STATE OF NORTH CAROLINA

The University of North Carolina at Chapel Hill

Invitation for Bid #: 3000012349

Chilled Water Infrastructure Expansion Bernard Chiller

Plant – Pre-Purchased Electrical Equipment Switchgear

& Switchboards Bid Set

Date Issued: 06/13/2025

Submit Written Questions: 06/20/25 at 1:00 PM EST

Bid Opening Date: 07/14/2025 at 1:00 PM EST

Direct all inquiries concerning this IFB to:

Marcy Moore

MRO Category Manager

Email: Mmrowlan@unc.edu

STATE OF NORTH CAROLINA

Invitation for Bids

3000012349

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 *ALL* Inquiries regarding this IFB to: **Marcy Moore**	**Invitation for Bids # 3000012349**
	Bids will be publicly opened: 07/14/2025 at 1pm
Using Agency: University of Chapel Hill	**Commodity No. and Description: Prepurchase Electrical Equipment Switchgear & Switchboards Bid Set**
Requisition No.: 1001057244	

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:	

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.

TABLE OF CONTENTS

1.0 PURPOSE AND BACKGROUND

LOW-VOLTAGE SWITCHGEAR

A. This equipment will be pre-purchased by the Owner and assigned to the successful Contractor after award.

B. Owner will make available shop drawings of Owner pre-purchased equipment for review. 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 equipment and all other activities as if the Contractor purchased the equipment directly. This includes directing the delivery truck to the jobsite, coordinating the date and time of delivery, receipt/unloading of the equipment at the jobsite.

D. Contractor shall install equipment and all auxiliaries as though Contractor had purchased equipment. This shall include, but not be limited to; 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. After completion of equipment installation, assemble equipment shop drawings, operating/maintenance instructions and part lists into the Contractor's project operation/maintenance manuals.

F. The following summarizes the general responsibilities of the electrical equipment supplier:

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

4. Provide Owner training

5. Provide O&M documentation Please see attached Scope of Work

SWITCHBOARDS

A. This equipment will be pre-purchased by the Owner and assigned to the successful Contractor after award expediting delivery and installation.

B. Owner will make available shop drawings of Owner pre-purchased equipment for review. 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 equipment and all other activities as if the Contractor purchased the equipment directly. This includes directing the delivery truck to the jobsite, coordinating the date and time of delivery, receipt/unloading of the equipment at the jobsite.

D. Contractor shall install equipment and all auxiliaries as though Contractor had purchased equipment. This shall include, but not be limited to; 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.

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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.

4. Provide Owner training. Provide O&M documentation.

Please see attached Chilled Water Infrastructure Expansion Bernard Chiller Plant

1.1 CONTRACT TERM

This section is intentionally omitted

2.0 GENERAL INFORMATION

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 is 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	06/13/2025
Hold Pre-Bid Conference/Site Visit	University	N/A
Submit Written Questions	Vendor	06/20/2025 at 1:00PM EST
Provide Responses to Questions	University	ASAP
Submit Bids	Vendor	07/14/2025 at 1:00PM EST
Contract Award	University	ASAP
Contract Effective Date	University	ASAP

2.5 SITE VISIT or PRE-BID CONFERENCE

This section is 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 -*3000012349:* 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://eprocurement.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) Title Page: Include the company name, address, phone number and authorized representative along with the Bid Number.

b) Completed and signed version of EXECUTION PAGES, along with the body of the IFB.

c) Signed receipt pages of any addenda released in conjunction with this IFB, if required to be returned.

d) Completed version of ATTACHMENT A: PRICING

e) Completed version of ATTACHMENT D: HUB SUPPLEMENTAL VENDOR INFORMATION

f) Completed and signed version of ATTACHMENT G: CERTIFICATION OF FINANCIAL CONDITION

g) 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

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

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.

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. Please ensure to include "ATTACHMENT A: PRICING" located under Section 7.0 Attachments as part of the Vendor's response.

4.2 ESTIMATED QUANTITIES

This section is intentionally omitted.

4.3 PRODUCT IDENTIFICATION

BRAND SPECIFIC

See attached Chilled Water Infrastructure Expansion Bernard Chiller Plant documentation.

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

A. Maintain factory wrapping or provide additional canvas or plastic cover to protect units from dirt, fumes, water, corrosive substances, construction debris, and traffic. Provide temporary heaters in switchgear as required to prevent condensation.

B. Deliver switchgear in 48" maximum width shipping splits, individually wrapped for protection, and mounted on shipping skids. Mark crates, boxes, and cartons clearly to identify equipment. Show crate, box, or carton identification number on shipping invoices.

C. Handle switchgear in accordance with applicable portions of ANSI/NECA 400. Use factory-installed lifting provisions. Handle carefully to avoid damage to switchgear internal components, enclosure, and finish**.**

SWITCH BOARDS

A. Store in clean, dry space. Maintain factory wrapping or provide additional canvas or plastic cover to protect units from dirt, fumes, water, corrosive substances, construction debris, and traffic. Provide temporary heaters in switchboards as required to prevent condensation.

B. Deliver switchboard in 48" maximum width shipping splits, individually wrapped for protection, and mounted on shipping skids.

C. Handle switchboards in accordance with NEMA PB 2.1 and ANSI/NECA 400. Use factory-installed lifting provisions. Handle carefully to avoid damage to switchboard internal components, enclosure, and finish.

4.5 AUTHORIZED RESELLER

This section is intentionally omitted

4.6 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 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): _____

4.7 MAINTENANCE OPTION

This section is intentionally removed.

4.8 DESCRIPTIVE LITERATURE

DESCRIPTIVE LITERATURE

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.

4.9 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.

4.10 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.

4.11 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.

4.12 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.

4.13 AGENCY INSURANCE REQUIREMENTS MODIFICATION

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

4.14 NC COVID-19 VACCINATION AND TESTING REQUIREMENT

This section is intentionally omitted.

4.15 FEDERAL COVID-19 VACCINATION REQUIREMENT

This section is intentionally omitted.

