THE UNIVERSITY OF SOUTHERN MISSISSIPPI
Procurement and Contract Services
118 College Drive #5003, Hattiesburg, Mississippi  39406-0001

Date:

Bid No. 16-30

THE UNIVERSITY OF SOUTHERN MISSISSIPPI is considering the purchase of the following item(s). We ask that you submit your bid and retain one copy for your files. Right is reserved to accept or reject any part of your bid. Your quotation will be given consideration if received in Bond Hall, Room 214 on or before:

2:00 p.m. CST

June 28, 2016

TERMS - Bidder should state terms of sale. Our terms are 2% ten days, net 45 days. These terms will apply unless otherwise specified.

AWARDING CONTRACT - Cash terms will not be used as a basis for awarding contracts; however, the University will accept cash discounts when earned.

NOTE: If you cannot quote on the exact material shown, please indicate any exception giving brand name and complete specifications of any alternate. If additional space is required, use a separate sheet or letter of transmittal.

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PROPOSAL MUST BE RETURNED TO THE UNIVERSITY IN A SEALED ENVELOPE. RFP NUMBER AND DATE OF BID OPENING MUST BE SHOWN ON THE OUTSIDE OF THE ENVELOPE.

We quote you as above-F.O.B. The University of Southern Mississippi. Shipment can be made in N/A days from receipt of order. DATE TERMS

Return quotation to Procurement Services at above address.

Signature Required
PROJECT MANUAL FOR

JOHNSON SCIENCE TOWER AND FORREST COUNTY HALL CHILLER UPGRADES 2016

UNIVERSITY OF SOUTHERN MISSISSIPPI
HATTIESBURG, MISSISSIPPI

USING AGENCY:
University of Southern Mississippi
Physical Plant Division
118 College Drive #5058
Hattiesburg, MS 39406

DATE: JUNE 2016
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NOTICE TO BIDDERS

Sealed bids will be received in the Office of the Director of Procurement Services, The University of Southern Mississippi, 118 College Drive #5003, Bond Hall, Room 214, Hattiesburg, Mississippi, until Tuesday, June 28, 2016 @ 2:00 p.m. for the purchase of the following:

Bid 16-30 Chiller Upgrades

Detailed specifications may be secured from the above office upon request or our website https://www.usm.edu/procurement-contract-services/current-bid-opportunities

Right is hereby reserved to reject any or all bids.

Steve Ballew
Director of Procurement and Contract Services
The University of Southern Mississippi
(601) 266-4131

Publish 2 times and charge to The University of Southern Mississippi:

June 9, 2016
June 16, 2016
GENERAL TERMS, CONDITIONS AND INSTRUCTIONS FOR BIDS/PROPOSALS

1.) Failure to examine any drawings, specifications, and instructions will be at bidder’s risk.

2.) Samples of items when called for must be furnished free of expense and if not destroyed in testing, will, upon request, be returned at the bidder’s expense. Request for the return of samples must be made within ten (10) days following opening bids. Each individual sample must be labeled with bidder’s name and manufacturer’s brand name and number.

3.) In order for your bid to be considered, it must be received and time stamped in our office by 2:00 P.M. of the bid opening date. It is the responsibility of the vendor to ensure their bid is received within the appointed time. If your bid package is not received in Bond Hall, Room 214, by 2:00 P.M. of the bid opening date, it will not be considered.

   a. If you are delivering your bid, you need to hand carry the bid package to:

      The University of Southern Mississippi
      Procurement Services
      Bond Hall, Room 214
      Hattiesburg, Mississippi

   b. If you are mailing your bid package via U.S. Postal Service, mail to:

      The University of Southern Mississippi
      Procurement Services
      118 College Drive #5003
      Hattiesburg, MS 39406-0001

   c. If you are express mailing your bid package via Federal Express or UPS, or any other delivery service which requires the use of a physical address, deliver to:

      The University of Southern Mississippi
      Receiving Department
      2609 West 4th Street
      Hattiesburg, MS 39401

4.) Bids or proposals shall not be modified, corrected, altered, or amended after the specified closing time and the opening of such bids, unless otherwise noted in the request for bids or proposals.
5.) The University of Southern Mississippi reserves the right to reject any and all bids, to waive any informality in bids, and unless otherwise specified by the bidders, to accept any items on the bid. If the bidder fails to state the time within which bids must be accepted, it is understood and agreed that The University of Southern Mississippi shall have 60 days to accept.

6.) Contracts and purchases will be made or entered into with the lowest, responsible bidder meeting specifications.

7.) A written purchase order or contract award mailed or otherwise furnished to the successful bidder within the time of acceptance specified in the Invitation for Bid results in a binding contract without further action by either party. The contract shall not be assignable by the vendor in whole or in part without the written consent of The University of Southern Mississippi.

8.) Bid files may be examined during normal working hours by bid participants. Non-participants will be prohibited from obtaining any information relative to the bid until the official award has been made.

9.) If purchase orders or contracts are canceled because of the awarded vendor’s failure to perform or request for price increase, that vendor shall be removed from our bidders’ list for a period of 24 months.

10.) No addendum will be issued within a period of two (2) working days prior to the time and date set for the bid opening. Should it become necessary to issue an addendum within the two-day period prior to the bid opening, the bid date will be reset giving bidders ample time to answer the addendum.

11.) Alternate bids, unless specifically requested or allowed, will not be considered.

12.) Bid openings will be conducted open to the public. However, they will serve only to open the bids. No discussion will be entered into with any vendor as to the quality or provisions of the specifications, and no award will be made either stated or implied at the bid opening. After the close of the bid opening meeting, the bids will be considered to be in the evaluation process and will not be available for review by bidders. Proposal openings are not required to be open to the public; however, the resulting award is open for public inspection.

13.) Prices quoted shall be firm for the term of the contract or for the stated time of acceptance.
14.) The bidder understands that The University of Southern Mississippi is an equal opportunity employer and, therefore, maintains a policy which prohibits unlawful discrimination based on race, color, creed, sex, age, national origin, physical handicap, disability, or any other such discrimination; and the bidder, by signing this bid, agrees during the term of agreement that the bidder will strictly adhere to this policy in its employment practices and provision of products or services.

15.) Bidders must upon request of The University of Southern Mississippi furnish satisfactory evidence of their ability to furnish products or services in accordance with the terms and conditions of these specifications. The University of Southern Mississippi reserves the right to make the final determination as to the bidder’s ability.

16.) Questions or problems arising from bid procedures should be directed to:

The University of Southern Mississippi
Attn: Deidre Edwards
118 College Drive #5003
Hattiesburg, MS 39406-0001
Phone: (601) 266-4131

17.) All items must equal or exceed the specifications listed. The absence of detail specifications or the omission of detail description shall be recognized as meaning that only the best commercial practices are to prevail and that only first quality materials and workmanship are to be used.

