



## **STATE OF NORTH CAROLINA**

**The University of North Carolina at Chapel Hill**

**Invitation for Bid #: 3000012445**

**Chilled Water Infrastructure Expansion Bernard Chiller Plant**

**Date Issued: 08/07/2025**

**Submit Written Questions: 08/14/2025 at 1:00PM EST**

**Bid Opening Date: 09/08/2025**

**At 01:00 PM EST**

**Direct all inquiries concerning this IFB to:**

**Marcy Moore**

**MRO Category Manager**

**Email: [Mmrowlan@unc.edu](mailto:Mmrowlan@unc.edu)**



## STATE OF NORTH CAROLINA

### Invitation for Bids #

**3000012445**

For internal State agency processing, including tabulation of bids, provide your company's eVP (Electronic Vendor Portal) Number. Pursuant to G.S. 132-1.10(b) this identification number shall not be released to the public. **This page will be removed and shredded, or otherwise kept confidential**, before the procurement file is made available for public inspection.

**This page shall be filled out and returned with your bid.  
Failure to do so shall be sufficient cause to reject your bid.**

\_\_\_\_\_  
Vendor Name

\_\_\_\_\_  
Vendor eVP #

**Note: For a contract to be awarded to you, your company (you) must be a North Carolina registered vendor in good standing. You must enter the vendor number assigned through eVP (Electronic Vendor Portal). If you do not have a vendor number, register at <https://vendor.ncgov.com/vendor/login>**

**STATE OF NORTH CAROLINA**  
***The University of North Carolina at Chapel Hill***

Refer <u>ALL</u> Inquiries regarding this IFB to: <b>Marcy Moore</b>	Invitation for Bids # 3000012445
	Bids will be publicly opened: 09/08/2025 at 1:00PM
Using Agency: University of Chapel Hill	Commodity No. and Description: Prepurchased Equipment Process
Requisition No.: 1001070655	Variable Frequency Drives Bid Set

Zoom Link for Opening if you would like to join:

<https://us04web.zoom.us/j/77110389832?pwd=MyXhqSoXxX9ax4U2lOs3zQv8aF7RPo.1>

**EXECUTION**

In compliance with this Invitation for Bids (IFB), and subject to all the conditions herein, the undersigned Vendor offers and agrees to furnish and deliver any or all items upon which prices are bid, at the prices set opposite each item within the time specified herein.

By executing this bid, the undersigned Vendor understands that false certification is a Class I felony and certifies that:

- this bid is submitted competitively and without collusion (G.S. 143-54),
- that none of its officers, directors, or owners of an unincorporated business entity has been convicted of any violations of Chapter 78A of the General Statutes, the Securities Act of 1933, or the Securities Exchange Act of 1934 (G.S. 143-59.2), and
- it is not an ineligible Vendor as set forth in G.S. 143-59.1.

Furthermore, by executing this bid, the undersigned certifies to the best of Vendor’s knowledge and belief, that:

- it and its principals are not presently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from covered transactions by any Federal or State department or agency.

As required by G.S. 143-48.5, the undersigned Vendor certifies that it, and each of its sub-Contractors for any Contract awarded as a result of this IFB, complies with the requirements of Article 2 of Chapter 64 of the NC General Statutes, including the requirement for each employer with more than 25 employees in North Carolina to verify the work authorization of its employees through the federal E-Verify system.

As required by Executive Order 24 (2017), the undersigned vendor certifies will comply with all Federal and State requirements concerning fair employment and that it does not and will not discriminate, harass, or retaliate against any employee in connection with performance of any Contract arising from this solicitation.

G.S. 133-32 and Executive Order 24 (2009) prohibit the offer to, or acceptance by, any State Employee associated with the preparing plans, specifications, estimates for public Contract; or awarding or administering public Contracts; or inspecting or supervising delivery of the public Contract of any gift from anyone with a Contract with the State, or from any person seeking to do business with the State. By execution of this bid response to the IFB, the undersigned certifies, for Vendor’s entire organization and its employees or agents, that Vendor are not aware that any such gift has been offered, accepted, or promised by any employees or agents of Vendor’s organization.

By executing this bid, Vendor certifies that it has read and agreed to the **INSTRUCTION TO VENDORS** and the **NORTH CAROLINA GENERAL TERMS AND CONDITIONS incorporated herein**. These documents can be accessed from the ATTACHMENTS page within this document.

**Failure to execute/sign bid prior to submittal may render bid invalid and it MAY BE REJECTED. Late bids cannot be accepted.**

COMPLETE/FORMAL NAME OF VENDOR:		
STREET ADDRESS:	P.O. BOX:	ZIP:
CITY & STATE & ZIP:	TELEPHONE NUMBER:	TOLL FREE TEL. NO:
PRINCIPAL PLACE OF BUSINESS ADDRESS IF DIFFERENT FROM ABOVE (SEE INSTRUCTIONS TO VENDORS ITEM #21):		
PRINT NAME & TITLE OF PERSON SIGNING ON BEHALF OF VENDOR:	FAX NUMBER:	
VENDOR’S AUTHORIZED SIGNATURE:	DATE:	E-MAIL:

Bid Number: 65-3000012445

Vendor: \_\_\_\_\_

**VALIDITY PERIOD**

Offer shall be valid for at least sixty (60) days from date of bid opening, unless otherwise stated here: \_\_\_\_\_ days, or if extended by mutual agreement of the parties. Any withdrawal of this offer shall be made in writing, effective upon receipt by the agency issuing this IFB.

**BID ACCEPTANCE**

If your bid is accepted, all provisions of this IFB, along with the written results of any negotiations, shall constitute the written agreement between the parties ("Contract"). THE UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL GENERAL TERMS AND CONDITIONS are incorporated herein and shall apply. Depending upon the Goods or Services being offered, other terms and conditions may apply, as mutually agreed.

**FOR STATE USE ONLY:** Offer accepted and Contract awarded this \_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, as indicated on the attached certification, by \_\_\_\_\_  
**(Authorized Representative of University of Chapel Hill)**

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## **1.0 PURPOSE AND BACKGROUND**

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### **OWNER PRE-PURCHASED EQUIPMENT**

A. This equipment will be prepurchased by the Owner and furnished to the successful Contractor after award for expediting delivery and installation as if the Contractor purchased the equipment directly.

B. Owner will make available manufacturer provided shop drawings of Owner prepurchased equipment for review by the Contractor. Contractor shall review shop drawings to ascertain that Contractor has included necessary labor and materials to install equipment and complete system it serves.

C. Contractor shall be responsible for arranging/coordinating delivery of Owner prepurchased equipment and all other related logistics and activities. This includes directing the delivery truck to the jobsite, coordinating the date and time of delivery, and receipt of the equipment at the jobsite. Manufacturer is responsible for equipment until it is unloaded at the jobsite by the Contractor.

D. Contractor shall install Owner prepurchased equipment and all appurtenances. This shall include, but not be limited to; unloading, rigging and setting equipment in place, making connections, starting, testing and installing equipment in accordance with manufacturer's recommendations, and maintaining equipment until such time as project is accepted by Owner. Perform all work and provide materials and connections for Owner furnished equipment in accordance with drawings and scope of work under all related specifications.

E. The following summarizes the general responsibilities of the equipment manufacturer:

1. Provide shop drawings and submittal data.
2. Manufacture and delivery of equipment including coordination of exact delivery date and supervision of rigging, unloading, and setting.
3. Lead equipment check-out, testing, and start-up process and submit report(s).
4. Provide touch up paint.
5. Provide O&M documentation.
6. Provide Owner training and participate in commissioning process.

**Please see attached Chilled Water Infrastructure Expansion Bernard Chiller Plant**

### **1.1 CONTRACT TERM**

This section intentionally omitted

## **2.0 GENERAL INFORMATION**

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### **2.1 INVITATION FOR BID DOCUMENT**

The IFB is comprised of the base IFB document, any attachments, and any addenda released before Contract award, which are incorporated herein by reference.

### **2.2 E-PROCUREMENT FEE**

This section intentionally omitted.

### **2.3 NOTICE TO VENDORS REGARDING IFB TERMS AND CONDITIONS**

It shall be the Vendor's responsibility to read the Instructions to Vendors, the University of North Carolina at Chapel Hill General Terms and Conditions, all relevant exhibits and attachments, and any other components made a part of this IFB and comply with all requirements and specifications herein. Vendors also are responsible for obtaining and complying with all Addenda and other changes that may be issued in connection with this IFB.

If Vendors have questions or issues, or exceptions regarding any component within this IFB, those must be submitted as questions in accordance with the instructions in the BID QUESTIONS Section. If the University determines that any changes will be made as a result of the questions asked, then such decisions will be communicated in the form of an IFB addendum. The University may also elect to leave open the possibility for later negotiation of specific provisions of the Contract that have been addressed during the question-and-answer period, prior to contact award.

Other than through this process or negotiation under 01 NCAC 05B.0503, the State rejects and will not be required to evaluate or consider any additional or modified terms and conditions submitted with Vendor’s bid. This applies to any language appearing in or attached to the document as part of the Vendor’s bid that purport to vary any terms and conditions or Vendors’ instructions herein or to render the bid non-binding or subject to further negotiation. Vendor’s bid shall constitute a firm offer that shall be held open for the period required herein (“Validity Period” above).

**The University may exercise its discretion to consider Vendor proposed modifications. By execution and delivery of this IFB Response, the Vendor agrees that any additional or modified terms and conditions, whether submitted purposely or inadvertently, shall have no force or effect, and will be disregarded unless expressly agreed upon through negotiations and incorporated by way of a Best and Final Offer (BAFO). Noncompliance with, or any attempt to alter or delete, this paragraph shall constitute sufficient grounds to reject Vendor’s bid as nonresponsive.**

**2.4 IFB SCHEDULE**

The table below shows the *intended* schedule for this IFB. The State will make every effort to adhere to this schedule.

