharge outlet shall be a bolt through flange connection. Flange connections shall be ANSI 125# rated. The casing shall have tapped and plugged holes for priming and draining. The casing bore shall be large enough to allow "back pullout" of the impeller without disturbing the casing or suction and discharge piping. The casing shall be supported by the power frame.

B. MATERIALS OF CONSTRUCTION

Casing.....Cast Iron (ASTM A48)
Impeller.....Bronze (ASTM B62)
Shaft.....Steel (AISI C1045)
Case Wear Ring.....Bronze (ASTM B62)
Shaft Sleeve.....Bronze (ASTM B62)
Power Frame.....Cast Iron (ASTM A48)

C. CASING

The casing will be of the end suction hydraulic design, with flanges the same size and a tangential discharge outlet. The pump shall include a volute type casing suction branch to minimize pumping noise.

D. IMPELLERS

The impellers shall be vacuum cast. They shall be finished all over, the exterior being turned and the interior being finished smooth and cleaned of all burrs, trimmings, and irregularities. The impellers shall be dynamically balanced. The impellers will be keylocked to the shaft.

E. CASE WEARING RINGS

The pump casing and stuffing box cover shall each be fitted with a case wear ring to minimize abrasive and corrosive wear to the casing. An additional case wear ring shall be supplied between the impellers. The case wear ring shall be of the radial type, press fitted into the casing.

F. MECHANICAL SEAL

Each pump is to be furnished with a mechanical seal with a Ni-Resist seat, carbon washer, Buna-N elastomers and stainless steel metal parts. A bypass

line must be provided between the seal faces and the discharge flange to assure adequate venting of the seal chamber and to provide lubrication.

G. SHAFT

The impellers shall be direct-coupled to the power frame shaft. The shaft shall be machined to provide an impeller keyway, and drilled and tapped to accept the impeller fastener. The shaft shall be one-piece. Stub shafts are not acceptable. The outboard shaft extension shall be machined with a keyway to accept a coupling to the driving unit. Water slingers shall be furnished on both the inboard and outboard shaft extension.

H. SHAFT SLEEVE

The pump shaft shall be fitted with a shaft sleeve to minimize shaft wear. The sleeve shall be sealed to the impeller hub by an O-ring, and shall be positively driven by a pin to the keyway. The use of adhesive compounds to fasten the sleeve to the shaft shall not be accepted.

I. BASEPLATE

The pump and motor shall be mounted on a groutable formed steel baseplate or a driprim baseplate with integral drip channels incorporated on each side. Each channel shall include an NPT drain connection and plug. The base shall be sufficiently rigid to support the pump and the motor without the use of additional supports or members.

J. COUPLING

A flexible coupling shall be provided to connect the pump shaft to the motor shaft. The coupling shall be of an all metal type with a flexible rubber insert. The entire rotating assembly shall be enclosed by a coupling guard.

K. MOTOR

Each pump is to be flexible coupled to a motor shall in accordance with the latest NEMA standards, and shall have the following characteristics:

1. Refer to equipment schedule for Voltage, Cycles, Speed and Enclosure.
2. Motors shall be suitable for continuous duty in ambient temperatures from C at rated service factor. Altitude shall be less than 3,300'.
3. All motors shall have a service factor of 1.15.
4. All motors shall be capable of developing NEMA Design B locked rotor and pull up torque with 90% of rated voltage applied.
5. The insulation system must be Class "F" or better with Class "B" rise at service factor 1.15 (90C).

6. Dual voltage motors 7.5 HP and larger must be capable of ATL and WYE-Delta starting on both voltages and part winding starting on the lower voltage.
7. Stator frame and end brackets shall be cast iron construction.
8. Bearings shall be either ball or cylindrical roller bearings.
9. Bearings shall be selected to provide an L-10 rated life of 30,000 hours with external load factors per NEMA MG1-14.42.
10. Frames 256T and smaller shall use sealed bearings. Frames 284T and larger shall be re-greasable while motor is operating.
11. All hardware shall be zinc-dichromate plated.
12. Nameplates shall be 304 stainless steel.
13. All motors shall have a neoprene gasket between the conduit box and the motor frame.
14. All motors to be dynamically balanced to .6 mils peak-to-peak or better.
15. Motors called out on the pumps schedules to be multi-speed shall be 1800/900 RPM, 4 pole/8 pole, and variable torque type with two (2) windings (single winding motors not acceptable).
16. Applicable Standards and Test:
 - a. NEMA Publication MG-1.
 - b. Testing per NEMA MG-1-12.53a (IEEE Test Standard, Method B with segregated loss analysis).
 - c. All motors shall be given a routine test per NEMA MG-1, Section 12.51.
 - d. UL Recognition and CSA listings are required. The nameplate shall be stamped accordingly.
 - e. Frame assignments shall be per NEMA MG-13.

Each motor shall have a sufficient horsepower rating to operate the pump at any point on the pump's head-capacity curve without overloading the nameplate horsepower rating of the motor regardless of service factor. The motor shall have a service factor of 1.15. The service factor is reserve for variations in voltage and frequency.