4.16 LOBBYING ACTIVITY CERTIFICATION FOR FEDERAL GRANTS

Federal law prohibits recipients of federal funds, whether through grants, contracts, or cooperative agreements, from using those funds to influence or attempt to influence (lobby) a federal official in connection with obtaining, extending, or modifying any federal contract, grant, loan, or cooperative agreement. Further, federal law requires that applicants for federal funds certify:

- that they abide by the above restriction;
- that they disclose any permissible (non-federal) paid lobbying on the Federal Awards being applied for; and
- that such certification requirements will also be included in any subawards meeting the applicable thresholds.

Vendors must complete and submit the CERTIFICATION FOR CONTRACTS, GRANTS, LOANS, AND COOPERATIVE AGREEMENTS and the OMB STANDARD FORM LLL when responding to this solicitation.

5.0 PRODUCT SPECIFICATIONS

5.1 SPECIFICATIONS

LOW-VOLTAGE SWITCHGEAR

A. Section includes free-standing, dead-front type, metal-enclosed, low-voltage distribution switchgear listed to UL 1558. This includes:

1. Switchgears: LVSWGR1, LVSWGR2, LVSWGR3, LVSWGR4, LVSWGR5, LVSWGR6

B. This equipment shall be fully commissioned per the requirements in the North Carolina State Construction Office 2020 Electrical Guidelines and Policies Section 260800 and per ANSI/NETA ECS-2015. The Owner will contract directly with the commissioning agent separate from the Contractor. Equipment supplier shall provide commissioning assistance during shop drawing submittal reviews, equipment inspections, equipment start-up and commissioning. Equipment supplier shall assist with coordinating the scheduling of commissioning activities as directed by the commissioning agent.

SWITCHBOARDS

A. Section includes free-standing, front-access-only, dead-front type low-voltage distribution switchboards. This includes:

1. Distribution Switchboards: MDP1, MDP2, MDP3, MDP,4 MDP5, MDP6, MDP7

B. This equipment shall be fully commissioned per the requirements in the North Carolina State Construction Office 2020 Electrical Guidelines and Policies Section 260800 and per ANSI/NETA ECS-2015. The Owner will contract directly with the commissioning agent separate from the General Contractor. Equipment supplier shall provide commissioning assistance during shop drawing submittal reviews, equipment inspections, equipment start-up and commissioning. Equipment supplier shall assist with coordinating the scheduling of commissioning activities as directed by the commissioning agent.

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

Bid Number:65-3000012346

Vendor: _____

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.

7.0 ATTACHMENTS

IMPORTANT NOTICE

RETURN THE REQUIRED ATTACHMENTS WITH YOUR RESPONSE

FOLLOW THE LINKS TO ACCESS EACH ATTACHMENT

ATTACHMENT A: PRICING

No attachment associated with this IFB. Please provide your firm fixed price:$_____

*Total Cost; $*_____

ATTACHMENT B: INSTRUCTIONS TO VENDORS

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

ATTACHMENT 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

LOBBYING ACTIVITY CERTIFICATION FOR FEDERAL GRANTS

The Certification for Contracts, Grants, Loans, and Cooperative Agreements and the OMB Standard Form LLL are separate

documents that 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

Chilled Water Infrastructure Expansion Bernard Chiller Plant

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

Pre-Purchased Electrical Equipment Switchgear & Switchboards Bid Set

Submitted by:

Affiliated Engineers

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

AEI Project No. 23480-01

March 28th, 2025

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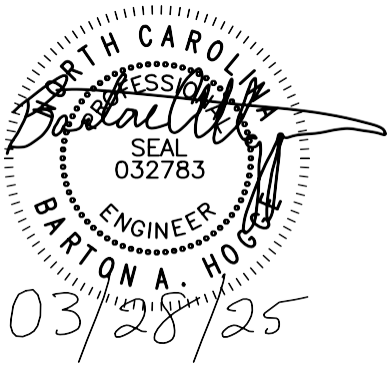
SPECIFICATIONS

DRAWING TITLE

CERTIFICATIONS



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SECTION 26 2300

LOW-VOLTAGE SWITCHGEAR

PART 1 - GENERAL

1.1 OWNER PRE-PURCHASED AND ASSIGNED EQUIPMENT

A. This equipment will be pre-purchased by the Owner and assigned to the successful Contractor after award.

B. Owner will make available shop drawings of Owner pre-purchased equipment for review. 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 equipment and all other activities as if the Contractor purchased the equipment directly. This includes directing the delivery truck to the jobsite, coordinating the date and time of delivery, receipt/unloading of the equipment at the jobsite.

D. Contractor shall install equipment and all auxiliaries as though Contractor had purchased equipment. This shall include, but not be limited to; 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. After completion of equipment installation, assemble equipment shop drawings, operating/maintenance instructions and part lists into the Contractor's project operation/maintenance manuals.

F. The following summarizes the general responsibilities of the electrical equipment supplier:

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
4. Provide Owner training
5. Provide O&M documentation

1.2 SCHEDULE

A. Schedule:

1. The following schedule is anticipated relative to the pre-purchased equipment delivery, installation and activation. This is a preliminary schedule and exact dates are to be coordinated with the Owner and Contractor.

a. Distribution Switchboards: LVSWGR1, LVSWGR2, LVSWGR3, LVSWGR4, LVSWGR5, LVSWGR6

i. Equipment Delivery: March 2026

ii. Installation, Start-Up & Commissioning: April – November 2026

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.

1.3 DESCRIPTION

A. Section includes free-standing, dead-front type, metal-enclosed, low-voltage distribution switchgear listed to UL 1558. This includes:

1. Switchgears: LVSWGR1, LVSWGR2, LVSWGR3, LVSWGR4, LVSWGR5, LVSWGR6

B. This equipment shall be fully commissioned per the requirements in the North Carolina State Construction Office 2020 Electrical Guidelines and Policies Section 260800 and per ANSI/NETA ECS-2015. The Owner will contract directly with the commissioning agent separate from the Contractor. Equipment supplier shall provide commissioning assistance during shop drawing submittal reviews, equipment inspections, equipment start-up and commissioning. Equipment supplier shall assist with coordinating the scheduling of commissioning activities as directed by the commissioning agent.