Event	Responsibility	Date and Time
Issue IFB	University	08/07/2025
Hold Pre-Bid Conference/Site Visit	University	N/A
Submit Written Questions	Vendor	08/14/2025 at 1:00PM EST
Provide Responses to Questions	University	ASAP
Submit Bids	Vendor	09/08/2025 at 1:00PM EST
Contract Award	University	ASAP
Contract Effective Date	University	ASAP

**2.5 SITE VISIT or PRE-BID CONFERENCE**

This section intentionally omitted.

**2.6 BID QUESTIONS**

Upon review of the IFB documents, Vendors may have questions to clarify or interpret the IFB in order to submit the best bid possible. To accommodate the Bid Questions process, Vendors shall submit any such questions by the “Submit Written Questions” date and time provided in the IFB SCHEDULE Section above, unless modified by Addendum.

Written questions shall be e-mailed to *mmrowlan@unc.edu* by the date and time specified above. Vendors will enter “IFB - 3000012445: Questions” as the subject for the email. Question submittals will include a reference to the applicable IFB section and be submitted in a format shown below:

Reference	Vendor Question
IFB Section, Page Number	Vendor question ...?

Questions received prior to the submission deadline date, the University’s response, and any additional terms deemed necessary by the University will be posted in the form of an addendum to *the electronic Vendor Portal (eVP)*, <https://evp.nc.gov>, and shall become an Addendum to this IFB. No information, instruction or advice provided orally or informally by any University

personnel, whether made in response to a question or otherwise in connection with this IFB, shall be considered authoritative or binding. Vendors shall rely *only* on written material contained in an Addendum to this IFB.

**2.7 BID SUBMITTAL**

**IMPORTANT NOTE: This is an absolute requirement.** Vendor shall bear the risk of late submission due to unintended or unanticipated delay. It is the Vendor’s sole responsibility to ensure its bid has been received as described in this IFB by the specified time and date of opening. The date and time of receipt will be marked on each bid when received. Any bid or portion thereof received after the bid submission deadline will be rejected.

If applicable to this IFB and using eVP, all proposal responses shall be submitted electronically via the electronic Vendor Portal (eVP). Additional information can be found at the eVP updates for Vendors link: <https://eprocmement.nc.gov/news-events/evp-updates-vendors>.

Failure to submit a bid in strict accordance with these instructions shall constitute sufficient cause to reject a Vendor’s bid(s). Vendors are strongly encouraged to allow sufficient time to upload bids.

Critical updated information may be included in Addenda to this IFB. It is important that all Vendors responding on this IFB periodically check the State’s eVP website for any Addenda that may be issued prior to the bid opening date. All Vendors shall be deemed to have read and understood all information in this IFB and all Addenda thereto.

**2.8 BID CONTENTS**

Vendors shall populate all attachments of this IFB that require the Vendor to provide information and include an authorized signature where requested. Failure to provide all required items, or Vendor’s submission of incomplete items, may result in the University rejecting Vendor’s bid, in the University’s sole discretion

Vendor IFB responses shall include the following items and attachments, which shall be arranged in the following order:

- a) Primary Cover Letter, which must contain all of the following; (i) a statement that confirms that the Vendor has read the IFB in its entirety, including all links, and all Addenda released in conjunction with the IFB; (ii) a statement that the Vendor agrees to perform in accordance with the scope of work, requirements, and specifications contained herein; and (iii) Vendor’s agreement to comply with all instructions, terms and condition, and attachments.
- b) Title Page: Include the company name, address, phone number and authorized representative along with the Bid Number.
- c) Completed and signed version of EXECUTION PAGES, along with the body of the IFB.
- d) Signed receipt pages of any addenda released in conjunction with this IFB, if required to be returned.
- e) Completed version of ATTACHMENT A: PRICING
- f) Completed version of ATTACHMENT D: HUB SUPPLEMENTAL VENDOR INFORMATION
- g) Completed version of ATTACHMENT E: CUSTOMER REFERENCE FORM
- h) Completed version of ATTACHMENT F: LOCATION OF WORKERS UTILIZED BY VENDOR
- i) Completed and signed version of ATTACHMENT G: CERTIFICATION OF FINANCIAL CONDITION
- j) Completed and signed version of ATTACHMENT H: VENDOR REQUEST FOR EO50 PRICE-MATCHING, if applicable

**2.9 ALTERNATE BIDS**

Unless provided otherwise in this IFB, Vendor may submit alternate bids for comparable Goods, various methods or levels of Service(s), or that propose different options. Alternate bids must specifically identify the IFB requirements and advantage(s) addressed by the alternate bid. Any alternate bid, in addition to the marking described above, must be clearly marked with the legend: “Alternate Bid #\_\_\_ [for ‘name of Vendor’]”. Each bid must be for a specific set of Goods and Services and must include

specific pricing. If a Vendor chooses to respond with various offerings, each must be offered with a separate price and be contained in a separate bid. Each bid must be complete and independent of other bids offered.

## **2.10 DEFINITIONS, ACRONYMS, AND ABBREVIATIONS**

Relevant definitions for this IFB are provided in 01 NCAC 05A .0112 and in the Instructions to Vendors referenced below which are incorporated herein by this reference.

## **3.0 METHOD OF AWARD AND BID EVALUATION PROCESS**

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### **3.1 METHOD OF AWARD**

North Carolina G.S. 143-52 provides a general list of criteria the University shall use to award contracts, as supplemented by the additional criteria herein. The Goods or Services being procured shall dictate the application and order of criteria; however, all award decisions shall be in the University's best interest.

All responsive bids will be reviewed, and award or awards will be based on the responsive bid(s) offering the lowest price that meets the specifications to include any required verifications set out herein such as but not limited to past performance, references, and financial documents.

While the intent of this IFB is to award a Contract(s) to a single Vendor for all line items the University reserves the right to make separate awards to different Vendors for one or more line items, to not award one or more line items or to cancel this IFB in its entirety without awarding a Contract, if it is considered to be most advantageous to the University to do so.

If a Vendor selected for award is determined by the University to be a non-resident of North Carolina, all responsive bids will be reviewed to determine if any of them were submitted by a North Carolina resident Vendor who requested an opportunity to match the price of the winning bid, pursuant to Executive Order #50 and G.S. 143-59 (for more information, please refer to ATTACHMENT H: VENDOR REQUEST FOR EXECUTIVE ORDER #50 PRICE MATCHING. If such bid(s) are identified, the University will then determine whether any such bid falls within the price-match range, and, if so, make a Contract award in accordance with the process that implements G.S. 143-59 and Executive Order #50.

The University reserves the right to waive any minor informality or technicality in bids received.

### **3.2 CONFIDENTIALITY AND PROHIBITED COMMUNICATIONS DURING EVALUATION**

While this IFB is under evaluation, the responding Vendor, including any subcontractors and suppliers, is prohibited from engaging in conversations intended to influence the outcome of the evaluation. See the Paragraph 29 of the Instructions To Vendors entitled COMMUNICATIONS BY VENDORS.

Each Vendor submitting a bid to this IFB, including its employees, agents, subcontractors, suppliers, subsidiaries and affiliates, is prohibited from having any communications with any person inside or outside the using agency; issuing agency; other government agency office or body (including the purchaser named above, any department secretary, agency head, members of the General Assembly and Governor's office); or private entity, if the communication refers to the content of Vendor's bid or qualifications, the content of another Vendor's proposal, another Vendor's qualifications or ability to perform a resulting contract, and/or the transmittal of any other communication of information that could be reasonably considered to have the effect of directly or indirectly influencing the evaluation of proposals, the award of a contract, or both.

Any Vendor not in compliance with this provision shall be disqualified from evaluation and award. A Vendor's proposal may be disqualified if its subcontractor and/or supplier engage in any of the foregoing communications during the time that the procurement is active (*i.e.*, the issuance date of the procurement until the date of contract award or cancellation of the procurement). Only those discussions, communications or transmittals of information authorized or initiated by the issuing agency for this IFB or inquiries directed to the purchaser named in this IFB regarding requirements of the IFB (prior to proposal submission) or the status of the award (after submission) are excepted from this provision.

### 3.3 BID EVALUATION PROCESS

Only responsive submissions will be evaluated.

**The University will conduct an evaluation of responsive Bids, as follows:**

Bids will be received according to the method stated in the Bid Submittal section above.

All bids must be received by the issuing agency not later than the date and time specified in the IFB SCHEDULE Section above, unless modified by Addendum. Vendors are cautioned that this is a request for offers, not an offer or request to contract, and the University reserves the unqualified right to reject any and all offers at any time if such rejection is deemed to be in the best interest of the University.

At the date and time provided in the IFB SCHEDULE Section above, unless modified by Addendum, the bids from each responding Vendor will be opened publicly and all offers (except those that have been previously withdrawn, or voided bids) will be tabulated. The tabulation shall be made public at the time it is created. When negotiations after receipt of bids is authorized pursuant to G.S. 143-49 and 01 NCAC 05B.0503, only the names of offerors and the Goods and Services offered shall be tabulated at the time of opening. If negotiation is anticipated, cost and price shall become available for public inspection at the time of the award. Interested parties are cautioned that these costs and their components are subject to further evaluation for completeness and correctness and therefore may not be an exact indicator of a Vendor's pricing position.

At their option, the evaluators may request oral presentations or discussions with any or all Vendors for clarification or to amplify the materials presented in any part of the bid. Vendors are cautioned, however, that the evaluators are not required to request presentations or other clarification—and often do not. Therefore, all bids should be complete and reflect the most favorable terms available from the Vendor. Prices bid cannot be altered or modified as part of a clarification.

Bids will generally be evaluated, based on completeness, content, cost and responsibility of the Vendor to supply the requested Goods and Services. Specific evaluation criteria are listed in Section 3.1 METHOD OF AWARD.

Upon completion of the evaluation process, the University will make Award(s) based on the evaluation and post the award(s) to the State's eVP website under the IFB number for this solicitation. Award of a Contract to one Vendor does not mean that the other bids lacked merit, but that, all factors considered, the selected bid was deemed most advantageous and represented the best value to the University.