2.04 SPLIT CASE PUMPS

HVAC PUMPS

- A. Type: Horizontal shaft, single stage, direct connected, horizontal split casing, for 125 psig maximum working pressure.
- B. Casing: Cast iron, with suction and discharge gage ports, renewable bronze casing wearing rings, seal flush connection, drain plug, flanged suction and discharge.
- C. Impeller: Bronze, fully enclosed, keyed to motor shaft.
- D. Bearings: Permanently lubricated roller or ball bearings.
- E. Shaft: 316 stainless steel with bronze shaft sleeve.
- F. Seal: Stainless steel mechanical seal with Buna-N elastomers, Ni - Resist seat and Carbon Washers.
- G. Drive: Flexible coupling with coupling guard. Flexible couplings shall be oversized for variable speed pumps. Refer to the schedule of coupling sizes to be used, shown later in this section.
- H. Baseplate: Cast iron or fabricated steel with integral drain rim.

2.05 VERTICAL IN-LINE PUMPS

- A. Type: Vertical, single stage, close coupled, back pull-out centrifugal pump for in-line mounting, for 125 psig maximum working pressure.
- B. Casing: Cast iron, with suction and discharge gage ports, renewable bronze casing wearing rings, seal flush connection, drain plug, flanged suction and discharge.
- C. Impeller: Bronze, fully enclosed, keyed to motor shaft, dynamically balanced.
- D. Bearings: Permanently lubricated roller or ball bearings.
- E. Shaft: Carbon steel with bronze shaft sleeve.
- F. Seal: Stainless steel mechanical seal with Buna-N elastomers, Ni-Resist seat and carbon washers.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install pumps in accordance with manufacturer's instructions.
- B. Provide access space around pumps for service. Provide no less than minimum as recommended by manufacturer.
- C. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitations, are non-overloading in parallel or individual operation,

and operate within 25 percent of midpoint of published maximum efficiency curve.

- D. Decrease from line size with long radius reducing elbows or eccentric reducers. Support piping adjacent to pump such that no weight is carried on pump casings. Refer to Section 15140.
- E. Provide air cock and drain connection on horizontal pump casings.
- F. Provide drains for bases and seals, piped to and discharging into floor drains.
- G. Lubricate pumps before start-up.
- H. Grout base of pump.
- I. Start up shall be performed by factory representative, including alignment.
- J. Laser alignment shall be performed for pumps 20 HP and greater.
- K. Start up certificate shall be provided to engineer with 10 days of start up.

END OF SECTION

SECTION 15545 - CHEMICAL (WATER) TREATMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Cleaning of piping systems.
- B. Chemical feeder equipment.
- C. Treatment for closed systems.

1.02 RELATED SECTIONS

- A. Section 15010 - Basic Mechanical System.
- B. Section 15510 - Hydronic Piping.
- C. Section 15975 - Automatic Control System.

1.03 SUBMITTALS

- A. Submit shop drawings under provisions of Section 15010 and Division 1.
- B. Submit shop drawings indicating system schematics, equipment locations, and controls schematics.
- C. Submit product data under provisions of Division 1.
- D. Submit product data indicating chemical treatment materials, chemicals, and equipment.
- E. Submit manufacturer's installation instructions under provisions of Division 1.
- F. Submit manufacturer's field reports under provisions of Division 1.
- G. Submit reports indicating start-up of treatment systems is completed and operating properly.
- H. Submit reports indicating analysis of system water after cleaning and after treatment.

1.04 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data under provisions of Division 1.
- B. Include data on chemical feed pumps, agitators, and other equipment including spare parts lists, procedures, and treatment programs.
- C. Include step by step instructions on test procedures including target concentrations.

1.05 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum three years experience. Company shall have local representatives with water analysis laboratories and full time service personnel.

1.06 REGULATORY REQUIREMENTS

- A. Conform to applicable code for addition of non- potable chemicals to building mechanical systems, and for delivery to public sewage systems.

1.07 MAINTENANCE SERVICE

- A. Furnish service and maintenance of treatment systems for one year from Date of Substantial Completion.
- B. Provide monthly technical service visits to perform field inspections and make water analysis on site. Detail findings in writing on proper practices, chemical treating requirements, and corrective actions needed. Submit two copies of field service report after each visit.
- C. Provide laboratory and technical assistance services for warranty period.
- D. Include training course at startup of systems for operating personnel, instructing them on installation, care, maintenance, testing, and operation of water treatment systems.
- E. Provide on site inspections of equipment during scheduled or emergency shutdown to properly evaluate success of water treatment program, and make recommendations in writing based upon these inspections.
- F. Provide separate quote for providing equipment and chemicals to treat recycled water system.

1.08 MAINTENANCE MATERIALS

- A. Submit maintenance materials under provisions of Division 1.
- B. Provide sufficient chemicals for treatment and testing during warranty period.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Betz Entec, Inc.

- B. Substitutions: Under provisions of Section 15010 and Division 1.

2.02 MATERIALS

- A. System Cleaner:

1. Liquid alkaline compound with emulsifying agents and detergents to remove grease and petroleum products.
2. Algaecide.