18.) It is the intent of the specifications to obtain a product that will adequately meet the needs of the user while promoting the greatest extent of competition that is practicable. It is the responsibility of the prospective bidder to review the entire Invitation to Bid packet and to notify The University of Southern Mississippi if the Specifications, Instructions, General, or Special Conditions are formulated in a manner which would unnecessarily restrict competition.

19.) It shall be incumbent upon the bidders to understand the specifications. Any requests for clarifications shall be in writing and shall be submitted to our Procurement Services office at least five (5) days prior to the time and date set for the bid opening, unless otherwise noted in the bid or proposal specifications. The minimum specifications are used to set a standard and in no case are used with the intention to discriminate against any manufacturer. Bidders should note the name and the manufacturer and model number of the product they propose to furnish and submit descriptive literature.
20.) Trade names, brand names, and/or manufacturer’s information used in these specifications are for the purpose of establishing quality, unless otherwise noted. Bids on products of other qualified manufacturers are acceptable, provided they are demonstrated as equal to those specified in construction, design and suitability. Each bidder shall submit with his bid a complete brochure with pictures on each item and shall point out specifically any deviations from the specified items. Failure to do so may disqualify any bid. Please bid as specified or an approved equal.

21.) A copy of the manufacturer’s standard guarantee/warranty shall accompany and become a part of this bid.

22.) There are no federal or state laws that prohibit bidders from submitting a bid lower than a price or bid given to the U.S. Government. Bidders may bid lower than U.S. Government contract price without any liability as The University of Southern Mississippi is exempt from the provisions of the Robinson-Patman Act and other related laws. In addition, the U.S. Government has no provisions in any of its purchasing arrangements with bidders whereby a lower price to The University of Southern Mississippi must automatically be given to the U.S. Government.

23.) All invoices, unless noted otherwise, are to be billed to:

   The University of Southern Mississippi  
   Accounts Payable  
   118 College Drive #5104  
   Hattiesburg, MS 39406-0001

24.) All equipment bid shall be of current production and of the latest design and construction.

25.) Where all, or part(s), of the bid is requested on a unit price basis, both the unit prices and the extension of the unit prices constitute a basis of determining the lowest responsible and responsive bidder. In cases of error in the extension of price, the unit price will govern.

AA/EOE/ADA1
INSTRUCTIONS TO BIDDERS  
SECTION 00100

PART 1 - GENERAL

1.01 QUESTIONS: Questions should be directed to the Office of Procurement and Contracts. Should a Bidder find discrepancies in, or omissions from, the Drawings or Project Manual, or be in doubt as to their meaning, the Bidder should immediately notify the Office of Procurement and Contracts. The Office of Procurement and Contracts will send written instruction(s) or interpretation(s) to all known holders of the documents and copy the Professional. Neither the Owner, the Professional, nor the Office of Procurement and Contracts will be responsible for any oral instruction or interpretation.

1.02 DISQUALIFICATION OF BIDDER: A Bidder may be disqualified for any of the following reasons:
   A. Failure to comply with the bid requirements.
   B. Bidder is in arrears on existing Contracts with USM or another state agency.
   C. Bidder is, or anticipates being, in litigation or arbitration with USM or another state agency.
   D. Bidder having defaulted on a previous Contract.

1.03 CONDITIONS OF WORK: Each Bidder must fully inform themselves of all conditions relating to the construction of the Project and employment of labor thereon. Failure to do so will not relieve a successful Bidder of obligations to furnish all material and labor necessary to carry out the provisions of the agreement. Insofar as possible, the Bidder must employ methods, or means, which will not cause interruption of, or interference with, the work of any other Bidder, or Contractor.

1.04 EXAMINATION OF SITE: All Bidders, including any general Contractor and Subcontractors, shall visit the building site, compare the Project Manual with any work in place and be informed of all conditions. Failure to visit the site will in no way relieve the successful Bidder from furnishing any materials or performing any work required to complete work in accordance with Drawings and Project Manual without additional cost to the Owner.

1.05 LAWS AND REGULATIONS: The Bidder's attention is directed to the fact that all applicable Mississippi state laws, rules and regulations of all authorities having jurisdiction.

1.06 OBLIGATION OF BIDDER: At the bid opening, each Bidder will be presumed to have inspected the site, read and become thoroughly familiar with the Drawings, if any, and the Project Manual, including all addenda.

1.07 BID DOCUMENT DEPOSIT AND RETURN: The deposit amount is indicated in the Advertisement for Bids. Upon returning the documents to the Professional within ten (10) days of the bid date and in good condition, all document holders will be refunded one-half (1/2) of the deposit. Any general contractor submitting a bid and all mechanical and/or electrical Subcontractors will be refunded one hundred percent (100%) of the deposit on one (1) set and fifty percent (50%) for each additional set. No partial sets of documents will be issued. Selected plan rooms will be issued one (1) set of documents without charge.
PART 2 - PROPOSAL FORM

2.01 METHOD OF BIDDING: Lump sum, single bids received as specified in the Project Manual.

2.02 PROPOSAL FORMS: The Bidder shall make all proposals on forms provided and shall fill all applicable blank spaces without interlineations or alteration and must not write a recapitulation of the work to be done. No oral or telegraphic proposals will be considered.

2.03 SUBSTITUTIONS: No substitutions, qualifications or redefining of the Specification requirements are allowed to be marked on the Proposal Form, unless specifically required by the Bid Documents.

2.04 ADDENDA: Any addenda to the Project Manual issued before or during the time of bidding shall be included in the proposal and become a part of the Request for Bid. The Proposal Form will have ample space to indicate the receipt of addenda. When completing the Proposal Form, the Bidder shall list the Addendum number and the date received in spaces provided.

2.05 BIDDER IDENTIFICATION:

A. Signature: The Proposal Form shall be signed by any individual authorized to enter into a binding agreement for the Business making the bid proposal.

B. Name of Business: The name appearing on the Proposal Form should be the same as the name appearing in the current Mississippi State Board of Contractors Roster.

C. Legal Address: The address appearing on the Proposal Form should be the same address appearing in the current Mississippi State Board of Contractors Roster.
PART 3 - SUBMITTING THE PROPOSAL FORM

3.01 **SUBMITTAL:** A bid must be delivered to the address indicated on the Advertisement for Bids prior to the time and date stated. Bids shall be submitted in *duplicate* and sealed in an opaque envelope marked, mailed or hand-delivered as follows:

```
(In upper left hand corner)
Name of Firm
(As it appears in the current Mississippi State Board of Contractors Roster)

(Bid shall be addressed and delivered to)
The University of Southern Mississippi
118 College Drive #5003
Hattiesburg, Mississippi 39406-001

(In lower left hand corner)
Bid for Project # ________________
Bid for Johnson Science Tower and Forrest County Hall Chiller Upgrades, University of Southern Mississippi
Title ______________________________
______________________________
```

If the Bid is mailed via Federal Express, or a similar service, the envelope containing the bid shall be placed inside a second envelope to prevent inadvertent premature opening of the Bid Proposal.