The University reserves the right to negotiate with one or more Vendors, or to reject all original offers and negotiate with one or more sources of supply that may be capable of satisfying the requirement, and in either case to require Vendor to submit a Best and Final Offer (BAFO) based on discussions and negotiations with the University.

### 3.4 PERFORMANCE OUTSIDE THE UNITED STATES

Vendor shall complete ATTACHMENT F: LOCATION OF WORKERS UTILIZED BY VENDOR. In addition to any other evaluation criteria identified in this IFB, the University may also consider, for purposes of evaluating proposed or actual contract performance outside of the United States, how that performance may affect the following factors to ensure that any award will be in the best interest of the University:

- a) Total cost to the University
- b) Level of quality provided by the Vendor
- c) Process and performance capability across multiple jurisdictions
- d) Protection of the University's information and intellectual property
- e) Availability of pertinent skills
- f) Ability to understand the University's business requirements and internal operational culture
- g) Particular risk factors such as the security of the University's information technology
- h) Relations with citizens and employees
- i) Contract enforcement jurisdictional issues

### **3.5 INTERPRETATION OF TERMS AND PHRASES**

This IFB serves two functions: (1) to advise potential Vendors of the parameters of the solution being sought by the University; and (2) to provide (together with other specified documents) the terms of the Contract resulting from this procurement. The use of phrases such as “shall,” “must,” and “requirements” are intended to create enforceable contract conditions. In determining whether bids should be evaluated or rejected, the University will take into consideration the degree to which Vendors have proposed or failed to propose solutions that will satisfy the University’s needs as described in the IFB. Except as specifically stated in the IFB, no one requirement shall automatically disqualify a Vendor from consideration. However, failure to comply with any single requirement may result in the University exercising its discretion to reject a bid in its entirety.

## **4.0 REQUIREMENTS**

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This Section lists the requirements related to this IFB. By submitting a bid, the Vendor agrees to meet all stated requirements in this Section, as well as any other specifications, requirements, and terms and conditions stated in this IFB. If a Vendor is unclear about a requirement or specification or believes a change in a requirement would allow for the University to receive a better bid, the Vendor is encouraged to submit these items in the form of a question during the question and answer period in accordance with the Bid Questions Section above.

SEE SCOPE OF WORK ATTACHED

### **4.1 PRICING**

Bid price shall constitute the total cost to the University for delivery fully assembled and ready for use, including all applicable charges for shipping, delivery, handling, administrative and other similar fees. Complete ATTACHMENT A: PRICING FORM and include in Vendor’s response.

### **4.2 ESTIMATED QUANTITIES**

This section is intentionally omitted.

### **4.3 PRODUCT IDENTIFICATION**

#### **SUITABILITY FOR INTENDED USE**

Vendors are requested to offer only items directly complying with the specifications herein or comparable items which will provide the equivalent capabilities, features and diversity called for herein. The University reserves the right to evaluate all bids for suitability for the required use and to award the one best meeting requirements and considered to be in the University’s best interest.

### **4.4 TRANSPORTATION AND IDENTIFICATION**

The Vendor shall deliver Free-On-Board (FOB) Destination to any requested location within the State of North Carolina with all transportation costs and fees included in the total bid price.

When an order is placed using a purchase order, the purchase order number shall be shown on all packages and shipping manifests to ensure proper identification and payment of invoices. If an order is placed without using a purchase order, such as via phone, the Buyer’s name shall be show on all packages. A complete packing list shall accompany each shipment. Vendors shall not ship any products until they have received an order.

#### 4.5 DELIVERY AND INSTALLATION

##### Delivery

The Vendor shall deliver Free-On-Board (FOB) Destination to the following location(s): **For completion by Vendor:** Delivery will be made from \_\_\_\_\_ (city, state) within \_\_\_\_\_ consecutive calendar days after receipt of purchase order. Promptness of delivery may be used as a factor in the award criteria.

Delivery shall not be considered to have occurred until installation has been completed. Upon completion of the installation, the Vendor shall remove and properly dispose of all waste and debris from the installation site. The Vendor shall be responsible for leaving the installation area clean and ready to use.

##### Installation

- A. Install VFD system in accordance with details, approved submittals and manufacturer's instructions and recommendations.
- B. Provide field low voltage wiring of VFD system components. Provide field interconnecting wiring between VFD and filters, line reactors and/or by-pass starter if bypass starter is specified and the wiring is not installed at factory. Install wiring in metal conduit and in accordance with Electrical sections of Division 26 and applicable Electrical Code.
- C. Provide control wiring between interlocks in VFD control circuits and driven motor's disconnect switches. Interlock VFD control circuits with driven motor's disconnect switches where such motor disconnect switches are provided. Disconnecting on-line motor shall shut down VFD. VFD shall restart upon reconnection of motor.
- D. Do not connect ground from one unit to another unit's cabinet.
- E. Use separate conduits for incoming and outgoing power conductors from each unit.
- F. Use separate conduit for control wiring for each unit. Do not combine control wiring with power wiring.
- G. Use minimum 18 ga shielded wiring with ground for control wiring.
- H. Install floor mounted drives on concrete housekeeping pad and minimum 3/4" thick 50 durometer, neoprene rubber isolation pad. Install wall-mounted drives on metal framing in accordance with Section 26 0529.

#### 4.6 AUTHORIZED RESELLER

This section is intentionally omitted

#### 4.7 WARRANTY

Manufacturer's standard warranty shall apply. Vendors shall include a copy of the manufacturer's standard warranty with the bid response.

Vendor warrants that all equipment furnished under this IFB will be newly manufactured, of good material and workmanship. The warranty will apply from date equipment is put into operation for a minimum period of twelve (12) months or the length of the manufacturer's warranty, whichever is longer. Such warranty shall cover the cost of all defective parts replacement, labor, freight, and technicians' travel at no additional cost to the University, or as specified by the Purchasing Agency herein. To the extent not superseded by the terms of this paragraph, manufacturer's warranty terms shall apply. Vendor's warranty shall be at least the level of coverage provided for its comparable customers.

The report of a problem does not presuppose that every call must result in an "on-site" visit for service/repair. The Vendor and/or service sub-contractor shall utilize best efforts to resolve problems in a timely fashion by using acceptable servicing methods to include, but not limited to, verbal problem analysis and remote diagnosis. The warranty requirement does not impose any additional duty on the University to make other than normal and good faith problem resolution efforts or

Bid Number: 65-3000012445

Vendor: \_\_\_\_\_

expenditures of time. Vendor shall be responsible for compliance with warranty terms by any third-party service provider. Vendor shall provide contact information for warranty service provider, below.

Vendor is authorized by manufacturer to repair equipment offered during the warranty period?  YES  NO

Will the Vendor provide warranty service?  YES  NO, a manufacturer-authorized third party will perform warranty service.

**Contact information** for warranty service provider:

Company Name: \_\_\_\_\_

Company Address: \_\_\_\_\_  
\_\_\_\_\_

Contact Person (name): \_\_\_\_\_

Contact Person (phone number): \_\_\_\_\_

Contact Person (email): \_\_\_\_\_

**4.8 MAINTENANCE OPTION**

This section is intentionally removed.

**4.9 DESCRIPTIVE LITERATURE**

**DESCRIPTIVE LITERATURE/CERTIFICATION**

Each bid shall be accompanied by complete descriptive literature, specifications, certifications, and all other pertinent data necessary for thorough evaluation of the item(s) offered and sufficient to determine compliance of the item(s) with the specifications. Failure to include such information to shall be a sufficient basis for rejection of the bid.

**4.10 HUB PARTICIPATION**

Pursuant to North Carolina General Statute G.S. 143-48, it is State policy to encourage and promote the use of small, minority, physically handicapped, and women contractors in purchasing Goods and Services. As such, this IFB will serve to identify those Vendors that are minority owned or have a strategic plan to support the State’s Historically Underutilized Business program by meeting or exceeding the goal of 10% utilization of diverse firms as 1st or 2nd tier subcontractors. Vendor shall complete ATTACHMENT D: HUB SUPPLEMENTAL VENDOR INFORMATION.

**4.11 REFERENCES**

Vendors shall provide at least three (3) references, using ATTACHMENT E: CUSTOMER REFERENCE FORM, for which your company has supplied the exact model of equipment offered. The University *may* contact these users to determine quality level of the offered equipment; as well as, but not limited to user satisfaction with Vendor performance. Information obtained *may* be considered in the evaluation of the bid.

**4.12 VENDOR’S REPRESENTATIONS**

If the bid results in an award, Vendor agrees that it will not enter any agreement with a third party that may abridge any rights of the University under the Contract. If any Services, deliverables, functions, or responsibilities not specifically described in this solicitation are required for Vendor’s proper performance, provision and delivery of the Service and deliverables under a resulting Contract, or are an inherent part of or necessary sub-task included within such service, they will be deemed to be implied by and included within the scope of the contract to the same extent and in the same manner as if specifically described in the Contract. Unless otherwise expressly provided herein, Vendor will furnish all of its own necessary management, supervision, labor, facilities, furniture, computer and telecommunications equipment, software, supplies and materials necessary for the Vendor to provide and deliver the Services and/or other Deliverables.

#### **4.13 FINANCIAL STABILITY**

As a condition of contract award, the Vendor must certify that it has the financial capacity to perform and to continue to perform its obligations under the Contract; that Vendor has no constructive or actual knowledge of an actual or potential legal proceeding being brought against Vendor that could materially adversely affect performance of this Contract; and that entering into this Contract is not prohibited by any contract, or order by any court of competent jurisdiction

Each Vendor shall certify it is financially stable by completing the ATTACHMENT G: CERTIFICATION OF FINANCIAL CONDITION. The University is requiring this certification to minimize potential performance issues from contracting with a Vendor that is financially unstable. This Certification shall be deemed continuing, and from the date of the Certification to the expiration of the Contract, the Vendor shall notify the University within thirty (30) days of any occurrence or condition that materially alters the truth of any statement made in this Certification.