- B. Closed System Treatment (Water):

1. Sequestering agent to reduce deposits and adjust pH.
2. Corrosion inhibitors.
3. Conductivity enhancers.

2.03 EQUIPMENT

- A. Closed System:

1. Pot Feeder: twelve (12) gallon Capacity as specified on drawings with quick opening cap for working pressure of 175.
2. Provide a coupon type corrosion test station and piping rack as indicated on drawings.

- B. Open System

1. The Contractor is to provide all equipment, piping, wiring, etc., and installation required for condenser water make-up. This package is to include all water treatment requirements, including all required chemicals for one (1) year from completion date, for open condenser water loops. (Refer to drawings for piping and water treatment schematic diagram.)
2. Water treatment services are to be provided by Betz Entec, Inc., in accordance with the existing services provided at the site. All vendor substitutions must be approved prior to bid.
3. Water treatment hardware, for each cooling tower loop, shall include, but not be limited to:
 - a) One (1) Lakewood Model 412 Conductivity/pH Controllers.
 - b) One (1) LMI Model A751-925 Flowmeter/Pulser Operated Chemical Feed Pump.
 - c) One (1) LMI Model A151-955 Chemical Feed Pump (Acid Feed).

- d) Two (2) LMI Model A181-955 Chemical Feed Pumps (Biocide Feed).
 - e) One (1) Grasslin Two (2) Circuit Electronic Time Switches, Model 32-72-2 (Biocide Control).
 - f) LMI Flowmeter-Pulser 2" Model FP-20 (Effluent Metering).
 - g) Corrosion Coupon Rack for Closed System.
4. Water Treatment Chemicals are to be administered as Follows:
- a) For operation of the water treatment while city water is being used for make-up (determined by water meter), the existing system shall remain in operation. This system is to administer corrosion inhibitor based on metered make-up (from city water) and blow-off is to be based on time.
 - b) While the cooling towers are utilizing effluent water (as described by the water meter), water treatment is to be administered as follows:
 - 1) PH is to be measured and controlled automatically by adding acid.
 - 2) Blow-off is to be controlled based on conductivity.
 - 3) Corrosion inhibitor is to be fed based on metered make-up.
 - 4) Biocides to be fed alternately based on time.
5. Regular Water Treatment Services are to be provided for One (1) year as follows:
- a) Entec 313 - Corrosion Inhibitor for Effluent Water.
 - b) Entec 345A - Primary Oxidizing Biocide (BIO-1).
 - c) Entec 349 - Primary Non-Oxidizing Biocide (BIO-2).
 - d) Entec 338B - Sodium Nitrite, Hot and Chilled Water Closed System Treatment.
 - e) Entec 234 - Antifoam Agent.
 - f) Corrosion Coupons.
 - g) Corrosion Coupon Analysis Every Sixty (60) Days, All Systems.

- h) Monthly Service, Including Written Report (3 copies).
 - i) Training of Plant Personnel.
 - j) Log Sheets and Water Control Manuals for Plant Personnel Use.
 - k) Test Kits and Reagents.
 - l) Product Fact Sheets and Material Safety Data Sheets.
 - m) Acid to be supplied by this Contractor.
6. Valve Requirements:
- a) Acceptable Manufacturers - Valves
 - 1) Stockham, Crane, Jenkins, Nibco (unless noted otherwise).
 - b) Gate Valves
 - 1) Up to 2 Inches: Bronze body, bronze trim, non-rising stem, handwheel, inside screw, single wedge or disc, solder ends.
 - c) Globe Valves
 - 1) Up to 2 Inches: Bronze body, bronze trim, rising stem and handwheel, inside screw, renewable composition disc, solder ends, with backseating capacity.
 - d) Ball Valves
 - 1) Up to 2 Inches: Bronze two piece body, stainless steel ball, teflon seats and stuffing box ring, lever handle, and balancing stops, solder ends.
 - e) Check Valves
 - 1) Up to 2 Inches: Bronze 45 degree swing disc, solder ends.
 - 2) 2-1/2" and Larger: Iron body, flanged ends (horizontal piping).
7. Piping Requirements (except water treatment):

- a) 2-1/2 Inches and Larger: Carbon steel, butt-weld, Schedule 40.
 - b) 2 Inches and Smaller: Type L, hard temper copper tubing.
 - c) Fittings
 - 1) 2-1/2" and Larger: Carbon steel, butt-weld, Schedule 40.
 - 2) 2" and Smaller: Wrought copper sweat.
 - d) Flanges (2-1/2" and larger): Carbon steel, slip-on, raised face, 150 lbs. and 250 lbs.
 - e) Unions (2" and Smaller): Brass.
8. Shop Drawings shall be submitted for Review by the Engineer after Review of Field Conditions for the Following Items:
- a) All water treatment products and installation.
 - b) Effluent Pipe Routing and Materials.
 - c) Project Schedule.
 - d) Float Valve Materials and Installation.

PART 3 EXECUTION

3.01 PREPARATION

- A. System shall be operational, filled, started, and vented prior to cleaning. Use water meter to record capacity in each system.
- B. Place terminal control valves in open position during cleaning.