Mailed Bids will be received up until 5:00 pm, the day prior to bid opening date.

3.02 **MODIFICATION TO BID:** A bidder may modify the bid prior to the scheduled closing time indicated in the Advertisement for Bids in the following manner:

A. **Notification on Envelope:** A modification may be written on the outside of the sealed envelope containing the bid.
B. **Facsimile:** A facsimile (fax) will not be acceptable.
C. **Electronic bids:** Electronic bids will not be acceptable.

3.03 **WITHDRAWAL OF BID:** Any bid may be withdrawn prior to the scheduled time for opening of bids. However, after bids have been opened, they may not be withdrawn until forty-five (45) days after bid opening.

PART 4 - BID OPENING

4.01 **OPENING OF BIDS:** Bids will be publicly opened shortly after the time stated in the Advertisement for Bids. Bidder representatives are invited; however, attendance is not mandatory.

4.02 **IRREGULARITIES:** The omission of any information requested on the Proposal Form may be
considered as an informality, or irregularity, by the awarding public body when in their opinion the omitted information does not alter the amounts contained in the submitted bid proposal, or place other bidders at a disadvantage.

4.03 **PROTEST:** Any protest must be delivered in writing to the Office of Procurement and Contracts within twenty-four (24) hours after the bid opening.

4.04 **ERRORS:** Any claim of error and request for release from bid must be delivered in writing to the Office of Procurement and Contracts within twenty-four (24) hours after the bid opening. The Bidder shall provide sufficient documentation with the written request clearly proving an error was made.

4.05 **AWARD OF BID:** The Owner reserves the right to reject any or all bids. A purchase agreement will be awarded on the basis of the low base bid, or low combination of base bid and those alternates selected by the Owner in any order determined to be in the best interest of the Owner and which produces a total within available funds.

**PART 5 - BIDDER'S CHECKLIST**
The following checklist is for the Bidder's assistance only. It is not inclusive and is not a part of the bid documents; therefore, this checklist should not be included with the Proposal Form when submitting a bid proposal.

5.01 **PROPOSAL FORM:**
   Base Bid
   ( ) Write in the amount of the base bid in words and numbers.

   Addenda
   ( ) Acknowledge the receipt of each addendum by writing in the number of the addendum and the date received.

   Acceptance
   ( ) Proposal is signed by authorized person
   ( ) Legal address of the business listed above

*** END OF SECTION ***
REQUEST FOR BIDS

Johnson Science Tower and Forrest County Hall Chiller Upgrades 2016

The University of Southern Mississippi (USM) is requesting bids for new chillers at Johnson Science Tower and Forrest County Hall Mechanical Plants. There will be one chiller replaced at each plant. The chillers submitted shall be per the specifications and chiller schedule.

This bids are for equipment only. This includes manufacturer’s representative work as indicated in specifications such as pre-startup, startup, and training. Chillers to be installed by USM contractors per manufacturer’s requirements.

The bid proposals shall include the following at a minimum:

- Chiller Submittals
- Performance Selection Data
- Dimensional Information
- Lump Sum Costs
- Recommended spare parts and associated costs
- Training Information
- Warranty Information
- Payment Terms forty-five (45) Days
- Shipping FOB Destination
- No Sales Taxes
- Lead Time

Sealed bids shall be due before June 28th 2:00 pm at the Office of Procurement and Contract Services. The bids shall be time stamped received at the receptionist desk. It is the vendor’s responsibility to ensure bids are received and stamped on time. Any bids stamped June 28th, 2:00 pm or later will not be accepted or opened. The bids will be evaluated by USM for awarding purchase agreement.

If you have any questions or would like to visit site, please contact Anthony Herrin at 601-266-6786.
To: Anthony Herrin  
University of Southern Mississippi  
Physical Plant Division  
118 College Drive #5058  
Hattiesburg, MS 39406-001  
Office: 601-266-4414

Re: University of Southern Mississippi  
JST / FCH Chiller Upgrades 2016

Gentlemen: Having carefully examined the Bidding Documents entitled; JOHNSON SCIENCE TOWER AND FORREST COUNTY HALL CHILLER UPGRADES 2016, as well as the premises and conditions affecting the work, the undersigned

(Company Name) _________________________________________________________________

proposes to furnish all services, labor, and materials required by them in accord with said Documents, without exception, for all work as delineated in the Project Manual Documents.

** Per attached Request for Bids **

For the lump sum of ________________________________

__________________________________________________DOLLARS ($________________________),

which sum is hereinafter called the “Base Bid”.

ALTERNATES:

Alternate # 1: Add to base bid a 2 year extended warranty in addition to the base 3 year warranty. All items shall be covered for 5 years per specifications if Alternate #1 is accepted.

Add to base bid the lump sum of ________________________________

__________________________________________________DOLLARS ($________________________),
BIDDER: ___________________________________________________

BY (Signed):   ________________________________________________

TITLE: _____________________________________________________

DATE: ______________________

Bidder’s Mailing Address: ___________________________________________

___________________________________________

___________________________________________

___________________________________________

If bidder is a partnership, please list names of all Partners:

_____________________________________________________

_____________________________________________________

_____________________________________________________

Bidder Acknowledges receipt of the following addenda:

Addendum No. ________________________ Dated:  ______________________________

Addendum No. ________________________ Dated:  ______________________________

Addendum No. ________________________ Dated:  ______________________________

Addendum No. ________________________ Dated:  ______________________________

END OF SECTION
SECTION 15640 - CENTRIFUGAL WATER CHILLER

PART 1 GENERAL

1.01 DESCRIPTION

A. Furnish two (2) centrifugal chillers water cooled.

B. Sizes and performance per specifications and schedule.

1.02 SECTION INCLUDES

A. Chiller package.

B. Charge of refrigerant and oil.

C. Controls and control connections.

D. Chilled water connections.

E. Condenser water connections.

F. Auxiliary water connections.

G. Starters.

H. Electrical power connections.

1.03 QUALITY ASSURANCE

A. Comply with AHRI requirements for testing and certification of the chillers.

B. Refer to OSHA 29 CFR 1910.95(a) and (b) for Occupational Noise Exposure Standard.

C. Refer to ASHRAE Standard 15, Safety Standard for Refrigeration System, for refrigerant vapor detectors and monitor.

1.04 APPLICABLE PUBLICATIONS


C. ASME SEC VIII - Boiler and Pressure Vessel Code.

D. ANSI/UL 465 - Central Cooling Air Conditioners.

E. AHRI STANDARD 550/590-2011 - Centrifugal, Helical rotary, scroll, and reciprocating water chillers.

F. AHRI Standard 575-2008 Sound

G. AFBMA 9 - Load Ratings and Fatigue Life of Roller Bearings.

H. ASHRAE STANDARD 34 - Number Designation and Safety Classification of Refrigerants


1.05 SUBMITTALS

A. Centrifugal chillers submittals shall include:

1. Rated capacity
2. Full load and part load efficiencies
3. Refrigerant - Acceptable refrigerants on which chiller performance is based are HCFC-123 and HFC-134a. All proposals for chiller performance must include an AHRI approved selection method for the specified refrigerants.
4. Accessories
5. Installation Instructions
6. Start-up procedures
7. Wiring diagrams – include factory and field installed wiring.
8. Refrigerant vapor detectors

B. Submit drawings indicating assembled dimensions, operating weight, load distribution, and required service and access clearances.