#### **4.14 AGENCY INSURANCE REQUIREMENTS MODIFICATION**

This section is intentionally omitted. Please see standard Terms and Conditions attached.

#### **4.15 NC COVID-19 VACCINATION AND TESTING REQUIREMENT**

This section is intentionally omitted.

#### **4.16 FEDERAL COVID-19 VACCINATION REQUIREMENT**

This section is intentionally omitted.

#### **4.17 LOBBYING ACTIVITY CERTIFICATION FOR FEDERAL GRANTS**

This section is intentionally omitted.

### **5.0 PRODUCT SPECIFICATIONS**

---

#### **5.1 SPECIFICATIONS**

See the Scope of Work document, Chilled Water Infrastructure Expansion Bernard Chiller Plant

SCO ID 22-25588-02H, Code: 42123-355/42323-305

Pre-purchased Equipment Process Variable Frequency Drives

- A. Provide Variable Frequency Drives (VFD) for each pump and fan sized to accommodate motors shown on drawings or schedules. Provide all VFDs from same manufacturer. Refer to the mechanical drawings for the VFD schedule.
- B. VFD manufacturer shall review driven equipment and motors for VFD compatibility. Submit written statement from manufacturer of driven equipment along with VFD shop drawing submittals, indicating verification of compatibility.
- C. VFD shall vary speed of its respective pump, fan or other driven equipment motor in response to either 4-20 mA control signal provided by Controls Contractor.
- D. VFD system shall consist of the following: 1. Variable frequency drive(s). 2. UL Listed disconnect device. 3. NEC recognized disconnect device (circuit breaker). 4. Internal reactor with minimum 5% impedance or equivalent input line reactor. 5. Operator keypad and display unit. 6. All components shall be in a common enclosure with single point wiring. 7. All auxiliary power shall be derived locally from a CPT inside the enclosure. 8. Provide internal fan(s) for cooling.
- E. Drives shall have SCCR (short circuit current rating) of 65 kA.

F. All VFD system components, including (but not limited to) input filters, drive, output filters, harmonic filters, etc. shall be located within a common enclosure, with a single point electrical connection for supply wiring and a single point electrical connection for wiring to load (motor). Enclosure shall be properly sized and equipped with fans for cooling all components.

**Please see attached Chilled Water Infrastructure Expansion Bernard Chiller Plant for additional details.**

## **5.2 CERTIFICATION AND SAFETY LABELS**

All manufactured items and/or fabricated assemblies subject to operation under pressure, operation by connection to an electric source, or operation involving a connection to a manufactured, natural, or LP gas source shall be constructed and approved in a manner acceptable to the appropriate state inspector which customarily requires the label or re-examination listing or identification marking of the appropriate safety standard organization; such as the American Society of Mechanical Engineers for pressure vessels; the Underwriters Laboratories and /or National Electrical Manufacturers' Association for electrically operated assemblies; or the American Gas Association for gas operated assemblies, where such approvals of listings have been established for the type of device offered and furnished. Further, all items furnished shall meet all requirements of the Occupational Safety and Health Act (OSHA), and state and federal requirements relating to clean air and water pollution.

## **5.3 DEVIATIONS**

The nature of all deviations from the Specifications listed herein shall be clearly described by the Vendor. Otherwise, it will be considered that items offered by the Vendor are in strict compliance with the Specifications provided herein, and the successful Vendor shall be required to supply conforming goods. Deviations shall be explained in detail on an attached sheet. However, no implication is made or intended by the University that any deviation will be acceptable. Do not list objections to the North Carolina General Terms and Conditions in this section.

## **6.0 CONTRACT ADMINISTRATION**

---

All Contract Administration requirements are conditioned on an award resulting from this solicitation. This information is provided for the Vendor's planning purposes

### **6.1 CONTRACT MANAGER AND CUSTOMER SERVICE**

This section is intentionally omitted.

### **6.2 POST AWARD PROJECT REVIEW MEETINGS**

This section is intentionally omitted.

### **6.3 CONTINUOUS IMPROVEMENT**

The University encourages the Vendor to identify opportunities to reduce the total cost the University. A continuous improvement effort consisting of various ideas to enhance business efficiencies as performance progresses.

### **6.4 PERIODIC STATUS REPORTS**

This section is intentionally omitted.

### **6.5 ACCEPTANCE OF WORK**

Performance of the work and delivery of Goods shall be conducted and completed at least in accordance with the Contract requirements and recognized and customarily accepted industry practices. Performance shall be considered complete when the Services or Goods are approved as acceptable by the Contract Administrator.

Acceptance of work products shall be based on the following criteria: See Scope of work.

The University shall have the obligation to notify Vendor, in writing ten (10) calendar days following completion of such work

or delivery of a deliverable described in the Contract that it is not acceptable. The notice shall specify in reasonable detail the reason(s) it is unacceptable. Acceptance by the University shall not be unreasonably withheld; but may be conditioned or delayed as required for reasonable review, evaluation, installation, or testing, as applicable to the work or deliverable. Final acceptance is expressly conditioned upon completion of all applicable assessment procedures. Should the work or deliverables fail to meet any specifications, acceptance criteria or otherwise fail to conform to the Contract, the University may exercise any and all rights hereunder, including, for Goods deliverables, such rights provided by the Uniform Commercial Code, as adopted in North Carolina.

## **6.6 INVOICES**

Vendor shall invoice the Purchasing Agency. The standard format for invoicing shall be Single Invoices meaning that the Vendor shall provide the Purchasing Agency with an invoice for each order. Invoices shall include detailed line item information to allow Purchasing Agency to verify pricing at point of receipt matches the correct price from the original date of order. At a minimum, the following fields shall be included on all invoices:

Vendor's Billing Address, Customer Account Number, NC Contract Number, Order Date, Buyer's Order Number, Manufacturer Part Numbers, Vendor Part Numbers, Item Descriptions, Price, Quantity, and Unit of Measure.

**INVOICES MAY NOT BE PAID UNTIL AN INSPECTION HAS OCCURRED AND THE GOODS ACCEPTED.**

## **6.7 DISPUTE RESOLUTION**

During the performance of the Contract, the Parties agree that it is in their mutual interest to resolve disputes informally. Any claims by the Vendor shall be submitted in writing to the University's Contract Manager for resolution. Any claims by the University shall be submitted in writing to the Vendor's Project Manager for resolution. The Parties shall agree to negotiate in good faith and use all reasonable efforts to resolve such dispute(s).

During the time the Parties are attempting to resolve any dispute, each shall proceed diligently to perform their respective duties and responsibilities under this Contract. The Parties will agree on a reasonable amount of time to resolve a dispute. If a dispute cannot be resolved between the Parties within the agreed upon period, either Party may elect to exercise any other remedies available under the Contract, or at law. This provision, when agreed in the Contract, shall not constitute an agreement by either party to mediate or arbitrate any dispute.

## **6.8 PRODUCT RECALL**

Vendor expressly assumes full responsibility for prompt notification to the Buyer listed on the face of this IFB of any product recall in accordance with the applicable state or federal regulations. The Vendor shall support the University, as necessary, to promptly replace any such products, at no cost to the University.

### **6.9.1 PRICE ADJUSTMENTS**

Prices proposed by the Vendor shall be firm against any increase for 60 days from the effective date of the Contract.

Price increase requests shall be submitted in writing to the Contract Lead, which shall include the reason(s) for the request and contain supporting documentation for the need. Price increases will be negotiated and agreed to by both the University and Vendor in advance of any price increase going into effect. The University is not obligated to accept pricing adjustments or increases and reserves the right to accept or reject them in part or in whole. Price de-escalation or decreases may be requested by the University at any time.

It is understood and agreed that orders will be shipped at the established Contract prices in effect on the date an order is placed. Invoicing that deviates from this provision may result in Contract to cancellation.

## **6.10 CONTRACT CHANGES**

Contract changes, if any, over the life of the Contract shall be implemented by contract amendments agreed to in writing by the University and Vendor. Amendments to the contract can only be made through the contract administrator.

**ATTACHMENTS**

**\*\*IMPORTANT NOTICE\*\***

**RETURN THE REQUIRED ATTACHMENTS WITH YOUR RESPONSE**  
FOLLOW THE LINKS TO ACCESS EACH ATTACHMENT

**ATTACHMENT A: PRICING**

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No attachment associated with this IFB. **Please submit all costs including transportation on a standard company quote document with a line for "TOTAL COST TO THE UNIVERSITY".**

**ATTACHMENT B: INSTRUCTIONS TO VENDORS**

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The Instructions to Vendors, which are incorporated herein by this reference, may be found here:

<https://www.doa.nc.gov/divisions/purchase-contract/vendor-forms>

**ATTACHMENT C: NORTH CAROLINA GENERAL TERMS & CONDITIONS**

---

The North Carolina General Terms and Conditions, which are incorporated herein by this reference, may be found here:

<https://www.doa.nc.gov/divisions/purchase-contract/vendor-forms>

**ATTACHMENT D: HUB SUPPLEMENTAL VENDOR INFORMATION**

---

Complete and return the Historically Underutilized Businesses (HUB) Vendor Information form, which can be found at the following link:

<https://www.doa.nc.gov/divisions/purchase-contract/vendor-forms>

**ATTACHMENT E: CUSTOMER REFERENCE FORM**

---

Complete and return the Customer Reference Form, which can be found at the following link:

<https://www.doa.nc.gov/divisions/purchase-contract/vendor-forms>

**F: LOCATION OF WORKERS UTILIZED BY VENDOR**

---

Complete and return the Location of Workers Utilized by Vendor, which can be found at the following link:

<https://www.doa.nc.gov/divisions/purchase-contract/vendor-forms>

**ATTACHMENT G: CERTIFICATION OF FINANCIAL CONDITION**

---

Complete, sign, and return the Certification of Financial Condition, which can be found at the following link:

<https://www.doa.nc.gov/divisions/purchase-contract/vendor-forms>

**ATTACHMENT H: VENDOR REQUEST FOR EO50 PRICE-MATCHING**

---

Complete, sign, and return the Vendor Request for EO50 Price-Matching, which can be found at the following link:

<https://www.doa.nc.gov/divisions/purchase-contract/vendor-forms>

**\*\*\* Failure to Return the Required Attachments May Eliminate  
Your Response from Further Consideration \*\*\***



THE UNIVERSITY  
*of* NORTH CAROLINA  
*at* CHAPEL HILL

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# Chilled Water Infrastructure Expansion Bernard Chiller Plant

SCO ID 22-25588-02H, Code: 42123-355 / 42323-305  
UNC Bldg. No. xxx

## Prepurchased Equipment Process Variable Frequency Drives Bid Set

Submitted by:



1414 Raleigh Road, Suite 305  
Chapel Hill, North Carolina 27517  
(919) 419-9802  
License No. C-2982

AEI Project No. 23480-02

July 22, 2025

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### SPECIFICATIONS

#### SECTION TITLE

#### DIVISION 23 - HEATING, VENTILATING, AND AIR-CONDITIONING

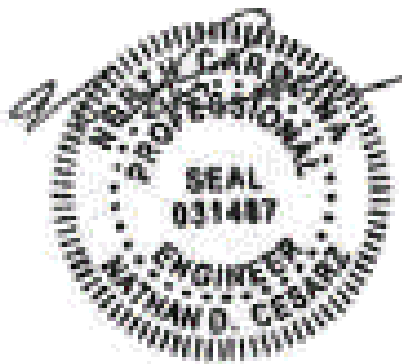
23 0514 Process Variable Frequency Drive (VFD) System

### DRAWINGS

#### SHEET TITLE

B.M.601 Mechanical Schedules

### CERTIFICATION



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**SECTION 23 0514  
PROCESS VARIABLE FREQUENCY DRIVE (VFD) SYSTEM**

**PART 1 - GENERAL**

**1.1 OWNER PRE-PURCHASED EQUIPMENT**

- A. This equipment will be prepurchased by the Owner and furnished to the successful Contractor after award for expediting delivery and installation as if the Contractor purchased the equipment directly.
- B. Owner will make available manufacturer provided shop drawings of Owner prepurchased equipment for review by the Contractor. Contractor shall review shop drawings to ascertain that Contractor has included necessary labor and materials to install equipment and complete system it serves.
- C. Contractor shall be responsible for arranging/coordinating delivery of Owner prepurchased equipment and all other related logistics and activities. This includes directing the delivery truck to the jobsite, coordinating the date and time of delivery, and receipt of the equipment at the jobsite. Manufacturer is responsible for equipment until it is unloaded at the jobsite by the Contractor.
- D. Contractor shall install Owner prepurchased equipment and all appurtenances. This shall include, but not be limited to; unloading, rigging and setting equipment in place, making connections, starting, testing and installing equipment in accordance with manufacturer's recommendations, and maintaining equipment until such time as project is accepted by Owner. Perform all work and provide materials and connections for Owner furnished equipment in accordance with drawings and scope of work under all related specifications.
- E. The following summarizes the general responsibilities of the equipment manufacturer:
  - 1. Provide shop drawings and submittal data.
  - 2. Manufacture and delivery of equipment including coordination of exact delivery date and supervision of rigging, unloading, and setting.
  - 3. Lead equipment check-out, testing, and start-up process and submit report(s).
  - 4. Provide touch up paint.
  - 5. Provide O&M documentation.
  - 6. Provide Owner training and participate in commissioning process.

**1.2 SCHEDULE**

**A. Schedule:**

- 1. The following schedule is anticipated relative to the prepurchased equipment delivery, installation and activation. This is a preliminary schedule and exact dates are to be coordinated with the Owner and Contractor.
  - a. Equipment Delivery: March 2027
  - b. Installation, Start-Up & Commissioning: November 2027 – March 2028

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Prepurchased Equipment – Process Variable  
Frequency Drive (VFD) System

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Process Variable Frequency Drive (VFD)  
System

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- B. Manufacturer shall be able to produce, test, and deliver the equipment (FOB) to a location dictated by the Contractor per the schedule described above.
- C. Contractor shall plan construction to allow for equipment to be received and installed at the job site within the above delivery window. If Contractor is unable to install equipment upon coordinated delivery date(s), it is the Contractor's responsibility to provide appropriate storage for equipment, local to the University, and provide transportation of equipment from storage site to job site.

### 1.3 SYSTEM DESCRIPTION

- A. Provide Variable Frequency Drives (VFD) for each pump and fan sized to accommodate motors shown on drawings or schedules. Provide all VFDs from same manufacturer. Refer to the mechanical drawings for the VFD schedule.
- B. VFD manufacturer shall review driven equipment and motors for VFD compatibility. Submit written statement from manufacturer of driven equipment along with VFD shop drawing submittals, indicating verification of compatibility.
- C. VFD shall vary speed of its respective pump, fan or other driven equipment motor in response to either 4-20 mA control signal provided by Controls Contractor.
- D. VFD system shall consist of the following:
  - 1. Variable frequency drive(s).
  - 2. UL Listed disconnect device.
  - 3. NEC recognized disconnect device (circuit breaker).
  - 4. Internal reactor with minimum 5% impedance or equivalent input line reactor.
  - 5. Operator keypad and display unit.
  - 6. All components shall be in a common enclosure with single point wiring.
  - 7. All auxiliary power shall be derived locally from a CPT inside the enclosure.
  - 8. Provide internal fan(s) for cooling.
- E. Drives shall have SCCR (short circuit current rating) of 65 kA.
- F. All VFD system components, including (but not limited to) input filters, drive, output filters, harmonic filters, etc. shall be located within a common enclosure, with a single point electrical connection for supply wiring and a single point electrical connection for wiring to load (motor). Enclosure shall be properly sized and equipped with fans for cooling all components required.

### 1.4 QUALIFICATIONS

- A. VFD system shall be furnished by a manufacturer with at least 10 years experience in design, construction and application of VFD equipment.

### 1.5 BID SUBMITTALS

- A. The following shall be provided with the equipment bid proposal:

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Prepurchased Equipment – Process Variable  
Frequency Drive (VFD) System

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System

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1. Cover letter with compliance table listing each specification section and indicating compliance "C", deviation for alternate "D", or exception with explanation "E". Any deviation or exception shall be accompanied with detailed explanation of how design intent is being upheld for evaluation by the Owner and Designer.
  2. Product data including:
    - a. Manufacturer's name
    - b. Identification of system components
    - c. Type of enclosure, dimensioned front elevation and plan view, equipment weight, conduit and cabling access locations.
    - d. Physical installation requirements for service access and ventilation.
    - e. Capacities/ratings/SCCR
    - f. System wiring and block diagram showing system components.
- B. References: a complete list of references shall be provided with each Proposal. The list shall include a minimum of five (5) references where equipment of similar manufacturer type and capacity has been installed. The list shall indicate the name of the facility where the equipment has been installed, location (city and state) of the equipment, installation date, equipment capacity, contact name and contact telephone number of each reference.
- C. Scheduled Maintenance Requirements: A complete list of the recommended scheduled maintenance requirements for the equipment shall be provided with each Proposal. The list shall identify each recommended service item and its recommended frequency (monthly, quarterly, etc.). The list shall, at a minimum, include the scheduled maintenance items identified.
- D. Other information to verify compliance with the Invitation for Bids.
- E. Award will be based on specification compliance and best overall value for the Owner.

## 1.6 FABRICATION SUBMITTALS

- A. Product Data for each VFD system including the following:
1. Complete technical description of the VFD system.
  2. Manufacturer's name.
  3. Identification of system components.
  4. 3-Wire system wiring and block diagram showing all system components.
  5. LV controls wiring schematic, terminations, DI/DO/AI/AO points, interface requirements with DCS system via MODBUS TCP/IP.
  6. Type of enclosure, dimensioned front elevation and plan view, equipment weight, conduit access locations.
  7. Physical installation requirements for access and ventilation.
  8. Capacities/ratings/SCCR.
  9. Cabling entry/exit and size requirements.

10. System wiring and block diagram showing system components.
11. Performance, control and protection data with specified features clearly shown.
12. Operating and monitoring devices with specified features clearly indicated.
13. Manufacturer's installation instructions.
14. Start-up operation, maintenance, spare parts, and field tests.
15. Other appropriate data.

- B. After quality assurance tests are complete, submit written certification that drive and components have passed factory quality assurance tests.
- C. Submit product and performance data on electrical noise attenuation device if required to meet electrical noise criteria specified. Isolation transformer is not electrical noise attenuation device.
- D. Submit printed list of settings for all items that require setting during startup or list of Factory Default Parameters.

## 1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data:
  1. Include manufacturer's recommended operating instructions, maintenance procedures and intervals, and preventive maintenance instructions.
  2. Include manufacturer's written instructions for testing and adjusting system.
  3. Include spare parts data listing, source, and current prices of replacement parts and supplies.
  4. Include copy of equipment warranty.

## 1.8 SPARE PARTS

- A. Three (3) spare fuses for each size or type of VFD.
- B. One (1) spare enclosure cooling fan for each different type of drive.
- C. Three (3) spare sets of ventilation air filters for each drive.
- D. One (1) spare key pad/touch screen for each different type of drive.

## 1.9 WARRANTY

- A. Manufacturer shall provide a five year warranty against defects in materials and workmanship for products specified in this Section. Warranty period shall begin on date of project final acceptance.