1.4 REFERENCE STANDARDS

A. ANSI/IEEE C37.13 – Low-Voltage AC Power Circuit Breakers Used in Enclosures

C. IEEE C37.20.1 – Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear

D. IEEE C37.90 – Relay and Relay Systems Associated with Electric Power Apparatus

E. IEEE C62.41.1 Guide on the Surges Environment in Low-Voltage (1000 V and Less) AC Power Circuits

F. IEEE C62.41.2 Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits

G. NFPA 70 – National Electrical Code

H. NEMA 250 – Enclosures for Electrical Equipment (1000 Volts Maximum)

I. UL 486A-486B – Wire Connectors

J. UL 869A – Reference Standard for Service Equipment

K. UL 1066 – Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures

L. UL 1558 – Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear

1.5 BID SUBMITTALS

A. 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.

B. Product Data: For each switchgear, components and accessories indicated:
   1. Include data on features and components and complete description; submit catalog cut sheets showing voltage, size, rating and size of surge protective devices, switching and overcurrent protective devices.
   2. Features, characteristics, factory settings and time-current curves of individual protective devices, auxiliary components and ground fault relaying.

C. Shop Drawings:
   1. For each switchgear specified in this Section:
      a. General Arrangement:
         1) Indicate front, plan, and side views of switchgear; access requirements; overall dimensions and components list; shipping splits and weights.
         2) Front elevation indicating location of devices and instruments.
         3) Sections through switchgear showing space available for conduits.
      b. Conduit entrance locations and requirements
      c. Nameplate legends
      d. Configuration, size and number of bus bars for each phase and current rating of buses
      e. Ground bus
      f. Neutral bus (where applicable)
      g. Short circuit ratings of switchgear and overcurrent protective devices, and bus withstand rating
      h. Instrument details; enclosure types and details
      i. Wiring diagrams: power, signal and control wiring
      j. Location of infrared viewing windows
      k. Mimic-bus diagram
      l. Key interlock product data and operational scheme

D. Manufacturer’s Installation Instructions:
   1. Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.

E. Test Reports: Indicate field test and inspection procedures and interpret test results and corrective action taken for compliance with specification requirements.

F. Closeout Submittals:

1.6 FABRICATION SUBMITTALS

A. All information from the Bid Submittal per Section 1.4 to include any updates to the development of any of the information.

B. Product Data: For each switchgear, components and accessories indicated:
   1. Include data on features and components and complete description; submit catalog cut sheets showing voltage, size, rating and size of surge protective devices, switching and overcurrent protective devices.
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D. Manufacturer's Installation Instructions:
   1. Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.

E. Test Reports: Indicate field test and inspection procedures and interpret test results and corrective action taken for compliance with specification requirements.

F. Closeout Submittals:
   1. Project Record Documents:
      a. Record actual locations, configurations, and ratings of switchgear and major components on single-line diagrams and plan layouts.
   2. Operation and Maintenance Data:
      a. Include manufacturer's recommended operating instructions, maintenance procedures and intervals, and preventive maintenance instructions.
      b. Include manufacturer's written instructions for testing and adjusting overcurrent protective devices.
      c. Include spare parts data listing, source, and current prices of replacement parts and supplies.

d. Include time-current curves, including selectable ranges for each type of overcurrent protective device.

1.7 QUALITY ASSURANCE

A. Obtain switchgear from one source and by single manufacturer.

B. Regulatory Requirements:
   1. Comply with NFPA 70 for components and installation.
   2. Furnish products listed and classified by a third party agency amongst those acceptable to the NCBCC (North Carolina Building Code Council) to Label Electrical & Mechanical Equipment.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store in clean, dry space. Maintain factory wrapping or provide additional canvas or plastic cover to protect units from dirt, fumes, water, corrosive substances, construction debris, and traffic. Provide temporary heaters in switchgear as required to prevent condensation.

B. Deliver switchgear in 48" maximum width shipping splits, individually wrapped for protection, and mounted on shipping skids. Mark crates, boxes, and cartons clearly to identify equipment. Show crate, box, or carton identification number on shipping invoices.

C. Handle switchgear in accordance with applicable portions of ANSI/NECA 400. Use factory-installed lifting provisions. Handle carefully to avoid damage to switchgear internal components, enclosure, and finish.

1.9 WARRANTY

A. Refer to Division 01 and Section 26 0000 - General Electrical Requirements for general warranty requirements.

B. Manufacturer shall provide standard two year warranty against defects in materials and workmanship for products specified in this Section. Warranty period shall begin on date of final acceptance.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Schneider Square D

B. Eaton Cutler-Hammer

C. ABB-GE Industrial Solutions

2.2 RATINGS

A. Nominal system voltage: As indicated on the drawings or scheduled.

B. Main bus continuous amperes: As indicated on the drawings or scheduled.

C. Short circuit current rating: as indicated on drawings.

D. Brace switchgear components to withstand mechanical forces for symmetrical fault current shown.

E. Provide label identifying "suitable for use as service entrance equipment".

2.3 CONSTRUCTION

A. IEEE C37.20.1, UL 1558.

B. Free-standing, dead-front type; metal-enclosed; side, front and rear panels of one-piece welded or bolted construction; compartments with ventilation louvers in top and bottom sections of front and rear panels; supporting frame: steel angles or channels rigidly fastened together, with same outside dimensions as the enclosure. The intent is for a fully compartmentalized construction.

C. Adequate strength and rigidity necessary to resist conditions of use to which it may be subjected and to support equipment, devices and appurtenances contained therein.

D. Incoming lug locations: Bottom, as applicable per drawings.

E. Barriers shall be placed such that no uninsulated, ungrounded service busbar or service terminal is exposed to inadvertent contact by persons or maintenance equipment while servicing load terminations

F. Environmental Limitations:
   1. Ambient temperatures: not exceeding 40°C
   2. Altitude: Not exceeding 2 km
   3. Temperature rise: Not to exceed 65°C over a 40°C ambient environment, with no derating required.

G. Device Mounting and Type:
   1. Front and rear accessible switchgear: Front and rear aligned
      a. All circuit breakers: Drawout and compartmented power circuit breakers.