C. Submit product data indicating options and specialties, electrical requirements, and wiring diagrams and connections. Indicate accessories, valves, strainers, and thermostatic valves required for the complete system.
D. Submit rigging, installation, and startup procedures. Include operations and maintenance data for both the chiller and starter or variable-speed drive. Include location, size, and type of field piping connections.

E. Submit performance data indicating energy input versus cooling load output from 100 to 25 percent of full load with constant 85F entering condenser water temperature.

F. Submit compressor and product data in table form indicating impeller speed (RPM), number of bearings, type of bearings, high speed impeller shaft RPM, sound pressure level per AHRI 575-1994 (dB), number of stages, number of sets of inlet guide vanes, amount of refrigerant charge (lb), and amount of oil required (gal).

G. Technician’s chiller maintenance and operation manuals.

1.06 VERIFICATION OF CHILLER CAPACITY AND EFFICIENCY

A. FACTORY PERFORMANCE TEST - STANDARD AHRI TOLERANCE TEST

1. The equipment testing shall be conducted in conformance with AHRI Standard 550/590-2011 procedures and tolerances. The conditions in the chiller equipment schedule on the drawings shall be demonstrated in the test, within tolerances allowed by AHRI Standard 550/590-2011.

2. A certified test report of all data shall be submitted to the owner within six weeks of the test completion. The factory certified test report shall be signed by an officer of the chiller manufacturer’s company.

3. If the equipment fails to perform within proposed tolerances, the manufacturer will be allowed to make necessary revisions to his equipment and retest as required. All costs associated with the re-test will be borne by the manufacturer.

4. If it is not demonstrated in the second test that the chiller does meet the performance requirements as stated in this specification herein, then the chiller will not be accepted.

B. All chillers shall be factory performance tested with the proposed refrigerant at 100%, 75%, 50%, and 25% load at the conditions
scheduled on the drawings in an AHRI certified test facility.

1. The manufacturer shall supply a certified test report to confirm performance as specified. Report shall include IPLV verification.

2. Proper AHRI certification documents for the manufacturer's test loop shall be made available for inspection upon request.

C. The factory test instrumentation shall be per AHRI Standard 550/590-2011, and the calibration of all instrumentation shall be traceable to the National Institute of Standards and Technology (NIST, formerly NBS).

D. The performance test shall be run with clean tubes in accordance with AHRI 550/590-2011 to include the following:

1. A downward temperature adjustment per AHRI 550/590-2011 Section C6.3 shall be made to the design leaving evaporator water temperature to adjust from the design fouling to the clean tube condition.

2. An upward temperature adjustment per AHRI 550/590-2011 Section C6.3 shall be made to the design entering condenser water temperature to adjust from the design fouling to the clean tube condition.

3. There shall be no exceptions to conducting the performance test with clean tubes and with temperature adjustments in (1) and (2). The manufacturer shall clean tubes, if necessary, prior to test to obtain a test fouling factor of .00001 h·ft²·°F/Btu.

E. Chiller shall be tested at the factory at 25% part load with 42F Evaporator Leaving water temperature, design evaporator flow, 85F Condenser Entering water temperature and design condenser water flow.

1. Chiller shall be tested to run at these conditions in steady state and demonstrate stable chiller operation without going into surge.

2. Use of hot gas bypass is prohibited.

3. A variable speed drive for compressor motor shall be factory installed on the chiller if required to achieve stable non-surge
operation at these part load conditions.

1.07 SOUND DATA

A. The Centrifugal Chiller shall not exceed a sound pressure level of 85 dBA at 100% load at the conditions scheduled on the drawings with 42F Evaporator Leaving Water Temperature as tested per AHRI Standard 575-2008.

B. To represent the chiller's loudest operating condition and expose any sound problems, a reduction in the temperature of the entering condenser water and/or raising of the leaving chilled water temperature shall not be allowed when determining the Sound Pressure Levels.

C. Sound Pressure Test – All chillers shall be sound tested. Each shall have a sound test conducted at the factory prior to shipment to confirm the submitted Sound Pressure Levels. All data must be measured and presented in strict accordance with AHRI Standard 575-2008. The Centrifugal Chiller shall not exceed sound pressure level of 85 dBA at 100% load at the conditions scheduled on the drawings with 42F Evaporator Leaving Water Temperature as tested per AHRI Standard 575-2008.

1. The sound data points shall be measured simultaneously during the verification of capacity and efficiency as outlined in Section 1.05.
2. No liquid-refrigerant injection will be allowed to reduce the sound pressure level, that reduces the chiller performance.
3. A certified test report of all data shall be submitted to the Owner within six weeks of the test completion. The factory certified test report shall be signed by an officer of the chiller manufacturer's company.
4. If the equipment exceeds the specified sound pressure level, the manufacturer will be allowed to make necessary revisions to his equipment and retest as required. All costs associated with the re-test will be borne by the manufacturer.
5. If it is not demonstrated in the second test that the chiller does meet the sound performance requirements as stated in this specification herein, then the chiller will not be accepted.

1.08 REGULATORY REQUIREMENTS
A. Conform to AHRI Standard 550/590-2011 code for rating and testing of water chillers.


C. Conform to ANSI/ASME SECTION VIII Boiler and Pressure Vessel Code for construction and testing of centrifugal chillers as applicable.

D. Conform to ANSI/ASHRAE STANDARD 15-2007 code for construction and operation of centrifugal chillers.

E. Unit shall bear the AHRI Certification Label for the specific type of water chiller as applicable.

1.09 DELIVERY, STORAGE, HANDLING AND EQUIPMENT ROOM REQUIREMENTS

A. Equipment shall be shipped FOB destination. The chillers shall be delivered to job site(s). Offloading to be coordinated with USM Physical Plant and Mechanical Contractor.

B. Manufacturer shall deliver new chillers within 12 weeks of order. Delivery time shall be included with bids.

C. Comply with manufacturer's installation instructions for rigging, chiller loading, local transportation requirements, unloading, storage, and final setting.

D. Protect chiller and controls from physical damage. Leave factory shipping covers in place until installation. The entire unit must me shrink wrapped with an environmentally recyclable material standard. The material shall include an imbedded desiccant to minimize/eliminate internal moisture.

E. The chiller shall ship with a dry nitrogen charge to eliminate potential charge loss during delivery and construction. The refrigerant monitoring system shall be active at the job site prior to the charging of the chiller.