3.02 CLEANING SEQUENCE

- A. Remove strainers, automatic air vents, and flow regulators from all HVAC piping systems and ensure all control and shut-off valves are fully open. Flush each HVAC system for two hours.
- B. Each HVAC piping system shall be thoroughly cleaned by filling with a solution of commercial cleaning chemicals designed to remove deposits such as pipe dope, oils, loose mill scale, rust and other extraneous materials. The recommended dosages and characteristics of the cleaner shall be such that the water need only be at ambient temperature. After the recommended dosages are added the

water shall be circulated for 36-72 hours. Systems shall then be drained, filled and flushed with clean water until no foreign matter is observed and total alkalinity of rinse water is equal to that of the make up water.

- C. Replace strainers, air vents, and flow regulators and fill system with clean water. In closed systems ensure expansion tank (if supplies) is approximately 2/3 water at system working pressure.
- D. Each system shall be properly treated to prevent scaling and corrosion.
- E. The water treatment service company currently under contract to the **Owner** to supply water treatment services for HVAC systems shall supervise the flushing and cleaning. That company shall certify in writing that the flushing and cleaning has been properly done.
- F. All cost associated with this service and certification shall be paid by the Contractor.

3.03 INSTALLATION

- A. Install closed and open systems in accordance with manufacturer's instructions.

3.04 CLOSED SYSTEM TREATMENT

- A. Provide one bypass feeder. Install isolating and drain valves and necessary piping. Install around globe valve downstream of circulating pumps unless indicated otherwise.
- B. Introduce closed system treatment through bypass feeder when required or indicated by test.
- C. Provide 3/4-inch water coupon rack around circulating pumps with space for 4 test specimens.
- D. Chemical for changing and maintaining the water treatment shall be supplied by the water treatment service company.

END OF SECTION 15545

SECTION 15682 - AIR COOLED PACKAGED WATER CHILLER

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Chiller package.
- B. Charge of refrigerant and oil.
- C. Controls and control connections.
- D. Chilled water connections.
- E. Starters.
- F. Electrical power connections.

1.02 RELATED SECTIONS

- A. Section 15010 - Basic Mechanical Requirements.
- B. Section 15170 - Motors.
- C. Section 15242 - Vibration Isolation.
- D. Section 15280 - Equipment Insulation.
- E. Section 15400 - Testing of Piping Systems.
- F. Section 15510 - Hydronic Piping.
- G. Section 15540 - HVAC Pumps.

1.03 REFERENCES

- A. ANSI/ASHRAE 15 - Safety Code for Mechanical Refrigeration.
- B. ANSI/ASHRAE 90A - Energy Conservation in New Building Design.
- C. ANSI/ASME SEC 8 - Boiler and Pressure Vessel Code.
- D. ANSI/NEMA MG 1 - Motors and Generators.
- E. ARI 590.

1.04 SUBMITTALS

- A. Submit shop drawings under provisions of Section 15010 and Division 1.

- B. Submit shop drawings indicating components, assembly, dimensions, weights and loadings, required clearances, and location and size of field connections. Indicate valves, strainers, and thermostatic valves required for complete system.
- C. Submit product data under provisions of Division 1.
- D. Submit product data indicating rated capacities, weights, specialties and accessories, electrical requirements, wiring diagrams, and part load curves.
- E. Submit written certification that components of package not furnished by manufacturer have been selected in accordance with manufacturers requirements.
- F. Submit manufacturer's installation instructions under provisions of Division 1.
- G. The Manufacturer shall review the contract drawings for space requirements, and state any modifications required for clearances, piping, electrical, and controls.

1.05 OPERATION AND MAINTENANCE DATA

- A. Submit operations data under provisions of Division 1.
- B. Include start-up instructions, maintenance data, parts lists, controls, and accessories. Include trouble- shooting guide.
- C. Submit maintenance data under provisions of Division 1.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Division 1. The Manufacturer's Technicians are to assemble the components that are shipped loose.
- B. The Contractor is to store, protect, and install products under provisions of Division 1.
- C. Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.
- D. The Contractor is to protect units on site from physical damage.

1.07 WARRANTY

- A. Provide ten (10) year warranty on the entire unit, including on parts and labor for the entire machine.
- B. The Manufacturer shall be responsible for the chiller installation to conform to recommended requirements for operating accessibility and maintenance. The Manufacturer shall also provide an authorized factory representative for initial start-up of the machine.

- C. The chiller manufacturer's direct service technicians shall provide unlimited service calls and warranty service (parts and labor) on the chiller for ten years from Date of Substantial Completion. A designated service company by the manufacturer is not acceptable. The chiller manufacturer shall maintain service capabilities no more than 50 miles from the jobsite.

1.08 MAINTENANCE SERVICE

- A. The Manufacturer shall provide two (2) operating inspections the first year and one (1) annual shutdown inspection each ten (10) years.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Dunham-Bush Bohn (Basis of Design).
- B. Pre-approved substitutions per Specification Section 15010.