H. Bus:
   1. Material: Copper with silver plating; copper: 98% conductivity.

2. Connections: Accessible from rear only for maintenance.
   a. Bolted:
      1) Not fewer than 4 bolts for each 4” x 4” contact
      2) Not fewer than 2 bolts for each 2” x 2” contact
      3) Grade 5 bolts and conical spring-type washers
3. Sizing: Standard size, based on 65°C over 40°C; full capacity of the breaker frame size, not the trip setting; fully rated vertical and horizontal bus sections.
4. Main Phase Buses: Three phase, 3 or 4 wire per drawings; uniform capacity for entire length of switchgear; ampacity as indicated on drawings; rated for the main protective device frame size or main incoming conductors.
5. Bus Arrangement: A-B-C (left to right, top to bottom, front to rear).
6. Provide provisions for top-entry busduct connection for redundant main breaker as shown on the drawings.

I. Ground Bus: Extend length of switchgear.
   1. 1/4" by 2" minimum size, hard-drawn copper of 98% conductivity, equipped with pressure connectors for feeder ground conductors. Provide disconnecting link for ground bus to enable maintenance of each switchgear while removing reference potential.

J. Neutral Bus: 100% of the ampacity of phase buses, as indicated on drawings, equipped with pressure connectors for outgoing circuit neutral cables. Neutral bus only in main breaker section for neutral-ground link connection only. Neutral not carried through the entire lineup.

K. Hinged Front Doors: Allow access to metering, accessory, and blank compartments, with latch and padlocking provisions.

L. Removable, Hinged Rear Doors and Compartment Covers: Secured by 1/4 turn latches, for access to rear interior of switchgear, with latch and padlocking provisions.

M. Circuit breaker compartment: Equipped to house drawout type circuit breakers, fitted with hinged outer doors, and segregated from adjacent compartments by steel barriers; equipped with drawout rails, levering out mechanism, primary and secondary contacts; The following functions may be performed without the need to open the circuit breaker door: lever circuit breaker between positions, operate manual charging system, close and open circuit breaker, examine and adjust trip unit, and read circuit breaker rating nameplate.

N. Section barriers extended to rear of section. Rear compartment barrier between the cable compartment and the main bus; glass polyester barrier between adjacent vertical structures in cable compartment. Each section shall be compartmentalized from adjacent section with openings for bussing between sections minimized into windows.

O. Bus isolation barriers: Arranged to isolate line bus from load bus at each main circuit breaker; separate barriered compartment for current and potential transformers; main and riser buses fully isolated from breaker instrument and auxiliary compartments.

P. Bus bars connect: Between vertical sections and between compartments. Cable connections are not permitted.

Q. Safety shutter: To automatically cover line and load stubs to protect against accidental contact.

R. Spare circuit breakers and spaces for future circuit breakersas shown on drawings.

S. Future Provisions: Fully equip spaces for future devices with bussing, bus connections, rails, mounting brackets, supports, and appurtenances, insulated and braced for short circuit currents, with continuous current rating as indicated on drawings. Extension of phase, neutral, and ground buses from both ends by means of predrilled bolt-holes and connecting links.

T. Sections alignment: front and rear.

U. Adequate lifting means.

V. Dimensions: maximum height as indicated on drawings, excluding floor sills, lifting members and pull boxes. Length and depth indicated scaled on the drawing are maximums allowed.

W. Line and Load Terminations: Long barrel two-hole compression type, labeled for 75°C copper and aluminum conductors; suitable for number, sizes and trip ratings; feeder load terminals: silver-plated copper bus extensions equipped with pressure connectors for outgoing circuit conductors.

X. Enclosure: Steel, NEMA 250, Type 1:

1. Enclosure Finish for Indoor Units: Factory-applied finish in manufacturer's standard gray finish over a rust-inhibiting primer on treated metal surface.

Y. Mimic Bus: Continuously integrated mimic bus factory applied to front of switchgear. Arrange in single-line diagram format showing bussing, connections and devices, using symbols and letter designations consistent with final mimic-bus diagram. Use black color plastic strips, fastened flat against panel face with corrosion-resistant screws and rivets. Coordinate mimic-bus segments with devices in switchgear sections to which they are applied. Produce a concise visual presentation of principal switchgear components and connections.

Z. Provide infrared viewing ports in rear of each cabinet such that the bus connections can be seen for adequate thermographic scanning without opening the enclosure door. Provide multiple ports as necessary for sufficient viewing angles to all connections. The infrared viewing ports shall not violate the UL listing of the equipment.

AA. Provide circuit breaker universal remote racking system. The system shall be capable of removing or inserting non-rotary circuit breakers while the operator remains outside the arc-flash boundary. The device shall be portable.

2.4 SERVICE ENTRANCE

A. UL 869A

B. Switchgear labeled as suitable for use as service entrance equipment, where applicable, with incoming line isolation barriers, and a removable neutral bond to switchgear ground for solidly grounded wye systems.

C. Barriers shall be placed such that no uninsulated, ungrounded service busbar or service terminal is exposed to inadvertent contact by persons or maintenance equipment while servicing load terminations.

D. Surge arrestors on all phases per requirements in Section 26 4300 - Surge Protective Devices (SPD).

2.5 SHORT CIRCUIT CURRENT RATING

A. Each switchgear with minimum short circuit current rating as indicated on drawings.

B. Switchgear: Marked with their maximum short circuit current rating at supply voltage.

C. Switchgear: Fully rated

2.6 SURGE PROTECTIVE DEVICES (SPD)

A. Per requirements in Section 26 4300 - Surge Protective Devices.

B. IEEE C62.41.1; integrally mounted, plug-in style, solid-state, parallel-connected, sine-wave tracking suppression and filtering modules.