## **PART 2 - PRODUCTS**

### 2.1 MANUFACTURER

- A. Manufacturers: ABB, Danfoss, Yaskawa

## 2.2 VFD DESCRIPTION

- A. Variable-frequency power converter (rectifier, dc bus, and IGBT, PWM inverter) factory packaged in an enclosure, with integral disconnecting means and overcurrent and overload protection, arranged to provide self-protection, and variable-speed control of one three-phase induction motors by adjusting output voltage and frequency.
  - 1. Units suitable for operation of NEMA MG 1, Design A and Design B motors as defined by NEMA MG 1, Section IV, Part 30, "Application Considerations for Constant Speed Motors Used on a Sinusoidal Bus with Harmonic Content and General Purpose Motors Used with Adjustable-Voltage or Adjustable-Frequency Controls or Both."
  - 2. Units suitable for operation of inverter-duty motors as defined by NEMA MG 1, Section IV, Part 31, "Definite-Purpose Inverter-Fed Polyphase Motors."
  - 3. Units shall be fully rated to withstand integrated short-circuit current.

## 2.3 FABRICATION

- A. VFD shall be of a fixed DC bus type with a full wave input diode bridge. The VFD shall convert 3 phase 60 Hz input power to three phase adjustable voltage, adjustable frequency output power using Pulse Width Modulation (PWM) switching techniques and third generation I.G.B.T.'s.
- B. VFD shall be variable torque, solid state, microprocessor-based control, modular design for standard induction AC motor.
- C. For maintenance purposes, VFD shall be capable of stable operation, (starting, stopping and running), with the motor completely disconnected (no load).
- D. Refer to the VFD schedule for maximum dimensions for the enclosure as well as cable entry/exit requirements.
- E. VFD shall be capable of operating any standard "off-the-shelf" squirrel cage induction motor with a full load rating within the capacity of the VFD. Therefore, at any time in the future it shall be possible to install a standard new or rewound motor in the field without requiring modification of the VFD.
- F. Circuitry shall be plug-in, plug-out modular. Printed circuit boards shall have protective coating to reduce corrosion.
- G. Complete unit shall conform to NEMA and NEC standards and control circuitry shall be electrically isolated from power circuitry. Entire assembly panel shall be third party listed. Third party agency shall be amongst those accredited by the North Carolina Building Code Council (NCBCC) to label electrical and mechanical equipment.  
<https://www.ncosfm.gov/codes/state-electrical-division/qualified-testing-laboratories>
- H. Provide control power transformer to serve enclosure auxiliary power requirements.

## 2.4 PERFORMANCE REQUIREMENTS

- A. Input: 460 (+10%, -10%) VAC, 3 Ph, 60 ( $\pm 2$ ) Hz
- B. Output: 460 VAC, 3 Ph, 10 to 60 Hz
- C. Operating Environment: VFD Manufacturer shall rate VFDs for specific environment in which they will operate.
  - 1. Ambient temperature:
    - a. Indoor applications: 14°F to 104°F
  - 2. Relative humidity: 95% non-condensing
  - 3. Elevation above sea level: 0 ft to 3280 ft
- D. Linear acceleration and deceleration adjustable from 5 to 60 seconds. Provide adjustable v/Hz ratio and low speed boost features.
- E. Output Current Rating: Continuous full load output current rating of drive shall not be less than that listed for motor of equivalent horsepower in NEC table 430-150.
- F. Drive overload capacity to be minimum 110% of motor FLA based on NEC ratings for one minute.
- G. Time to Shutdown: Inversely proportional to square of overload current ( $t = k/I^2$ ).
- H. Motor Regeneration Protection: Unit shall have capacity of dissipating regeneration energy up to VFD current rating without damage to or shutdown of drive. Unit shall be capable of starting into rotating load.
- I. Output Frequency Stability:  $\pm 0.5\%$  of base frequency in 24 h throughout range of rated operating conditions.
- J. Output Voltage Regulation:  $\pm 2\%$  of maximum rated output voltage.
- K. Output voltage rise time shall be no faster than 1000 V/micro sec measured at the motor terminals.
- L. Power Loss Ride-Through: 1 cycle.
- M. Linearity (speed reference to output frequency):  $\pm 1.0\%$
- N. Input Power Factor: Minimum of 0.95 regardless of speed and load.
- O. Minimum drive efficiency as percent of input power shall be as follows:

<u>Percent Load</u>	<u>Frequency (Hz)</u>			
	<u>60</u>	<u>50</u>	<u>30</u>	<u>15</u>
100	97	96	95	90
75	97	96	94	90

50	97	96	94	90
25	96	95	91	84

## 2.5 CONTROL FEATURES

- A. VFD shall have a door mounted digital operator interface with an 8-Line, 32-character HOA LCD display providing readout functions that include output frequency, output voltage, output current, output power, DC bus voltage, interface terminal status, PI feedback and fault status.
- B. Main Printed Circuit Board (PCB) must be common throughout the various horsepower models. The main PCB must be able to be quickly removed from the drive chassis via the use of plug-in connectors and removable terminal blocks.
- C. Main PCB must have at least three programmable multi-function output relays (Form A or Form C, rated 2 A @ 250 VAC & 30 VDC)VFD shall have an enclosure constructed from metal to reduce E.M.I.
- D. Main PCB shall be constructed with isolated control circuitry.
- E. VFD must have bi-directional auto-speed search for starting into rotating loads spinning in any direction and returning the motor is desired speed in the proper direction.
- F. VFD speed control circuit shall accept either 4-20 mA DC isolated ungrounded transmitter signal in automatic mode and from manual speed control keypad in manual mode.
- G. Provide adjustable minimum and maximum speed settings (0 - 100%) for both auto and manual mode. Initial minimum setting shall be 25%.
- H. Provide adjustable automatic reset for fault trips, except short circuit type faults. After selected number of unsuccessful restart attempts, drive shall be shut down. Number of restart attempts and time interval between resets shall be selective.
- I. When unit shuts down due to power outage, unit shall be capable of being restarted manually or automatically.
- J. VFD shall be capable of starting into rotating loads spinning in any direction.
- K. Provide critical frequency avoidance circuit with at least 3 field adjustable bands to avoid operation at speeds, which cause excessive vibration in driven equipment.
- L. Minimum drive efficiency as percent of input power shall be as follows: 96% at half-speed; 98% at full-speed.
- M. Provide drive with provisions to accept an ungrounded 4-20 mA output signal.

- N. For exposed outdoor motors VFD controller shall receive signals from motor winding thermostats to shut motor off due to overheating and energize 120V motor heater based on run status and low winding temperature to prevent internal motor condensation.

## 2.6 INTEGRATION WITH DISTRIBUTED CONTROL SYSTEM (DCS)

- A. Furnish each VFD with digital communication bus card for connection to DCS use via MODBUS TCP/IP. No third-party translator is permitted. Coordinate with Control Contractor for specific interface requirement.
- B. The VFD shall be capable of communicating all available information all operational and safety information/control information that VFD utilizes to operate to the DCS including Manual-Off-Automatic status.
- C. Provide four pre-programmed relay/contacts for remote output indication of VFD fault condition, motor run status based on current or torque above minimum threshold, and one spare.
- D. In addition to the above communication, the VFD shall be capable of communicating the following hard wired input/output signals with the DCS. Provide all required wiring, relays, contacts, terminal strips, etc. to support this communication.
  - 1. VFD start/stop
  - 2. VFD status
  - 3. VFD fault
  - 4. VFD speed
  - 5. Motor kW
  - 6. Forward Rotation (Cooling Towers Only)
  - 7. Reverse Rotation (Cooling Towers Only)

## 2.7 PROTECTION FEATURES

- A. Power circuits shall be protected by electronic protection circuits. Electronic protection circuits shall provide orderly shutdown without blowing fuses and prevent component loss under the following abnormal conditions.
  - 1. Overcurrent protection shall be via circuit breaker. The use of fused disconnect is not allowed.
  - 2. Instantaneous overcurrent and over voltage trip of output.
  - 3. Solid state protective circuit shall provide NEC motor running overload protection tested in accordance with UL 991.
  - 4. Power line overvoltage or undervoltage.
  - 5. Phase sequence detection or insensitivity to incoming power phase sequence.
  - 6. Single and 3 Ph short circuit protection.
  - 7. Control circuit malfunction.
  - 8. Overtemperature.

9. Ground fault for all 3 phases.
- B. VFD shall protect itself from damage due to phase-to-phase or phase-to-ground faults without fuse blowing or use of isolation transformers. VFDs which require isolation transformers to provide ground fault protection are not acceptable.
  - C. In addition, provide the following protection features.
    1. Input line-to-line and line-to-ground transient protection
    2. Control circuit transformer fusing.
    3. Grounded control chassis.
    4. Diagnostic indication.
  - D. VFD shall employ adjustable torque limit control, which shall override speed command and decrease frequency while maintaining correct volts/hertz ratio whenever load level surpasses VFD design level or set point.
  - E. VFD shall employ adjustable torque limit control which shall override the speed command and decrease the frequency while maintaining the correct volts/hertz ratio whenever the load level surpasses the VFD design level or set point.
  - F. The AC drive shall have a minimum AC undervoltage power loss ride-through of 200 msec.

## 2.8 OPERATING AND MONITORING DEVICES

- A. The following functionality shall be provided and may be controlled via touchscreen/keypad:
  1. Hand-Off-Auto device.
  2. Operating mode selector device marked "Hand-Off-Auto".
  3. Manual speed control keypad.
  4. Power on indication.
  5. Drive run indication.
  6. Drive fault indication with testable feature.
  7. Fault reset device.
- B. Speed indicating meter or digital indication (0 - 100%) calibrated in percent speed or frequency meter with 0 to 90 Hz scale to indicate motor speed.
- C. Integral digital programming and operating display which shows Hz, Percent Output Current, Output Voltage, Percent Output Power, Operating Parameters and their values, and Diagnostic Fault Codes. In addition, Keypads shall be incorporated to facilitate digital programming of drive adjustments. Analog potentiometer adjustments are not acceptable.
- D. Provision shall be included to provide selectable programming security by inhibiting program parameter changes with password security.