2.02 MANUFACTURED UNITS

- A. Provide factory assembled, factory tested, single piece, multi-compressor, air-cooled rotary liquid chiller complete with Y-delta closed starter. Contained within the unit cabinet shall be all factory wiring, piping, controls, refrigerant charge (R-22), 115-volt convenience outlet, and special features required prior to field start-up.
- B. Unit shall have completely independent refrigeration circuits with one compressor per circuit.
- C. Unit Cabinet: Galvanized steel casing, zinc phosphatized, and finished with air-dry paint.
- D. Fans: Condenser fans shall be direct-driven propeller type discharging air vertically upward: Fans shall be equipped with permanently lubricated bearings, PVC coated steel wire safety guards, inherent corrosion resistance shafts, and be statically and dynamically balanced.
- E. Compressors:
 - 1. Each compressor shall be direct driven, semi-hermetic, rotary screw type, direct drive, 3,600 rpm, with capacity control slide valve, rolling element bearings, differential refrigerant pressure oil pump and oil heater. The motor shall be a hermetically sealed, two pole squirrel cage induction motor.

Oil separator and filtration devices shall be provided separate from the compressor. Provide check valves in the compressor discharge and lube oil system and a solenoid valve in the lube system.

2. Each compressor shall be mounted on spring vibration isolators with an isolation efficiency of no less than 95 percent.
3. Cycles per hour per compressor shall not exceed six (6).

F. Evaporator:

1. Evaporators shall be dual-circuited with shell-and-tube design and seamless copper tubes rolled into tube sheets.
2. Tubes shall be tested and stamped in accordance with ASME code for refrigerant side working pressure of 300-psig and waterside of 215 psig.
3. Evaporator shall be equipped with removable heads and flanged type water connections.
4. Shell shall be insulated with 3/4 inch closed cell Armaflex foam of maximum K factor 0.26.
5. Evaporator shall be equipped with electric heaters along the shell under the insulation to protect against cooler freeze-up.
6. Evaporator design shall incorporate two (2) independent direct expansion refrigerant circuits.

- G. Condenser: Coil shall be air cooled with integral sub cooler, constructed of aluminum fins mechanically bonded to seamless copper tubes which are then cleaned, dehydrated, and sealed. Condenser coils shall have corrosion coating. The condenser shall be factory leak tested under water with air at 506 psig.

- H. Refrigeration Circuits: Each unit shall have two independent refrigerant circuits with one rotary screw compressor per circuit. Each refrigerant circuit shall include a compressor discharge service valve, liquid line shut off valve, removable core filter drier, liquid line sight glass with moisture indicator, charging port and an electronic expansion valve. Provide fully modulating compressors and electronic expansion valves for variable capacity modulation over the entire operating range.

I. Controls, Safeties, and Diagnostics:

1. Control Panel:

- a. All unit controls shall be housed in a weather tight enclosure with removable plates to allow for connection of power wiring and remote interlocks. All controls, including sensors, shall be factory mounted and tested prior to shipment. Units shall be UL listed.

Microcomputer controls shall provide all control functions including start-up and shutdown, leaving chiller water temperature control,

compressor and electronic expansion valve modulation, fan sequencing, anti-recycle logic, automatic lead/lag compressor starting and load limiting.

- b. The unit control module shall utilize its Adaptive control microprocessor, which shall automatically take action to avoid unit shutdown due to abnormal operating conditions associated with low refrigerant temperature, high condensing temperature and motor current overload. The unit shall shutdown automatically if abnormal operating conditions continue to violate its protective limit.
- c. Unit protective functions shall include loss of chilled water flow, evaporator freezing, loss of refrigerant, low refrigerant pressure, high refrigerant pressure, reverse rotation, compressor starting and running over current, phase loss, phase imbalance, phase reversal, and loss of oil flow.
- d. Provide a menu driven digital display which indicates over 20 operating data points including chilled water set point, current limit set point, leaving chilled water temperature, evaporator and condenser refrigerant pressures and temperatures. It shall also include over 60 diagnostic checks monitored and displayed when a problem is detected.
- e. Provide standard power connections, which shall include main three-phase power, and two 115-volt single-phase power connections for control power and heat tape.

J. Motor Safeties:

- 1. Compressors shall be equipped with the following manual reset-type protections:
 - a. Thermal overload.
 - b. Pressure overload.
 - c. Electrical overload through the use of definite-purpose contactors and calibrated, ambient compensated, magnetic trip circuit breakers. Circuit breakers shall open all 3 phases in the event of an overload in any one phase, or single phasing condition.
- 2. Fan motors shall have inherent over current protection.

K. Operating Characteristics:

- 1. Unit shall be capable of starting and running at outdoor ambient temperatures up to 115 F per maximum load criteria of ARI Standard 590.

2. Unit shall be capable of starting up with 95 F entering water temperature to the evaporator.
- L. Motors:
 1. Compressor motors shall be cooled by suction gas passing around motor windings.
 2. Condenser fan motors shall be 3-phase type with permanently lubricated bearings and class B insulation.
- M. Electrical Requirements:
 1. Unit primary electrical power supply shall be connected to a single point.
 2. Unit shall operate on 3-phase, 60 cycle power at the voltage shown in the equipment schedule.
 3. Unit shall be provided with a factory mounted non-fused disconnect switch with safety interlock to door.
 4. Provide unit with Y-delta type starter.
- N. Special Features:
 1. Provide 4 to 20 MA chilled water reset interface.