2.7 OVERCURRENT PROTECTIVE DEVICES

A. Power Circuit Breaker and Accessories: ANSI/IEEE C37.13; UL 1066; metal frame; field interchangeable electrical accessories, including shunt trip, spring release, electrical operator, auxiliary contacts and trip unit.
   1. Ratings: As indicated for continuous, interrupting, and short-time current ratings for each circuit breaker; voltage and frequency ratings same as switchgear.
   2. Operating Mechanism: Mechanically and electrically trip-free, stored-energy operating mechanism with the following features:
      a. Normal Closing Speed: Independent of both control and operator.
      b. Slow Closing Speed: Optional with operator for inspection and adjustment.
      c. Means for manual opening and closing.
      d. Operation counter.
   3. Auxiliary Contacts: for remote indication of circuit breaker position, with spare auxiliary switches and other auxiliary switches required for normal circuit breaker operation. Contact shall be wired through secondary disconnect devices to a terminal block in stationary housing.
      a. Bell alarm: 2 Form “C” contacts with lockout
      b. Auxiliary switches: 8 Form “C” contacts
      c. Cell position switches: 3 Form “C contacts for test, connected, and disconnected positions.
   4. Drawout Features: Circuit breaker mounting assembly equipped with a racking mechanism to position circuit breaker and hold it rigidly in connected, test, and disconnected positions. Include the following features:
      a. Interlocks: Prevent movement of circuit breaker to or from connected position when it is closed, and prevent closure of circuit breaker unless it is in connected, test, or disconnected position.
      b. Circuit Breaker Positioning: An open circuit breaker may be racked to or from connected, test, and disconnected positions only with the associated compartment door closed unless live parts are covered by a full dead-front

shield. An open circuit breaker may be manually withdrawn to a position for removal from the structure with the door open. Status for connection devices for different positions includes the following:

1) Test Position: Primary disconnect devices disengaged, and secondary disconnect devices and ground contact engaged.
2) Disconnected Position: Primary and secondary devices and ground contact disengaged.

c. Remote racking capability

5. Arc Chutes: Readily removable from associated circuit breaker when it is in disconnected position and arranged to permit inspection of contacts without removing circuit breaker from switchgear.
6. Padlocking Provisions: For installing at least three padlocks on each circuit breaker to secure its enclosure and prevent movement of drawout mechanism.
7. Operating Handle: One for each circuit breaker capable of manual operation.
8. Electric Close Button: One for each electrically operated circuit breaker.
9. Key Interlocks: Arranged so keys are attached at devices indicated. Mountings and hardware are included where future installation of key interlock devices is indicated.
10. Indicating Lights: To indicate circuit breaker is open or closed, for main and bus tie circuit breakers interlocked wither with each other or with exterior devices.
11. Communication Capability: Integral communication module with functions and features compatible with power monitoring and control system specified in Section 26 0913 - Electrical Power Monitoring and Control.
12. Listed for 100% of breaker's continuous ampere rating.

B. Circuit Breaker Electronic Trip Units general characteristics:

1. Circuit breakers, with solid-state microprocessor based trip units:
   a. Unit shall consist of current sensors, solid-state trip device, and solid-state adjustable time/current curve shaping elements.
   b. Trip units shall be removable to allow for field upgrades.
   c. Trip units shall incorporate "True RMS Sensing."
2. Solid-state elements shall provide functions as indicated above.
3. Adjustments shall be made using non-removable, discrete steps.
4. Sealable transparent cover shall be provided over adjustments.
5. Adjustable long-time pickup (Ir) and delay shall be available in an adjustable rating plug that is UL listed as field-replaceable. Adjustable rating plug shall allow for five minimum long-time pickup settings from 0.4 to 1.0 times the sensor plug (In). Other adjustable rating plugs shall be available for more precise settings to match the application. Long-time delay settings shall be at least three bands.
6. Short-time pickup shall allow for five minimum settings from 1.5 to 10 times Ir. Short-time delay shall be at least three bands with I2t ON and OFF.
7. Instantaneous settings on the trip units shall be available in five minimum bands from 2 to 15 times In. The instantaneous settings shall also have an OFF setting when short-time pickup is provided.
8. Trip units shall have the capability to electronically adjust the settings locally and remotely to fine increments below the switch settings. Fine increments for pickup adjustments are to be one ampere. Fine increments for delay adjustments are to be one second.

9. Trip unit shall indicate:
    a. Long-time fault
    b. Short-time fault
    c. Instantaneous fault
    d. Ground fault, where provided
    e. Real time metering functions including voltas, amps, kVA, kVAR, PF and frequency.
10. Trip unit shall provide local trip indication and capability to indicate local and remote reason for trip, i.e., overload, short circuit or ground fault.
11. Trip unit shall contain means to conduct circuit breaker tests, or via separate test kit.
12. Breaker shall be equipped with externally accessible test points to be used for field testing.
13. Trip units shall have arc flash energy reduction maintenance settings (ERMS). Settings shall be activated by lockable switch on the face of the enclosure. Arc flash reduction settings shall be adjustable. Provide blue LED indicator light when ERMS mode is activated for each circuit breaker.

C. Ground Fault protection equipment on breakers, where indicated: Integrally mounted relay and trip unit, push-to-test feature and ground fault indicator:
    1. Ground-fault protection with at least three adjustable short-time-delay settings and three trip-time-delay bands; adjustable current pickup with maximum setting of 1200 A.
    2. Ground-fault settings for circuit breaker sensor sizes 1200 A or below shall be in nine bands from 0.2 to 1.0 times In. The ground-fault settings for circuit breakers above 1200 A shall be in minimum three bands up to 1200 A.

2.8 CONTROL POWER, COMPONENTS IDENTIFICATION, AND CONTROL WIRING

A. Control Circuits: 120 V, supplied through secondary disconnecting devices from control-power transformer: Dry-type transformers in separate compartments for units larger than 3 KVA, including primary and secondary fuses.

B. Control-Power Fuses: Primary and secondary fuses for current-limiting and overload protection of transformer and fuses for protection of control circuits.

C. Control components mounted within assembly, such as relays, pushbuttons, switches etc.: Suitably marked for identification, corresponding to appropriate designations on manufacturer’s wiring diagrams.

D. Control Wiring: Factory installed, with bundling, lacing, and protection included; flexible conductors for #8 AWG and smaller, for conductors across hinges, and for conductors for interconnections between shipping units; insulated locking spade terminals for control connections, except where saddle type terminals, integral to a device; current transformer secondary leads, connected to short circuit terminal blocks; terminal blocks with suitable numbering strips for group of control wires leaving switchgear, with wire markers at each end of control wiring.