- E. Control shall incorporate microprocessors for operator interface, diagnostics, and fault managements, and power management.
- F. Optional programming software, which includes provision for serial communication with drive, shall be available for shipment at time of equipment order placement.
- G. Fault buffers to sequentially store last four faults. Parameter and fault information to be stored in non-volatile memory.

## 2.9 QUALITY ASSURANCE TESTS

- A. Complete drive assembly shall be factory tested with actual AC induction motor, 100% load and temperature cycled within environment chamber at 104°F. Documentation of test shall be furnished to verify successful completion of test at Engineer's request.

## 2.10 DISCONNECT DEVICE

- A. Provide integral switch to disconnect incoming electrical power to units. Disconnect device shall be UL Listed devices:
  - 1. Enclosed molded case breaker; ampere rated and providing over current protection
- B. Disconnect device shall be capable of being padlocked in OFF position and complying with OSHA Requirements. Operating handle shall indicate whether switch is "ON" or "OFF".
- C. Switch shall have cover interlock to prevent unauthorized opening of switch door when handle is in "ON" position and to prevent closing of switch mechanism with door open. Provide defeater mechanism to defeat the interlock for user required access.

## 2.11 INPUT LINE REACTORS

- A. Series line reactors shall be designed for harmonic filtering service and shall be UL component recognized. Construction shall be copper wire wound on steel cores. Inductors shall be 3-phase. Design maximum temperature rise for inductors shall be 239°F.
- B. Inductors shall be air-gapped to avoid saturation. Inductance shall be measured under full load and shall be within  $\pm 5\%$  of design value.
- C. Line reactor shall be included integral to drive enclosure.
  - 1. Where mounting line reactor in VFD enclosure is not possible, enclosure shall be steel with enamel finish and no knockouts. Enclosure shall match construction of VFD enclosure and shall have hinged lockable cover. Screened openings shall be provided for enclosure ventilation. Enclosure shall be built with integral mounting brackets for platform or wall mounting. Coordinate location with other trades. Provide disconnect switch for line side filters.

- D. Internal DC bus chokes are acceptable when providing equivalent performance to AC line reactors specified.

### **PART 3 – EXECUTION – BY THE EQUIPMENT MANUFACTURER**

#### **3.1 START-UP**

- A. Provide services of factory trained engineer or technician to approve installation; start-up test and adjust for proper operation.
- B. Should drive operation be deficient, make changes necessary to bring units into compliance with specified performance requirements. Cost of changes and retest shall be borne by drive manufacturer.
- C. Upon completion of this service, submit report signed by manufacturer's service representative, including start-up and test log.

#### **3.2 TRAINING**

- A. The equipment manufacturer shall provide full operating, service and maintenance training programs for the Owner's maintenance personnel. All costs associated with Owner Training shall be included in the base proposal, including travel and per diem expenses. Training shall occur at the Owners facility. Training will be scheduled separately at a time determined by the Owner.
- B. Training shall only occur after the systems provided are installed by the Contractor, started up by the Manufacturer, and made ready for proper operation.
- C. Manufacturer shall instruct and train Owner's representative in operation and maintenance and participate in any commissioning of each system provided for the project.
- D. A complete syllabus and O&M Manuals shall be submitted and approved by Owner four weeks prior to training.
- E. Include minimum of 8 hours of start-up and Owner training and a minimum of an additional 8 hours of commissioning support time for each system.
- F. Owner may video tape training sessions for their use in future training of their operations and maintenance staff.

### **PART 4 – EXECUTION - BY THE INSTALLING CONTRACTOR**

#### **4.1 INSPECTION**

- A. Visually inspect equipment and components at time of delivery. Submit report to Owner and Designer with list of items or deficiencies to be corrected.

UNC - Chapel Hill

CHW Infrastructure Expansion – BCP  
Prepurchased Equipment – Process Variable  
Frequency Drive (VFD) System

07/22/25

Process Variable Frequency Drive (VFD)  
System

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## 4.2 PROTECTION

- A. Protect VFD cabinets from dust/dirt during storage and operation until turned over to Owner.
- B. If VFDs are not furnished with internal air filter racks, provide temporary filter media to protect VFD cabinets and replace filter media as required.

## 4.3 INSTALLATION

- A. Install VFD system in accordance with details, approved submittals and manufacturer's instructions and recommendations.
- B. Provide field low voltage wiring of VFD system components. Provide field interconnecting wiring between VFD and filters, line reactors and/or by-pass starter if bypass starter is specified and the wiring is not installed at factory. Install wiring in metal conduit and in accordance with Electrical sections of Division 26 and applicable Electrical Code.
- C. Provide control wiring between interlocks in VFD control circuits and driven motor's disconnect switches. Interlock VFD control circuits with driven motor's disconnect switches where such motor disconnect switches are provided. Disconnecting on-line motor shall shut down VFD. VFD shall restart upon reconnection of motor.
- D. Do not connect ground from one unit to another unit's cabinet.
- E. Use separate conduits for incoming and outgoing power conductors from each unit.
- F. Use separate conduit for control wiring for each unit. Do not combine control wiring with power wiring.
- G. Use minimum 18 ga shielded wiring with ground for control wiring.
- H. Install floor mounted drives on concrete housekeeping pad and minimum 3/4" thick 50 durometer, neoprene rubber isolation pad. Install wall-mounted drives on metal framing in accordance with Section 26 0529.

## 4.4 START UP

- A. Assist manufacturer with start-up of VFD in accordance with procedures as defined by manufacturer for proper operation.
- B. Adjust critical frequency avoidance feature to step over frequencies which cause excessive vibration in driven equipment.

- C. Adjust passive harmonic filter capacitor contactor setpoint to ensure drives do not present leading power factor to electrical systems during low-load conditions.
- D. Contractor shall schedule and expedite the manufacturers start-up process and support the Owners commissioning activities. Contractor shall coordinate exact timing of these activities and arrange for appropriate manufacturer personnel to be on-site.
- E. After successful completion of equipment installation, the Contractor shall assemble and incorporate equipment shop drawings, operating/maintenance instructions, and part lists into the Contractor's project operation/maintenance manuals.

**END OF SECTION**

MARK CTP	LOCATION	GPM EACH CELL	MIN. FLOW EACH CELL	MAX. PD (FT) (2)	TEMPERATURE (°F)			FAN MOTOR (EACH CELL)			CONTROLLER	REMARKS
					AIR WB	EWT	LWT	MAX. HP	VOLT	PHASE		
301B	ROOF	7,500	3,750	25	80	95	85	200	480	3	Y	(1)
302B	ROOF	7,500	3,750	25	80	95	85	200	480	3	Y	(1)
303B	ROOF	7,500	3,750	25	80	95	85	200	480	3	Y	(1)
304B	ROOF	7,500	3,750	25	80	95	85	200	480	3	Y	(1)
305B	ROOF	7,500	3,750	25	80	95	85	200	480	3	Y	(1)

NOTES:  
1. VFD FOR DIRECT DRIVE COOLING TOWER FAN MOTOR PROVIDED BY COOLING TOWER MANUFACTURER.  
2. FROM INLET FLANGE CONNECTION.

MARK FIT	SYSTEM	SERVICE	TYPE	CAPACITY (GPM)	SIZE (IN)	MAX. PD (FT)	VOLTAGE	REMARKS
102_2B	CWS	CRM 2_2B	INLINE MAGNETIC	7,500	20	N/A	24	
103_2B	CWS	CRM 3_2B	INLINE MAGNETIC	7,500	20	N/A	24	
104_2B	CWS	CRM 4_2B	INLINE MAGNETIC	7,500	20	N/A	24	
105_2B	CWS	CRM 5_2B	INLINE MAGNETIC	7,500	20	N/A	24	
201_1B	CHR	CRM 1_1B	INLINE MAGNETIC	4,275	16	N/A	24	
202_1B	CHR	CRM 2_1B	INLINE MAGNETIC	4,275	16	N/A	24	
203_1B	CHR	CRM 3_1B	INLINE MAGNETIC	4,275	16	N/A	24	
204_1B	CHR	CRM 4_1B	INLINE MAGNETIC	4,275	16	N/A	24	
205_1B	CHR	CRM 5_1B	INLINE MAGNETIC	4,275	16	N/A	24	
800A	MU	CHW MAKE-UP	INLINE MAGNETIC	80	2.5	N/A	24	
800B	MU	CHW MAKE-UP	INLINE MAGNETIC	470	4	N/A	24	
200B	CHS	MINIMUM FLOW BYPASS	INLINE MAGNETIC	2,138	10	N/A	24	
300BB	CWS	TOWER BLEED	INLINE MAGNETIC	190	4	N/A	24	
300AB	MU	CW MAKEUP	INLINE MAGNETIC	565	8	N/A	24	
350B	RCW	CW MAKEUP	INLINE MAGNETIC	565	8	N/A	24	

MARK CRM	COMPRESSOR TYPE	CHILLER ARRANGEMENT	MAX. OPER. WEIGHT (LBS)	REFRIGERANT CLASSIFICATION	CAPACITY (TONS)	MAXIMUM KW/TON	EVAPORATOR					REMARKS	
							GPM	EWT (°F)	LWT (°F)	PASS	MAX. PD (FT)		FOULING FACTOR
1_1B	CENTRIFUGAL	SERIES-COUNTERFLOW	60,000	A1 OR B1	1,225	0.57	4,275	56	49	1	10.9	0.0001	(1)
1_2B	CENTRIFUGAL	SERIES-COUNTERFLOW	60,000	A1 OR B1	1,275			49	42	1	10.9	0.0001	(1)
2_1B	CENTRIFUGAL	SERIES-COUNTERFLOW	60,000	A1 OR B1	1,225	0.57	4,275	56	49	1	10.9	0.0001	(1)
2_2B	CENTRIFUGAL	SERIES-COUNTERFLOW	60,000	A1 OR B1	1,275			49	42	1	10.9	0.0001	(1)
3_1B	CENTRIFUGAL	SERIES-COUNTERFLOW	60,000	A1 OR B1	1,225	0.57	4,275	56	49	1	10.9	0.0001	(1)
3_2B	CENTRIFUGAL	SERIES-COUNTERFLOW	60,000	A1 OR B1	1,275			49	42	1	10.9	0.0001	(1)
4_1B	CENTRIFUGAL	SERIES-COUNTERFLOW	60,000	A1 OR B1	1,225	0.57	4,275	56	49	1	10.9	0.0001	(1)
4_2B	CENTRIFUGAL	SERIES-COUNTERFLOW	60,000	A1 OR B1	1,275			49	42	1	10.9	0.0001	(1)
5_1B	CENTRIFUGAL	SERIES-COUNTERFLOW	60,000	A1 OR B1	1,225	0.57	4,275	56	49	1	10.9	0.0001	(1)
5_2B	CENTRIFUGAL	SERIES-COUNTERFLOW	60,000	A1 OR B1	1,275			49	42	1	10.9	0.0001	(1)