PART 3 EXECUTION

3.01 INSTALLATION (RECEIVING, UNLOADING, AND INSTALLING READY ^L FOR OPERATION AND TESTING)

- A. Install in accordance with manufacturer's instructions.
- B. Align chiller package on concrete pad.
- C. Install units on vibration isolators. Refer to Section 15242.
- D. Connect to electrical service. Refer to Section 16180.
- E. Connect chilled water piping. Refer to Section 15510.
- F. Arrange piping for easy dismantling to permit tube cleaning.
- G. Coordinate unit starter with requirements in Section 16480 of the Specifications.

3.02 MANUFACTURER'S FIELD SERVICES

- A. Assemble components shipped separately, charge oil, and refrigerant.

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CHILLER AND FAN REPLACEMENT

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- B. Prepare, test, and start systems under provisions of Division 1 and Supplementary General Conditions.
- C. Supply service of factory-trained representative to perform testing, dehydration and charging of machine, start-up, and instruction on operation and maintenance to Owner.
- D. Supply initial charge of refrigerant and oil, and perform application with factory trained Technicians.

3.03 DEMONSTRATION

- A. Provide systems demonstration under provisions of Division 1.
- B. Demonstrate system operation and verify specified performance. Refer to Section 15990.

END OF SECTION 15682

SECTION 15875 - POWER ROOF VENTILATORS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Centrifugal Roof Exhausters.
- B. Upblast Centrifugal Roof Exhausters.
- C. Roof Curbs.

1.02 RELATED WORK

- A. Section 15010 - Basic Mechanical Requirements.
- B. Section 15170 - Motors.
- C. Section 15242 - Vibration Isolation.
- D. Section 15990 - Testing, Adjusting, and Balancing.
- E. Section 16180 - Equipment Wiring Systems: Electrical Supply to Units.
- F. Section 16480 - Motor Control.

1.03 REFERENCES

- A. AMCA 99 - Standards Handbook.
- B. AMCA 210 - Laboratory Methods of Testing Fans for Rating Purposes.
- C. AMCA 300 - Test Code for Sound Rating Air Moving Devices.
- D. AMCA 301 - Method of Publishing Sound Ratings for Air Moving Devices
- E. SMACNA - Low Pressure Duct Construction Standard.

1.04 QUALITY ASSURANCE

- A. Performance Ratings: Conform to AMCA 210.
- B. Sound Ratings: AMCA 301, tested to AMCA 300.
- C. Fabrication: Conform to AMCA 99.

1.05 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 15010 and Division
- B. Provide product data on wall and roof exhausters, and ceiling and cabinet fans.
- C. Provide fan curves with specified operating point clearly plotted.
- D. Submit sound power levels for both fan inlet and outlet at rated capacity.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS: Submit alternates to engineer of record for review.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Secure roof exhausters with stainless steel screws to roof curb and secure roof curb to roof.

END OF SECTION 15875

SECTION 15990 - TESTING, ADJUSTING, AND BALANCING

PART 1 GENERAL

1.01 Summary Statement

- A. Test and balance of HVAC systems supply, return, and exhaust systems shall be performed by an independent test and balance agency certified by AABC or NEBB. The cost of the TAB services are a part of the base bid for this Contract. The TAB services provided herein shall be completed and the written report submitted to the Engineer a minimum of 15 days prior to Substantial Completion of each project phase. The Owner will then perform a verification TAB. If discrepancies are found, they will be corrected by this Contractor and the Contractor will be responsible to pay for additional trips for the Owner's TAB representatives to verify.

1.02 Related Documents

- A. The requirements set forth in the Bidding Requirements and the Contractual Conditions of Division One shall apply to this Section.
- B. The requirements of Section 15010, Basic Mechanical Requirements, shall be adhered to in the test and balance work which shall include Section 15260, Piping Insulation; Section 15515, Hydronic Specialties; Section 15890, Ductwork; and Section 15975, Building Management and Automatic Temperature Control System.

1.03 General

A. Scope

1. Description

- a. The Contractor shall, at the Contractor's expense, procure the services of an independent testing and balance firm which specializes in the balancing and testing of heating, ventilating and air conditioning systems. This specialty services firm shall balance, adjust and test water circulation, air moving equipment, air distribution and/or exhaust systems as herein specified.
- b. Test and balance work shall not begin until all systems have been completed and are in full working order to the satisfaction of the Project Architect/Engineer and the Owner. This Contractor shall make all preliminary tests and adjustments before advising in writing that test and balance work is ready to begin and shall place all systems and equipment into full operation during each working day of testing and balancing.

- 2. Replacement pulleys (adjustable and non-adjustable), additional balancing dampers, pressure taps, balancing valves, cocks and fittings, etc., required to effect proper air and water balance shall be furnished and installed by this Contractor at no additional cost to the

Owner. This Contractor shall do this work as soon as possible so as not to delay the completion of the test and balance work.