2.9 ACCESSORY COMPONENTS AND FEATURES

A. Furnish portable test set to test functions of circuit breakers and solid-state trip devices without removal from switchgear. Include relay and meter test plugs suitable for testing switchgear meters and switchgear class relays.

B. Furnish accessory set including tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.

C. Furnish overhead circuit-breaker lifting devices, mounted at top front of switchgear, with hoist and lifting yokes matching each drawout circuit breaker.

D. Furnish set of tools for manually charging circuit breaker stored energy device.

E. Furnish racking handle to manually move circuit breaker between connected and disconnected positions.

F. Lockout Devices: Circuit breakers with integral, lockout/tagout devices.

2.10 CUSTOMER METERING

A. Per requirements in Section 26 2713 - Electrical Metering.

B. The incoming service shall have a separate digital energy meter. All feeders shall use the integral meter to the trip unit.

C. The intent is to display metering data from each digital energy meter and trip units at the following locations:
   1. At the BAS system

D. It is the design intent to consolidate all meters and trip units into an ethernet gateway and map that data to the BAS system using MODBUS protocol.

PART 3 - EXECUTION

3.1 COORDINATION

A. Instruct manufacturer about the location of incoming lugs, i.e., top or bottom feed based on incoming feeder entrance location.

B. Coordinate installation of housekeeping concrete pad based on actual equipment supplied:
   1. Concrete: Per requirements in Division 03 – Concrete.
   2. Dimensions: Per requirements in Section 26 0529 - Hangers and Supports for Electrical Systems.

C. Coordinate with miscellaneous trades for equipment foreign to the electrical installation to be outside of dedicated electrical space.

D. Verify with manufacturer that “touch-up” paint kit is available for repainting.

3.2 EXAMINATION

A. Examine areas and surface to receive switchgear for compliance with requirements, installation tolerances, and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Verify that space indicated for switchgear mounting meets code-required working clearances.

C. Notify Designer of any discrepancies prior to submittal of product data and shop drawings.

3.3 INSTALLATION

A. Install switchgear in accordance with applicable portions of ANSI/NECA 400.

B. Switchgear mounting:
   1. Bolt switchgear to concrete housekeeping pads, using anchor bolts in accordance with Section 26 0529 - Hangers and Supports for Electrical Systems. Cast anchor bolt inserts into pads.

C. Install engraved plastic nameplates under provisions of Section 26 0553 - Electrical Systems Identification for switchgear, every instrument, overcurrent protective device and disconnect device. Attach nameplate to exterior of switchgear using small corrosion-resistant metal screws and rivets. Do not use contact adhesive. Indicate switchgear manufacturer's name and drawing number, name, amperage, voltage, phase, number of wires, short circuit current rating . For each overcurrent protective device and disconnect device, include circuit, load and area served, voltage/phase rating, and fuse size and type, when applicable.

D. Provide printed operating instructions for switchgear, including control and key interlocking sequences and emergency procedures.

E. Tighten electrical connectors and terminal according to equipment manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

F. Connect surge protective devices to switchgear per requirements in Section 26 4300 - Surge Protective Devices (SPD).

G. Tighten electrical connectors and terminals according to equipment manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

H. Apply temporary heat to maintain temperature according to manufacturer's written instructions.

3.4 CONNECTIONS

A. Ground switchgear according to Section 26 0526 - Grounding and Bonding for Electrical Systems.

B. Connect power and control wiring according to Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables.

3.5 FIELD QUALITY CONTROL

A. Inspect switchgear for physical damage, proper alignment, connections, anchorage, seismic restraints and grounding.

B. Perform testing and verification of all remote metering and monitoring.

C. Test continuity of each circuit.

D. Test switchgear per requirements in Section 26 0812 and 26 0813 - Power Distribution Acceptance Test Tables .

E. Replace any equipment that does not operate as intended during start-up and commissioning at no additional cost to Owner.

3.6 REPAINTING

A. Remove paint splatters and other marks from surface of equipment.

B. Touch-up chips, scratches or marred finishes to match original finish, using manufacturer-supplied paint kit. Leave remaining paint with Owner.

3.7 ADJUSTING

A. Set field-adjustable circuit breakers trip settings, to values indicated on drawings or recommended by the overcurrent protective device coordination study provided by Designer.

3.8 CLEANING

A. Clean switchgear during construction phase, prior to initial testing and energization, and prior to final punch list, after other trades have departed. Cleaning procedures shall be as follows:
   1. Vacuum dirt and construction debris from interior and exterior of equipment; do not use compressed air to assist in cleaning.
   2. Rack out circuit breakers and remove arc chutes.
   3. Wipe down surfaces, including arc chutes and circuit breakers with Endust or equivalent.
   4. Use paintbrush to dust small, hard-to-reach crevices.

3.9 DEMONSTRATION

A. Provide training session by manufacturer for one workday at a job location, to train the Owner’s personnel in the operation and maintenance of switchgear.

END OF SECTION

SECTION 26 2413
SWITCHBOARDS

PART 1 - GENERAL

1.1 OWNER PRE-PURCHASED EQUIPMENT

A. This equipment will be pre-purchased by the Owner and assigned to the successful Contractor after award expediting delivery and installation.

B. Owner will make available shop drawings of Owner pre-purchased equipment for review. 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 equipment and all other activities as if the Contractor purchased the equipment directly. This includes directing the delivery truck to the jobsite, coordinating the date and time of delivery, receipt/unloading of the equipment at the jobsite.

D. Contractor shall install equipment and all auxiliaries as though Contractor had purchased equipment. This shall include, but not be limited to; 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. After completion of equipment installation, assemble equipment shop drawings, operating/maintenance instructions and part lists into the Contractor's project operation/maintenance manuals.

F. The following summarizes the general responsibilities of the electrical equipment supplier:

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.
4. Provide Owner training.
5. Provide O&M documentation.

1.2 SCHEDULE

A. Schedule:

1. The following schedule is anticipated relative to the pre-purchased equipment delivery, installation and activation. This is a preliminary schedule and exact dates are to be coordinated with the Owner and Contractor.

a. Distribution Switchboards: MDP1, MDP2, MDP3, MDP4, MDP5, MDP6, MDP7

i. Equipment Delivery: March 2026

ii. Installation, Start-Up & Commissioning: April – November 2026

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.