F. The chiller shall ship with a full charge of oil.

1.10 WARRANTY
A. Chiller manufacturer shall provide complete chiller parts, labor and refrigerant warranty for 36 months (3 years) from startup or 40 months from shipment, whichever occurs first for all chillers. Warranty shall cover any loss of refrigerant. The 3 year warranty shall include the entire chiller including starters, motors, and variable speed drives.

B. The chiller manufacture shall provide to the owner an original manufacturer factory warranty certificate for each chiller listing at minimum chiller model, serial number, and warranty information as specified herein.

C. This refrigerant warranty covers refrigerant that must be replaced due to a part failure resulting from a defect in material or manufacture.

D. All warranty coverage to include all expenses for travel.

E. Third party insurance policies are not acceptable.

PART 2  PRODUCTS

2.01  GENERAL

A. Description: Factory-assembled and tested water chiller complete with compressor, evaporator, condenser, controls, starter, interconnecting unit piping and wiring, indicating accessories, reliefs, oil heater, purge system, mounting frame, and all accessories for operational chiller.

B. Chiller manufacturer shall provide a complete operating charge of refrigerant, and shall install the charge in the chiller at the job site. Refrigerant shall be either R-123 or R-134a.

C. The USM provided contractor shall install centrifugal water chillers as scheduled in the specifications.

D. The units shall produce the specified tonnage per the scheduled data in accordance with AHRI 550/590-2011. The unit shall bear the AHRI certification label as applicable.

E. Storage per ASHRAE Std 147: Chillers using R-134a refrigerant must have a pumpdown capability that isolates the refrigerant charge for storage in a suitable vessel.
F. Refrigeration Transfer: Provide service valves and other factory-installed accessories required to facilitate transfer of refrigerant from the chiller to remote systems.

G. High pressure chillers: Provide Refrigerant Isolation for chillers using 134a refrigerant. Factory install check or manual isolation valves in the compressor discharge line to the condenser and the refrigerant liquid line leaving the condenser to allow for isolation and storage of the full refrigerant charge in the chiller condenser shell. In addition, provide isolation valve on the suction side of compressor from evaporator to allow for isolation and storage of full refrigerant charge in the chiller evaporator shell.

H. Low pressure chillers: Chillers using R-123 refrigerant must have a high efficiency purge system to ensure that any potential possible non-condensable leakage into the vessel is immediately eliminated. The purge run time shall be monitored by the main unit controller as to act as a leak detector if required.

I. Provide manufacturers standard isolation pads.

J. Chillers to match existing piping and power connections as closely as possible.

K. Chillers to fit within existing mechanical room space and entrance. See dimensions on schedule and Part 3 for disassembly requirements. Bidder is responsible for verifying chiller will fit through existing plant entrance or disassembly requirements.
## CHILLER SCHEDULE

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## MANUFACTURERES

A. Chillers shall be Trane CVHE or equal manufactured by York International or Carrier Corporation only.

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B. All requirements of the plans and specifications must be complied with, regardless of the manufacturer.

2.04 COMPRESSOR AND MOTOR

A. The compressor shall be centrifugal Single or multistage, having statically and dynamically balanced impeller, either direct or gear driven. Impeller shaft shall be heat-treated carbon steel of sufficient rigidity to prevent whip or vibration at operating speed. Shaft main bearings shall be of journal type with bronze or babbitt line steel cartridge, aluminum alloy one piece insert type, or rolling element type with L 10 life of a minimum of 200,000 hours. Casing shall be cast iron or steel plate with split sections gasketed and bolted together multistage.

B. Capacity control shall be by means of variable inlet guide vanes in the compressor suction to modulate the chiller capacity from 100 to 10 percent of full unit rated capacity without unstable compressor operation. The inlet guide vanes shall be electrically operated upon the actuation of temperature or pressure sensor.

C. Low pressure refrigerant machines shall be provided when available.

D. Compressor assembly shall be vibration tested at the factory. Vibration shall not exceed 0.15 inches per second. The test data shall be recorded and provided to the customer for approval.

E. The motor shall be hermetically sealed and either suction or liquid refrigerant cooled. Hot gas motor cooling is not acceptable.

1. Motors shall have winding RTD's for temperature sensing on each phase. These temperatures shall be furnished to the unit control panel for monitoring and alarm.

2. Open drive chiller motors shall be provided with mechanical space cooling or ventilation by bidder to offset heat rejection at no additional cost to owner. There is currently no mechanical cooling in either plant other than minimum ventilation. Any open drive chillers shall be able to operate under existing conditions with provided cooling or ventilation.
F. Chillers with speed increasing transmissions shall not exceed 10,000 RPM compressor speed. For gear drive compressor speeds that exceed 4,000 RPM, chiller manufacturer shall annually inspect the gears and all bearings during warranty period. A report shall be forwarded to the owner each year over the warranty period to confirm completion.

G. The impellers shall be fully shrouded and made of a high strength aluminum alloy. Impellers shall be dynamically balanced and over-speed tested at 1.25 times impeller shaft speed.

2.05 LUBRICATION

A. Lubrication System shall be forced feed type and shall provide oil at proper temperature to all parts requiring lubrication.

B. Make provisions to insure lubrication of bearings prior to starting and of shaft seal both on stopping and starting, or bearings and shaft seal shall be submerged in oil.

C. On units providing for forced feed lubrication prior to starting, a differential oil pressure cutout interlocked with compressor starting equipment shall allow compressor to operate only when required oil pressure is provided to bearings.

2.06 EVAPORATOR


B. Evaporator tubes shall be internally and externally enhanced. The minimum tube wall thickness root to root across the entire tube length shall be 0.025 inch. Tubes shall be individually replaceable.

C. The evaporator water piping connections shall be victalic.

D. The evaporator waterbox shall be Non-Marine type.

E. Supply and return head waterboxes shall be designed for a working pressure of 150 psig and shall be factory hydrostatic pressure tested at 150 percent of the design pressure. Provide drain and vent connections in water boxes.

F. Manufacturer shall insulate chiller. Insulation will be 3/4” insulation
and cover all low-temperature surfaces to include the evaporator, waterboxes, and suction elbow. Economizer, if applicable, is insulated with 3/8" insulation. The entirety of both evaporator water boxes shall be insulated.

G. Units with multi-stage compressors shall incorporate an interstage flash vessel "economizer". All units with single stage compressors shall have the condensers circuited for liquid subcooling and be provided with a thermometer well and temperature sensor to monitor the amount of sub-cooling at front control panel.

H. Refrigerant expansion devices shall be fixed plate orifices. If adjustable or float type refrigerant metering devices and thermal expansion valves are furnished instead, they shall be inspected and adjusted by the manufacturer at the end of each year for the first five years of operation to assure equivalent reliability and maintenance to a fixed orifice system. A written report shall be forwarded to the owner each year to confirm completion.