3. Air filters shall be replaced and strainers shall be cleaned by this Contractor before proceeding with test and balance and thereafter as required by the test and balance firm.
4. Systems shall be placed into service using approved start up procedures. This (mechanical) contractor shall be responsible for proper initial setting and adjustment of HVAC equipment, air handlers, VAV boxes, exhaust fans, etc. furnished and installed by him.
5. This Contractor shall provide test openings as required; shall operate HVAC equipment and provide trades persons to assist and make adjustments for test and balance during the process.
6. When the Owner's verification test and balance firm is ready to test according to the established schedule, but is prevented from testing and balancing, making adjustments or taking measurements due to incompleteness of the work, all extra charges for test and balance attributable to the delay may be back charged to this Contractor. The Project Architect/Engineer shall be the judge as to whether a delay has occurred and back charges due the Owner, and which, if judged proper, shall be effected through a Change Order reducing the Contract Sum.
7. The Contractor's test and balance firm shall periodically visit the site during construction of the HVAC system. No less than two visits per phase will be made. Should methods, materials or workmanship being used adversely affect balancing and adjusting work, the test and balance agency shall report its findings in writing to the Contractor with recommendations for correction.
8. The Contractor's test and balance firm has agreed or shall agree to carry out the test and balance in accordance with the AABC National Standards for Total Systems Balance, 1982 or the NEBB Procedural Standards for Testing, Adjusting and Balancing or Environmental Systems, Fourth edition, and in conformance with ASHRAE Handbook, 1991, Chapter 34, Testing, Adjusting and Balancing and as outlined in this Specification Section.
9. This Contractor shall furnish to the testing and balancing agency a complete set of plans and specifications, addenda, shop drawings, schedules and change orders as may be required.

B. Quality Assurance

1. The final result of balancing shall be to provide uniform air temperatures within a two (2) degree F spread in the conditioned space at peak load conditions.

2. All instruments used shall be accurately calibrated within six months of testing and balancing and shall be maintained in good working order.
3. In the event of dispute, the Owner or Contractor or Project Architect/Engineer may choose to provide verification of test and balance reports, and such verification shall be by a third independent agency selected by the Engineer. Reports found to be inaccurate will be disallowed, and the Contractor's test and balance firm will be required to repeat operations under the supervision of the third independent agency until accurate reports are completed and agreed upon, provided the Contractor's TAB firm is found to be at fault in the judgment of the Engineer. The cost of disputed test and balance work shall be borne by the Owner or Contractor (whichever is found to be at fault).

C. Submittals

1. The test and balance firm will submit two (2) copies of data for the testing and balancing for the approval of the Project Architect/Engineer and three (3) file copies to the Owner and two (2) copies to this Contractor.
2. All data and information shall be compiled in a neat, orderly format on 8-1/2" x 11" test forms and shall be signed and sealed by the certified individual as previously described.

2.01 Execution

A. Air Balance

1. This Contractor shall prepare the air systems for balancing and verify same for test and balance firm as follows:
 - a. Mechanically check fans, blowers and air handling equipment and make such available to operate under design conditions.
 - b. Set volume dampers, air dampers and vanes in their normal position.
 - c. Set grilles, diffusers, etc. installed with vanes, blades in their normal position.
 - d. Mechanically check controls, whether they are electronic, electric or pneumatic or a combination thereof, and make available to operate under design conditions.
 - e. Mark damper shafts and locking devices to accurately represent the position of their respective dampers when in optimum position.
2. The Contractor's test and balance firm shall perform the following tests and balance system in accordance with these requirements:

- a. Test and adjust fan RPM to design requirements.
 - b. Test and record motor full load amperes. Verify the sizing and settings of overloads as well as document same on reports. Coordinate with Division 16 to install and size overloads to NEC and manufacturers requirements.
 - c. Make pitot tube traverse of main supply and return ducts and obtain design CFM at fans.
 - d. Test and record system total pressures, suction and discharge.
 - e. Test and adjust system for design CFM recirculated air.
 - f. Test and adjust system for design CFM outside air.
 - g. Test and record coil entering air temperatures (D.B. heating and cooling).
 - h. Test and record coil entering air temperatures (W.B. cooling).
 - i. Test and record coil leaving air temperatures. (D.B. heating and cooling).
 - j. Test and record coil leaving air temperatures (W.B. cooling).
 - k. Adjust all main supply and return air ducts to proper design CFM.
 - l. Adjust all zones to proper design CFM ($\pm 10\%$), supply and return. Show all DDC readings at time of measured readings. Coordinate with Controls Contractor to resolve differences.
 - m. Test and adjust each diffuser, grille, and register to within $\pm 10\%$ of design requirements.
 - n. Each grille, diffuser and register shall be identified as to location, area and system.
 - o. Test and record all room temperatures, D.B. and W.B. Test shall be made near room thermostat where installed at four feet above floor.
3. Size, type and manufacturer of diffusers, grilles, registers, and all tested equipment shall be identified and listed. Manufacturer's ratings on all equipment shall be used to make required calculations.
 4. Readings and tests of diffusers, grilles and registers, shall include test resultant velocity, required CFM and test resultant CFM after adjustments.
 5. In cooperation with the control manufacturer's representative, the test and balance firm shall set adjustments of automatically operated dampers to operate as specified, indicated, and/or noted.

6. Testing and balance firm shall check all controls for proper calibrations and list all controls requiring adjustment by control installers.
7. Diffusers, grilles and registers shall be adjusted by the test and balance firm to minimize drafts in all areas.
8. The test and balance firm shall verify duct work leakage tests. Data from duct work leakage tests shall be tabulated and included with the test and balance report. Leakage tests per SMACNA requirements shall be performed.
9. Tested section of duct work shall be marked by this Contractor and verified by the test and balance firm. All tests and repairs shall be made before duct sections are concealed or insulated.