1.3 DESCRIPTION

A. Section includes free-standing, front-access-only, dead-front type low-voltage distribution switchboards. This includes:

1. Distribution Switchboards: MDP1, MDP2, MDP3, MDP,4 MDP5, MDP6, MDP7

B. This equipment shall be fully commissioned per the requirements in the North Carolina State Construction Office 2020 Electrical Guidelines and Policies Section 260800 and per ANSI/NETA ECS-2015. The Owner will contract directly with the commissioning agent separate from the General Contractor. Equipment supplier shall provide commissioning assistance during shop drawing submittal reviews, equipment inspections, equipment start-up and commissioning. Equipment supplier shall assist with coordinating the scheduling of commissioning activities as directed by the commissioning agent.

1.4 REFERENCE STANDARDS

A. ANSI/NECA 400 – Recommended Practice for Installing and Maintaining Switchboards

B. IEEE C62.41.1 Guide on the Surges Environment in Low-Voltage (1000 V and Less) AC Power Circuits

C. IEEE C62.41.2 Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits

D. NFPA 70 – National Electrical Code

E. NEMA AB 1 – Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit Breaker Enclosures

F. NEMA AB 3 – Molded-Case Circuit Breakers and Their Applications

G. NEMA FU 1 – Low-Voltage Cartridge Fuses

H. NEMA KS 1 – Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum)

I. NEMA PB 2 – Dead-Front Distribution Switchboards

J. NEMA PB 2.1 – General Instructions for Proper Handling, Installation and Maintenance of Dead-Front Distribution Switchboards Rated 600 Volts or Less

K. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum)

L. UL 98– Enclosed and Dead-Front Switches

M. UL 486A-486B – Wire Connectors

N. UL 489 – Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures

O. UL 869A – Reference Standard for Service Equipment

P. UL 891 – Dead-Front Switchboards

Q. UL 1053 – Ground-Fault Sensing and Relaying Equipment

R. UL 1066 – Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures

1.5 BID SUBMITTALS

A. 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.

B. Complete bill of materials

C. Product Data: For each switchboard, major components and accessories indicated:

D. Shop Drawings:
   1. For each switchboard specified in this Section:
      a. One Line Diagrams for both power and instrumentation & controls.
      b. General Arrangement:
         1) Indicate front, plan, and side views of switchboards; access requirements (front, side, rear); overall dimensions and components list; shipping splits and weights.
         2) Front elevation indicating location of devices and instruments.
         3) Sections through switchboard showing space available for conduits.
      c. Conduit entrance locations and requirements.
      d. Configuration, size and number of bus bars for each phase and current rating of buses.
      e. Ground bus.
      f. Short circuit ratings of switchboards and overcurrent protective devices, and bus withstand rating.
      g. Instrument details; enclosure types and details.
      h. Wiring diagrams: power, signal and control wiring.

1.6 FABRICATION SUBMITTALS

A. All information from the Bid Submittal per Section 1.4 to include any updates to the development of any of the information.

B. Product Data: For each switchboard, components and accessories indicated:
   1. Include data on features and components and complete description; submit catalog cut sheets showing voltage, size, rating and size of surge protective devices, switching and overcurrent protective devices.
   2. Features, characteristics, factory settings and time-current curves of individual protective devices, auxiliary components and ground fault relaying.

C. Shop Drawings:
   1. For each switchboard specified in this Section:
      a. General Arrangement:
         1) Indicate front, plan, and side views of switchboards; access requirements (front, side, rear); overall dimensions and components list; shipping splits and weights.
         2) Front elevation indicating location of devices and instruments.
         3) Sections through switchboard showing space available for conduits.
      b. Conduit entrance locations and requirements.
      c. Nameplate legends.
      d. Configuration, size and number of bus bars for each phase and current rating of buses.
      e. Ground bus.
      f. Short circuit ratings of switchboards and overcurrent protective devices, and bus withstand rating.
      g. Instrument details; enclosure types and details.
      h. Wiring diagrams: power, signal and control wiring.

D. Manufacturer's Installation Instructions:
   1. Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.

E. Test Reports: Indicate field test and inspection procedures and interpret test results and corrective action taken for compliance with specification requirements.

F. Closeout Submittals:
   1. Project Record Documents:
      a. Record actual locations, configurations, and ratings of switchboard and major components on single-line diagrams and plan layouts.
   2. Operation and Maintenance Data:
      a. Include manufacturer's recommended operating instructions, maintenance procedures and intervals, and preventive maintenance instructions.

b. Include manufacturer's written instructions for testing and adjusting overcurrent protective devices.
c. Include spare parts data listing, source, and current prices of replacement parts and supplies.
d. Include time-current curves, including selectable ranges for each type of overcurrent protective device.

1.7 QUALITY ASSURANCE

A. Obtain switchboards from one source and by single manufacturer.

B. Regulatory Requirements:
1. Comply with NFPA 70 for components and installation.
2. Furnish products listed and classified by a third party agency amongst those acceptable to the NCBCC (North Carolina Building Code Council) to Label Electrical & Mechanical Equipment.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store in clean, dry space. Maintain factory wrapping or provide additional canvas or plastic cover to protect units from dirt, fumes, water, corrosive substances, construction debris, and traffic. Provide temporary heaters in switchboards as required to prevent condensation.

B. Deliver switchboard in 48" maximum width shipping splits, individually wrapped for protection, and mounted on shipping skids.

C. Handle switchboards in accordance with NEMA PB 2.1 and ANSI/NECA 400. Use factory-installed lifting provisions. Handle carefully to avoid damage to switchboard internal components, enclosure, and finish.

1.9 WARRANTY

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Schneider Square D

B. Eaton Cutler-Hammer

C. ABB-GE Industrial Solutions

2.2 RATINGS

A. Nominal system voltage: As indicated on the drawings or scheduled.

B. Main bus continuous amp: As indicated on the drawings or scheduled.

C. Short circuit current rating: as indicated on drawings.

D. Brace switchboard components to withstand mechanical forces for symmetrical fault current shown.

2.3 CONSTRUCTION

A. NEMA PB 2, UL 891

B. Free-standing, dead-front type; vertical sections bolted together; sides and rear covered with removable bolt-on covers; adequate ventilation within enclosure; supporting frame: steel channels rigidly fastened together, with same outside dimensions as the enclosure.