2.07 CONDENSER


B. Condenser tubes shall be internally and externally enhanced. The minimum tube wall thickness root to root across the entire tube length shall be 0.025 inches. Tubes shall be individually replaceable.

C. The condenser water piping connections shall be victalic.

D. The condenser waterbox shall be Non-Marine type.

E. Supply and return head waterboxes shall be designed for a working pressure of 150 psig and shall be factory hydrostatic pressure tested at 150 percent of the design pressure. Provide drain and vent connections in water boxes.

2.08 ECONOMIZER

A. Provide economizer if required by manufacturer.

B. Flash gas shall be piped from economizer to inlet of intermediate stage impeller wheel. In case of rotary compressor flash gas shall
be piped from economizer to the intermediate compressor point.

C. Provide a refrigerant flow control system (float valve or variable/multiple orifice system) to automatically regulate flow of liquid refrigerant through economizer.

D. If external type economizer is used, such economizer shall be constructed and tested in accordance with Section 8 of ASME Boiler and Pressure Vessel Code for working pressures produced by refrigerant used, unless exempt by Section U-1 of the code.

2.09 INSULATION

A. Evaporator, suction piping, compressor, and all other parts subject to condensation shall be factory insulated with 1.0 inch minimum thickness of flexible-elastomeric closed cell thermal insulation, complying with ASTM C534, Type II, for sheet materials.

2.10 PURGE SYSTEM

A. Chillers utilizing HCFC-123 and chillers using refrigerants with vapor pressure less than 14.7 psig shall be supplied with Purge System.

B. Purge unit shall be factory-mounted, complete with necessary, piping, operating and safety controls and refrigerant service valves to isolate the unit from the chilling unit. The purge efficiency must meet ASHRAE Standard 147-2002 paragraph 4.7.

C. Purge unit shall be air, water, or refrigerant cooled.

D. The purge shall be capable of operating when the chiller is idle in accordance with ASHRAE Standard 147-2002, paragraph 4.7.2 (a).

E. Purge system shall be manually or automatically started and stopped, and shall be assembled as a compact unit.

F. Purge system shall include elapsed time meter, refrigerant service valves, piping, and operating controls.

G. When in operation, purge system shall function automatically to remove, water vapor, and condensable gases from refrigeration system and to condense, separate, and return to system any refrigerant present therein.
2.11 MOTOR LOAD LIMITER

A. Provide a sensing and control system, which will limit maximum load current of compressor motor to a manually selectable percentage of 40 percent to 100 percent of full load current.

B. System shall sense compressor motor current and limit it by modulating inlet guide vanes at the compressor, overriding other controls in their ability to increase loading, but not overriding their ability to reduce loading.

2.12 RUPTURE DISCS AND RELIEFS

A. Chillers utilizing HCFC-123 shall be supplied with all metal, non-fragmented with reverse buckling design rupture disc and a safety relief valve downstream of the rupture disc.

B. Chillers using refrigerants HFC-134a shall be supplied with single or multiple reseating type, spring-loaded relief valve.

2.13 CONTROLS

A. The chiller shall be controlled by a unit mounted, stand-alone Direct Digital Control (DDC) system. A dedicated chiller microprocessor control panel is to be supplied with each chiller by the chiller manufacturer.

B. The chiller control panel shall provide an analog output signal that shall indicate the condenser refrigerant pressure or condenser/evaporator differential refrigerant pressure. The actual refrigerant pressure must but sensed with a transducer. Calculated refrigerant pressure is not permitted.

C. The chiller control panel shall provide condenser limit control including a pressure transducer and interconnecting piping and wiring. This control shall be used to avoid high condenser refrigerant pressure tripouts. The control shall take action in response to the condenser refrigerant pressure. Whenever this control is in effect, the panel will automatically indicate that the chiller is in adaptive mode and if the condition exists for more than 30 seconds, a limit warning alarm shall energize. The actual refrigerant pressure must but sensed with a transducer. Calculated refrigerant pressure is not permitted.
D. Enclosure shall be unit mounted NEMA 250 Type 1.

E. A color, touch sensitive liquid crystal display (LCD) shall be unit mounted and a minimum of 12.1” diagonal. The display shall be fully adjustable in height and viewing angle. Animated graphical representations of chiller subsystem operation shall be used to enhance the user interface.

F. Display shall consist of a menu driven interface with easy touch screen navigation to organized subsystem reports for compressor, evaporator, condenser, purge and motor information as well as associated diagnostics. The controller shall display all active diagnostics and a minimum of 20 historical diagnostics.

G. The controller shall have the ability to display all primary subsystem operational parameters on dedicated trending graphs. The operator must be able to create up to 6 additional custom trend graphs, choosing up to 10 unique parameters for each graph to trend log data parameters simultaneously over an adjustable period and frequency polling.

H. The chiller control panel shall provide control of chiller operation and monitoring of chiller modules, sensors, actuators, relays and switches. The chiller control panel shall include controls to safely and efficiently operate the chiller.

I. Safeties - the chiller control panel shall provide the following manually reset safeties:

1. Low chilled water temperature
2. Low evaporator refrigerant temperature or pressure
3. High condenser refrigerant pressure
4. Loss of evaporator or condenser water flow
5. High or low oil pressure
6. Low differential oil pressure
7. Low oil temperature
8. High oil temperature
9. High motor winding temperatures
10. High motor current
11. Starter/AFD function faults
12. Sensor faults
13. Unit controls operation

J. The chiller control panel or starter shall incorporate advanced motor
protection to safeguard the motor throughout the starting and running cycles from the adverse effects of:

1. Current phase loss
2. Current phase unbalance
3. Current phase reversal
4. Under/Over voltage
5. Motor current overload
6. Distribution fault protection with auto restart consisting of three-phase current sensing devices that monitor the status of the current
7. Starter contactor fault protection
8. Starter transition failure

K. The chiller control panel shall be capable of displaying system data in I-P or SI units.

L. The front of the chiller control panel shall display the following in clear language, without the use of codes, look-up tables, or gauges:

1. Run time
2. Number of starts
3. Current chiller operating mode
4. Chilled water set point and set point source
5. Electrical current limit set point and set point source
6. Entering and leaving evaporator water temperatures
7. Entering and leaving condenser water temperatures
8. Saturated evaporator and condenser refrigerant temperatures
9. Evaporator and condenser approach temperatures
10. Evaporator and condenser refrigerant pressure
11. Oil tank temperature
12. Oil tank pressure
13. Oil pump discharge pressure
14. Differential oil pressure
15. Bearing oil temperatures
16. Compressor motor current per phase
17. Compressor motor percent RLA
18. Compressor motor voltage per phase
19. kW energy consumption and power factor
20. Compressor motor winding temperatures per phase
21. Purge operating mode
22. Purge operating status
23. Time until next purge run
24. Daily pumpout - 24 hours
25. Avg daily pumpout - 7 Days  
26. Purge refrigerant compressor suction temp  
27. Purge liquid temp (chiller condenser saturated refrigerant temperature)  
28. Daily pumpout limit/alarm  

M. The chiller control panel shall provide password protection of all setpoints.  

N. Control authority must be capable of handling at least four conditions: Off, local manual at the chiller, local automatic at the chiller and automatic control through a remote source.  