B. Water Balance

1. This Contractor shall prepare the new and existing water systems for balancing and verify same to test and balance agency in the following manner:
 - a. Open all valves to full open position. Close all by-pass valves. Set modulating valve to full coil flow.
 - b. Check all strainers and, if required, clean same.
 - c. Examine water in system and determine if water has been treated and cleaned. If water appears dirty, test and balance work shall stop and this Contractor shall reclean system as specified in the Project Specifications.
 - d. Check expansion tanks to determine if they are not air bound and if the system is completely full of water.
 - e. Check all air vents at high points of water system and determine if all are installed and operating freely. Make sure all air is removed from the system.
 - f. Set all temperature controls so all coils are calling for full cooling, and determine that this closes all automatic by-pass valves at coils.
 - g. Check operation of automatic by-pass valves.
 - h. Check and set operating temperatures of chillers and heat exchangers to design requirements.
 - i. Complete air balance work must have been accomplished and all work adjusted and corrected before actual water balance is complete.
2. The test and balance firm shall perform the following:
 - a. Check and record water temperatures at inlet side of coils.

- b. Proceed to balance each water coil.
- c. Upon completion of flow readings and adjustments at coils, mark all settings and record data.
- d. Install pressure gages on coils, read pressure drop through coil at set flow rate on-call for full cooling.
- e. Record settings and readings on all gauges as found when testing began, and as left when testing is complete.
- f. Record and check the following items at each cooling element:
 - 1. "Inlet water" temperature.
 - 2. "Leaving water" temperatures.
 - 3. Pressure drop of each coil.

C. Sound Testing

- 1. Using approved instruments, the test and balance firm shall conduct tests in selected areas of the building as specified below. Sound level readings shall be measured in decibels on the "A" and "C" scales of the General Radio Company sound level meter, or equal sound level meter that meets the current American Standards (224.3-1944) based on the acoustic reference power of D.B./RE 10.13 watts. Readings shall set forth the total random sound level of the selected rooms or areas with the system in operation, as compared to total background sound level with the system not in operation. The system increase over the background level shall be recorded in decibels on the "A" and "C" scales. If sound levels are above those listed below, adjustments shall be made by this Contractor to bring the sound level within the range set forth. If this cannot be done with the equipment as installed, recommendations shall be made by the test and balance firm to correct the sound level to within the specified range. Additions of sound traps, insulation, or dampers shall be made by this Contractor under the direction of the balance agency at no additional cost to the Owner, provided the noise is due to Contractor's fault. Sound level readings (in decibels) shall be taken at each diffuser, grille or register in occupied areas. The sound levels shall be approximately 45 degrees to the center of the diffuser, etc., on the "A" and "C" scales of a General Radio Company sound level meter. The computed equivalent sound level meter readings weighting scale "A" (DBA) shall not exceed 40 for general office type space, 35 for classroom and conference room type space and 30 for sensitive areas such as libraries or auditoriums.
- 2. Sound measurements shall be taken in the following locations:
 - a. A typical classroom remote from mechanical equipment rooms.
 - b. A typical classroom adjacent to mechanical equipment room.

- c. Typical offices.
 - d. Special assembly rooms such as auditoriums, music rooms, libraries.
- 3. When a typical space (a, b, or c above) has been tested and passed, all such spaces shall be considered complying. Conversely, if a typical space fails, all such spaces shall be considered as failed and require testing.
 - 4. Unless test results indicate failure to comply with the intention of these Specifications, sound testing shall be done only once, preferably during cooling season.
 - 5. Sound levels at maximum rates shall be listed on the TAB report on a point measured basis as required above.

D. Equipment

- 1. The test and balance agency shall submit, as part of its report, complete identification and operating data on the following:
 - a. Air handling units.
 - b. New and existing air devices (grilles, registers, diffusers).
 - c. VAV boxes.
 - d. Chillers, pumps, etc.
- 2. Pump Impeller Size Requirements
 - a. Test and balance agency shall measure pump characteristics and select the pump impeller diameter required to achieve the design flow conditions of the particular system while optimizing the motor work and balancing valve position in order to alleviate noise caused by turbulence in the valve. Turn these dimensions, along with the installed pump curves with the new pump and system curves, for review by the Engineer. Upon approval by the Engineer, the impeller dimensions shall be turned over to the installing contractor for impeller shaving.

E. Certification

- 1. The test and balance report to the Project Architect/Engineer and to the Owner shall be signed, "sealed" and certified by a certified balancing agent in the State of Florida whose specialty discipline is HVAC, together with a signed statement that this balancer's specialty is HVAC.

END OF SECTION

ELECTRICAL SPECIFICATIONS

DIVISION 16

16010 BASIC ELECTRICAL REQUIREMENTS

16060 ELECTRICAL DEMOLITION FOR REMODELING

16111 CONDUIT

16120 BUILDING WIRE AND CABLE

16130 BOXES

16190 SUPPORTING DEVICES

16195 ELECTRICAL IDENTIFICATION

16440 DISCONNECT SWITCHES