MARK CRM	CONDENSER GPM	EWT (°F)	LWT (°F)	PASS	MAX. PD (FT)	FOULING FACTOR	ELECTRICAL										STARTER TYPE
							MAX. POWER INPUT (KW)	MCA (AMPS)	MOP (AMPS)	LRA (AMPS)	RLA (AMPS)	INRUSH	VOLT	PH			
1_1B	7,500	90	95	1	10.8	0.00025	686					6440	-	-	480	3	VFD (UNIT MOUNTED)
1_2B		85	90	1	10.8	0.00025	704					6440	-	-	480	3	VFD (UNIT MOUNTED)
2_1B	7,500	90	95	1	10.8	0.00025	686					6440	-	-	480	3	VFD (UNIT MOUNTED)
2_2B		85	90	1	10.8	0.00025	704					6440	-	-	480	3	VFD (UNIT MOUNTED)
3_1B	7,500	90	95	1	10.8	0.00025	686					6440	-	-	480	3	VFD (UNIT MOUNTED)
3_2B		85	90	1	10.8	0.00025	704					6440	-	-	480	3	VFD (UNIT MOUNTED)
4_1B	7,500	90	95	1	10.8	0.00025	686					6440	-	-	480	3	VFD (UNIT MOUNTED)
4_2B		85	90	1	10.8	0.00025	704					6440	-	-	480	3	VFD (UNIT MOUNTED)
5_1B	7,500	90	95	1	10.8	0.00025	686					6440	-	-	480	3	VFD (UNIT MOUNTED)
5_2B		85	90	1	10.8	0.00025	704					6440	-	-	480	3	VFD (UNIT MOUNTED)

NOTES:  
1. TWO (2) CHILLERS CONNECTED IN SERIES-COUNTERFLOW (SC) ARRANGEMENT.

MARK P	LOCATION	SERVICE	TYPE	MAX. OPER. WEIGHT (LBS)	CAP. (GPM)	HEAD (FT)	MAX. NPSHR (FT)	MIN. EFF. (%)	SIZE (IN)		ELECTRICAL CHARACTERISTICS				REMARKS	
									SUCT.	DISCH.	VFD	HP	RPM	VOLT		PH
101B	MECHANICAL ROOM	CONDENSER WATER	HORIZONTAL SPLIT CASE	9,000	12,500	100	30	81	20	16	YES	400	1200	480	3	(1)
102B	MECHANICAL ROOM	CONDENSER WATER	HORIZONTAL SPLIT CASE	9,000	12,500	100	30	81	20	16	YES	400	1200	480	3	(1)
103B	MECHANICAL ROOM	CONDENSER WATER	HORIZONTAL SPLIT CASE	9,000	12,500	100	30	81	20	16	YES	400	1200	480	3	(1)
104B	MECHANICAL ROOM	CONDENSER WATER	HORIZONTAL SPLIT CASE	9,000	12,500	100	30	81	20	16	YES	400	1200	480	3	(1)
201B	MECHANICAL ROOM	CHILLED WATER	HORIZONTAL SPLIT CASE	9,000	7,125	150	18	83	16	12	YES	350	1200	480	3	(1)
202B	MECHANICAL ROOM	CHILLED WATER	HORIZONTAL SPLIT CASE	9,000	7,125	150	18	83	16	12	YES	350	1200	480	3	(1)
203B	MECHANICAL ROOM	CHILLED WATER	HORIZONTAL SPLIT CASE	9,000	7,125	150	18	83	16	12	YES	350	1200	480	3	(1)
204B	MECHANICAL ROOM	CHILLED WATER	HORIZONTAL SPLIT CASE	9,000	7,125	150	18	83	16	12	YES	350	1200	480	3	(1)
701B	MECHANICAL ROOM	CHILLED WATER	VERTICAL INLINE	1,000	645	75	10	76	5	5	YES	20	1800	480	3	

NOTES:  
1. OWNER PREPURCHASED AND FURNISHED TO CONTRACTOR

MARK VFD	EQUIPMENT	LOCATION	HP	VOLTS	RPM	PULSE	MAX. ENCL. SIZE (LxWxH)	INPUT CIRCUIT BREAKER	INTERNAL POWER- TO MTR HEATER	OUTPUT REACTOR	OUTPUT DVIDT FILTER	BYPASS STARTER	HARMONIC TRAP	SINGLE ENCLOSURE	REMARKS
P-102B	CW PUMP	FIRST FLOOR	400	460	1200	6	70"x32"x86"	Y	N	N	N	N	N	Y	OFCI
P-103B	CW PUMP	FIRST FLOOR	400	460	1200	6	70"x32"x86"	Y	N	N	N	N	N	Y	OFCI
P-104B	CW PUMP	FIRST FLOOR	400	460	1200	6	70"x32"x86"	Y	N	N	N	N	N	Y	OFCI
P-201B	CHW PUMP	FIRST FLOOR	350	460	1200	6	42"x32"x86"	Y	N	N	N	N	N	Y	OFCI
P-202B	CHW PUMP	FIRST FLOOR	350	460	1200	6	42"x32"x86"	Y	N	N	N	N	N	Y	OFCI
P-203B	CHW PUMP	FIRST FLOOR	350	460	1200	6	42"x32"x86"	Y	N	N	N	N	N	Y	OFCI
P-204B	CHW PUMP	FIRST FLOOR	350	460	1200	6	42"x32"x86"	Y	N	N	N	N	N	Y	OFCI
P-701B	CHW HVAC PUMP	FIRST FLOOR	20	460	-	6	24"x18"x36"	Y	N	N	N	N	N	Y	OFCI

CTF-301B	COOLING TOWER FAN	MEZZANINE	200	460	-	6	35"x22"x56"	Y	Y	N	N	N	N	Y	1.2 OFCI
CTF-302B	COOLING TOWER FAN	MEZZANINE	200	460	-	6	35"x22"x56"	Y	Y	N	N	N	N	Y	1.2 OFCI
CTF-303B	COOLING TOWER FAN	MEZZANINE	200	460	-	6	35"x22"x56"	Y	Y	N	N	N	N	Y	1.2 OFCI
CTF-304B	COOLING TOWER FAN	MEZZANINE	200	460	-	6	35"x22"x56"	Y	Y	N	N	N	N	Y	1.2 OFCI
CTF-305B	COOLING TOWER FAN	MEZZANINE	200	460	-	6	35"x22"x56"	Y	Y	N	N	N	N	Y	1.2 OFCI
EF-1	PAINT BOOTH EXHAUST	MEZZANINE	5	460	-	6	24"x18"x36"	Y	N	N	N	N	N	Y	
EF-2	REFRIGERANT EXHAUST	MEZZANINE	10	460	-	6	24"x18"x36"	Y	N	N	N	N	N	Y	
SF-1-1	AHU-1	FIRST FLOOR	25	460	-	6	24"x18"x36"	Y	N	N	N	N	N	Y	
SF-1-2	AHU-1	FIRST FLOOR	25	460	-	6	24"x18"x36"	Y	N	N	N	N	N	Y	
SF-2-1	AHU-2	FIRST FLOOR	20	460	-	6	24"x18"x36"	Y	N	N	N	N	N	Y	
SF-2-2	AHU-2	FIRST FLOOR	20	460	-	6	24"x18"x36"	Y	N	N	N	N	N	Y	
SF-3-1	AHU-3	MEZZANINE	25	460	-	6	24"x18"x36"	Y	N	N	N	N	N	Y	
SF-3-2	AHU-3	MEZZANINE	25	460	-	6	24"x18"x36"	Y	N	N	N	N	N	Y	
SF-4-1	AHU-4	MEZZANINE	15	460	-	6	24"x18"x36"	Y	N	N	N	N	N	Y	
SF-4-2	AHU-4	MEZZANINE	15	460	-	6	24"x18"x36"	Y	N	N	N	N	N	Y	
RF-4-1	AHU-4	MEZZANINE	3	460	-	6	24"x18"x36"	Y	N	N	N	N	N	Y	
RF-4-2	AHU-4	MEZZANINE	3	460	-	6	24"x18"x36"	Y	N	N	N	N	N	Y	

NOTES:  
1. VFD FOR COOLING TOWER PERMANENT MAGNET ROTOR (PMR) APPLICATION SHALL BE PROVIDED WITH THE COOLING TOWER VENDOR AND COORDINATED FOR THE SPECIFIC APPLICATION.  
2. REFER TO THE 'E SERIES' SHEETS FOR THE DESIGN INTENT FOR THE VFD WIRING SCHEMATIC TO INCLUDE 120V AND LV WIRING BETWEEN THE VFD AND THE COOLING TOWER COMPONENTS.

CHILLERS

24 6000

CHILLERS

23 0903

PUMPS

23 2123

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23 0515

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07/22/25

Sheet Keynotes:

Rev	Date	Description of Issue
C	07/11/25	CD FOR REVIEW
B		