O. The chiller control panel shall provide evaporator freeze protection and low limit control to avoid low evaporator refrigerant temperature trip-outs during critical periods of chiller operation. Whenever this control is in effect, the controller shall indicate that the chiller is in adaptive mode. If the condition exists for more than 30 seconds, a limit warning alarm relay shall energize.  

P. The chiller control panel shall provide individual relay outputs to start/stop the evaporator and condenser water pumps. The condenser water pump relay output can be used to enable the cooling tower temperature controls.  

Q. The chiller control panel shall provide leaving chilled water temperature reset based upon return water temperature.  

R. The chiller control panel shall be capable of providing short cycling protection.  

S. Provide communication interface (BACnet/IP) to communicate all of the above factory installed controls required in this specification to the existing TRANE Summit Building Automation System.  

1. Chiller manufacture shall provide factory trained service technician on site to work with controls contractor to establish controls communication between chiller and the existing Trane Summit Building Automation System.  
2. USM to provide controls contractor to assist factory technician with integration of new equipment.  

2.14 STARTERS
A. LOW VOLTAGE, UNIT MOUNTED, STAR DELTA STARTER

1. Motor starter shall be a Factory Installed and Wired Unit Mounted Star-Delta Closed Transition Starter and shall have a NEMA 1A gasketed enclosure.
2. Motor starters shall include incoming line provisions for the number and size cables shown on the drawings. Incoming line lugs shall be copper mechanical type.
3. Contactors shall be sized properly to the chiller full load currents.
4. Each motor starter shall include a 4 KVA control power transformer with fused primary and secondary. Control relays shall be provided within the motor starter to interface with the control panel.
5. If the chiller main processor does not include an advanced motor protection system, the starter shall include an advanced motor protection system incorporating electronic three phase current overloads and current transformers. This electronic motor protection system shall monitor and protect against the following conditions:
   a. Current phase loss
   b. Current phase unbalance
   c. Current phase reversal
   d. Under/Over line voltage
   e. Motor current overload during startup and running
   f. Momentary power loss protection with auto restart consisting of three-phase current sensing devices that monitor the status of the current. Restart inhibit is active and looks at motor RTDs to maximize starts/hour.
   g. Starter contactor fault protection
   h. Starter transition failure
   i. Distribution fault protection.
6. The starter shall be able to operate in temperatures up to 104 degrees F.
7. All field supplied wires, bus bars, and fittings shall be copper only.
8. Provide factory installed non-fused disconnect switch.

B. LOW VOLTAGE VARIABLE SPEED DRIVE (VSD), UNIT MOUNTED

1. Chiller shall be furnished with Variable Speed Drive in place
of Star Delta Starter only if required to achieve stable non-surge operation at 25% part load with 42F Evaporator Leaving water temperature, 85F Condenser Entering water temperature and design flow rates. Stable non-surge operation shall be demonstrated at factory test.

2. The centrifugal water chiller shall be furnished with a liquid cooled variable speed drive (VSD) as shown on the drawings. The VSD shall be factory mounted on the chiller and shipped completely factory assembled, wired and tested.

3. The VSD will be specifically designed to interface with the centrifugal water chiller controls and allow for the operating ranges and specific characteristics of the chiller. The VSD control logic shall optimize chiller efficiency by coordinating compressor motor speed and compressor inlet guide vane position to maintain the chilled water setpoint while avoiding surge. If a surge is detected, VSD surge avoidance logic will make adjustments to move away from and avoid surge at similar conditions in the future.

4. The VSD efficiency shall be 97% or better at full speed and full load. Fundamental displacement power factor shall be a minimum of 0.96 at all loads.

5. The VSD shall be solid state, microprocessor based pulse-width modulated (PWM) design. The VSD shall be voltage and current regulated. Output power devices shall be IGBT transistors.

6. Power semi-conductor and capacitor cooling shall be from a liquid cooled heatsink.

7. The VSD shall be refrigerant cooled to minimize maintenance and maximize cooling efficiency. If a water cooling design is used, especially an open loop condenser water design, a cleanable shell and tube heat exchanger must be supplied. Plate and frame heat exchangers are not allowed.

8. The VSDs shall each be furnished in a NEMA 1 metal enclosure having as minimum a short circuit current rating (SCCR) of 65,000 amps per UL 508. It will include three phase input lugs plus a grounding lug for electrical connections, output motor connection via factory installed bus bars and all components properly segregated and completely enclosed in a single metal enclosure.
   a. Enclosure shall include a padlockable, door-mounted circuit breaker with shunt trip and AIC rating of 65,000 amps.
   b. The entire chiller package shall be UL/CUL listed.
9. The VSD shall be tested to ANSI/UL Standard 508 and shall be listed by a Nationally Recognized Testing Laboratory (NRTL) as designated by OSHA.

10. The VSD design shall include a standard integrated active rectification control system to limit total demand distortion (TDD) in current at the VSD to less than or equal to 5% as measured at the VSD input, in compliance to recommendations stated in IEEE 519-1992.
   a. If optional active or passive filters are used to meet the less than or equal to 5% TDD, then the losses associated with the filter shall be included in the chiller performance on the selection (adjust penalties accordingly).
   b. If a remote mounted filter is used to meet the less than or equal to 5% TDD, then the losses associated with the filter shall be included in the chiller performance on the selection (adjust penalties accordingly). Additionally, the remote filter must be brought in and tested along with the chiller for all applicable tests.
   c. If a remote mounted filter is used and is required to be tested, the contractor is responsible for all associated installation costs of the remote filter for testing.

11. Input shall be nominal [460 - 480V, 60Hz] [380 - 415V, 50Hz], three phase AC power, ± 10 percent of nominal voltage.

12. Line frequency 38-60 hertz.

13. The VSD shall include the following features:
   a. All control circuit voltages are physically and electrically isolated from power circuit voltage.
   b. 150% instantaneous torque available for improved surge control.
   c. Soft start, adjustable linear acceleration, coast-to-stop.
   d. Insensitivity to incoming power phase sequence.
   f. Output line-to-line short circuit protection.
   g. Line-to-ground short circuit protection.
   h. Protection from phase loss at AFD input.
   i. Protection from phase reversal/imbalance.
   j. Protection from over/under-voltage.
   k. Protection from over-temperature.

14. The following VSD status indicators shall be available to facilitate startup and maintenance:
a. Output speed in hertz and rpm.
b. Input line voltage.
c. Input line kW.
d. Output/load amps.
e. Average current in percent RLA.
f. Load power factor.
g. Fault.
h. VSD transistor temperature.

1.5. Service Conditions - at full output power:
a. No external venting or heat exchangers shall be required.
b. Operating ambient temperature of 32°F - 104°F (0°C - 40°C).
c. Room ambient up to 95% relative humidity.
d. Elevation up to 3300 feet (1000 meters). For every 300 feet (90 meters) above 3300 feet, the rated output current shall be decreased by 1%.

2.15 Refrigerant Monitor

A. Chiller manufacturer shall provide one (1) continuously operating Trane model RMWE or equal refrigerant vapor monitor, code approved for this application. The purpose of the refrigerant monitor is to detect leakage of refrigerant from locations where the refrigerant is either stored or used inside the mechanical room.

B. Mechanical contractor shall install and wire the refrigerant monitor in the mechanical room.

C. Refrigerant Monitor Performance

1. Refrigerant monitor shall be capable of detecting concentrations of 1 ppm for low-level leak detection of both the refrigerant type used in the new chiller (R-123 or R-134a) and the refrigerant type used in the existing chiller to remain (R-11). Monitor shall be factory-calibrated for both of the appropriate refrigerants.

2. Monitor shall have four sample points which will allow contractor to install tubing to sense refrigerant at four distinct points inside the mechanical room.

3. All monitors shall be capable of continuously monitoring the machinery room for the refrigerant used in the system. Monitor design and construction shall be compatible with
temperature, humidity, barometric pressure and voltage fluctuations of the machinery room operating environment.

4. The refrigerant monitor shall provide an alarm relay output which energizes when the monitor detects a refrigerant level at or above the TLV®-TWA (or toxicity measurement consistent therewith) for both refrigerant types and shall also energize a light and audible alarm mounted on the monitoring device. Light and audible alarm shall be provided integral to the refrigerant monitor.

5. Provide a remote light and buzzer to be installed and wired outside of the mechanical room to the refrigerant monitor by the mechanical contractor.

6. The refrigerant vapor monitor shall provide a failure relay output, separate from those described above, that energizes when the monitor detects a fault in its operation. Examples of faults include low airflow through the monitor, circuit failure, and a saturated or absent sensor signal. This output shall signal an alarm condition to the building operator so that the monitor can be checked and returned to operation.

D. Operating instructions that detail the calibration and maintenance requirements of the refrigerant vapor monitor in use shall be accessible to machinery room maintenance personnel. Calibration and maintenance of the refrigerant monitor shall be included in the general maintenance procedures for the machinery room.

2.16 Self Contained Breathing Apparatuses

A. Chiller manufacturer shall provide one (1) self-contained breathing apparatuses (SCBA) code approved for this application, to be installed by mechanical contractor.

B. Each SCBA shall be furnished with 30 minute aluminum tank and a mounting case.

PART 3 EXECUTION

3.01 INSTALLATION – TO BE PERFORMED BY OTHERS (USM CONTRACTORS)

A. Install in accordance with manufacturer's instructions.

B. Provide for connection to electrical service. Include for connection of oil pump if required.
C. Provide for connection of electrical wiring between starter and chiller control panel, oil pump, and purge unit.

D. Furnish and install necessary auxiliary water piping for oil cooling units if required.

E. Arrange piping for easy dismantling to permit tube cleaning.

F. Provide piping from chiller relief device to outdoors. Size as recommended by manufacturer.

G. The following Equipment Room Requirements must be provided and installed by the mechanical contractor:

1. Follow minimum standards for refrigeration systems as required by ANSI/ASHRAE Standard 15-2007 paying special attention to requirements for air monitoring, ventilation, self-contained breathing apparatus, and leak detection to assure the safety of chiller plant operating personnel.

2. Install proper outside exhaust of chiller refrigerant relief device(s), discharge header(s), and purge unit(s). Route exhaust to the outside of the building and away from all air intakes in compliance with ANSI/ASHRAE Standard 15-2007. Per ASHRAE Std 147, medium pressure units with relief valves only shall have rupture discs also to minimize refrigerant leakage.

3. Install a refrigerant monitor that can be calibrated for appropriate refrigerant(s), capable of detecting concentrations of minimum ppm for low-level leak detection to assure the safety of chiller plant operating personnel.

4. Install suitable audible and visual alarms that activate well below the Acceptable Exposure Level (AEL) of the specific refrigerant(s) to alert persons inside and outside of the equipment room that a refrigerant leak condition exists.

5. Storage per ASHRAE Std 147: Chillers using R-134a refrigerant must have a pumpdown capability that isolates the refrigerant charge for storage in a suitable vessel.

6. Provide one (1) Self Contained Breathing Apparatuses.

3.02 MANUFACTURER'S FIELD SERVICES

A. Start-up of chiller shall be performed by a factory trained service technician.
B. Field Disassembly: As necessary the Chiller Manufacturer shall disassemble the chiller outside of the mechanical room to allow the Mechanical Contractor to move the disassemble chiller components to the new chiller location shown on the plans. After the mechanical contractor has moved the chiller components to the location of the chiller shown on the plans, the chiller manufacturer shall reassemble the chiller. Disassembly and reassembly of chiller must be performed 100% by manufacturer's factory trained technicians.

1. See overall chiller approximate dimensions on schedule.
2. Bidder is responsible for sizing chiller to fit within existing footprint.
3. Bidder is responsible for configuring piping connections approximately to existing.

C. Applied chiller manufacturer shall maintain service office and shop no more than 100 miles from the job site, with a minimum of five factory trained centrifugal chiller technicians.

D. The manufacturer shall furnish complete submittal wiring diagrams of the chiller(s) starter(s) and associated components like cooling towers, pumps, interlocks, etc. as applicable for field maintenance and service.

E. Factory authorized representative shall provide Owner with minimum four (4) hours training on maintenance, start/stop procedures, and operation.

F. Factory representative shall perform leak test prior to starting of chillers. This is to be done at the site once chiller is in place and ready for startup.

3.03 STARTING OF SYSTEMS

A. Coordinate Schedule for start-up of various equipment and systems.

B. Notify Professional and Owner seven (7) days prior to start-up of each system.

C. Verify each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, or
other conditions which may cause damage.

D. Verify that tests, meter readings and specified electrical characteristics agree with those required by the equipment or system manufacturer.

E. Verify wiring and support components for equipment are complete and tested.

F. Manufacturer to provide authorized representative to be present at site to inspect, check and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

G. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.04 DEMONSTRATION AND INSTRUCTIONS

A. Manufacturer’s representative shall demonstrate operation and maintenance of Products to Owner's personnel.

B. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.

C. Demonstrate start-up, operation, control, adjustment, troubleshooting, servicing, maintenance, and shutdown of each item of equipment at agreed-upon times, at designated location.

D. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

END OF SECTION
SUPPLEMENTAL DRAWINGS

EXISTING JOHNSON SCIENCE TOWER PLANT

JST CHILLER TO BE REPLACED