C. Adequate strength and rigidity necessary to resist conditions of use to which it may be subjected and to support equipment, devices and appurtenances contained therein.

D. Distribution Switchboards shall provide hinged door protective cover. Front panel construction shall allow for view of the full circuit breaker label and entire trip unit. This is for investigation and adjustment of circuit breaker without need to remove cover and be exposed to bussing.

E. Incoming lug locations: As indicated on the drawings or scheduled.

F. Environmental Limitations:
   1. Ambient temperatures: Not exceeding 40°C.
   2. Altitude: Not exceeding 2 km
   3. Temperature rise: Not to exceed 65°C over a 40°C ambient environment, with no derating required.

G. Device Mounting and Type:
   1. Front accessible switchboard: Front and rear aligned:
      a. Main device: Fixed (individually) mounted circuit breaker unless specified otherwise on the schedule on the drawings.
      b. Feeder devices: Group mounted molded-case circuit breakers unless specified otherwise on the schedule on the drawings.

H. Bus:
   1. Material: Copper with silver plating silver-plated copper: 98% conductivity. The bus bars shall have sufficient cross-sectional area to meet UL 891 temperature rise requirements through actual tests.
   2. Connections:
      a. Bolted:
         1) Not fewer than 4 bolts for each 4” x 4” contact.
         2) Not fewer than 2 bolts for each 2” x 2” contact.
         3) Grade 5 bolts and conical spring-type washers.

4) Clamp joints are not allowed.

3. Sizing: Standard size, based on 65°C over 40°C.
4. Main Phase Buses: Three phase, 3 wire; fully rated; uniform capacity for entire length of switchboard; ampacity as indicated on drawings; rated for the main protective device frame size or main incoming conductors.
5. Insulation: Fully insulated bus bars. If that is not possible, provide full compartmentalization of each circuit breaker.
6. All feeder device line and load connection straps: Rated to carry current rating of device frame (not trip rating).
7. Support for Buses: Adequate strength for indicated short circuit current.

I. Ground Bus: Extend length of switchboard.
1. 1/4” x 2” minimum-size, hard-drawn copper of 98 percent conductivity, equipped with pressure connectors for feeder ground conductors.

J. Main incoming compartment.

K. Hinged Front Doors: Allow access to metering and accessory compartments; concealed hinges; fastened by head bolts.

L. Cable Supports: For each vertical section.

M. Vertical Insulating Barrier: Between the device compartment and bus compartment.

N. Vertical Insulating Barrier: Between the bus compartment and cable compartment.

O. Barriers: Between adjacent sections.

P. Hinged Front Panels: Allow access to metering, accessory, and blank compartments.

Q. Hinged Compartment Covers: Secured by standard bolts, for access to interior of switchboard.

R. All buswork shall have 30 cycles withstand rating.

S. Adequate lifting means.

T. Dimensions: 90" maximum height, excluding floor sills, lifting members and pull boxes. Length and depth indicated on the drawing are maximum allowed.

U. Line and Load Terminations: Compression type (wherever possible) accessible from front only of switchboard, labeled for 75°C copper and aluminum conductors; suitable for number, size and trip ratings. The intent is for the switchboard to be constructed such that compression type terminations can be installed. If compression type is not possible (due to circuit breaker frame type) provide mechanical connections.

V. Enclosure: Steel, NEMA 250, Type 1:
1. Enclosure Finish for Indoor Units: Factory-applied finish in manufacturer’s standard gray finish over a rust-inhibiting primer on treated metal surface.

2.4 SHORT CIRCUIT CURRENT RATING

A. Each switchboard with minimum short circuit current rating as indicated on drawings.

B. Switchboards: Marked with their maximum short circuit current rating at supply voltage.

C. Switchboards: Series rated switchboards are not acceptable.

2.5 SURGE PROTECTIVE DEVICES (SPD)

A. By switchboard manufacturer.

B. IEEE C62.41.1; integrally mounted, plug-in style, solid-state, parallel-connected, suppression and filtering modules

C. Per requirements in Section 26 4300 - Surge Protective Devices (SPD)

2.6 OVERCURRENT PROTECTIVE DEVICES

A. Molded-Case Circuit Breaker: NEMA AB 1, NEMA AB 3, UL 489; lockable handle; interrupting capacity to meet available fault current.
   1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for all circuit breaker trip sizes. Refer to schedule on the drawings for additional information and individual circuit breaker requirements.

B. Enclosed, Insulated-Case Circuit Breaker and Accessories: NEMA AB 1, UL 489; fully rated circuit breaker with interrupting capacity rating to meet available fault current.
   1. Fixed (individually) circuit breaker mounting.
   2. Two-step, stored-energy closing; manually operated.
   3. A charging handle, closed pushbutton, open pushbutton and Off/On/Charge indicator located on the breaker escutcheon and visible with the breaker compartment closed.
   4. Electronic (solid-state microprocessor-based) trip units with interchangeable rating plug, trip indicators, field-adjustable settings and the following trip functions:
      a. Instantaneous trip.
      b. Long- and short-time pickup levels.
      c. Long- and short-time time delay adjustments with I2t response.
      d. Ground-fault pickup level, time delay, and I2t response.
   5. Auxiliary Contacts: Two SPDT switches with “a“ and “b“ contacts; “a“ contacts mimic circuit breaker contacts, “b“ contacts operate in reverse of circuit breaker contacts.
   6. Communication Capability: Integral communication module with functions and features compatible with power monitoring and control system specified in Section 26 2713 – Electrical Metering.

7. Trip units 800A and greater shall have arc flash reduction settings (ARMS). Settings shall be activated by lockable switch on the face of the enclosure. Arc flash reduction settings shall be adjustable. Provide blue LED indicator light when ARMS mode is activated for circuit breaker.
8. Listed for 100% of breaker's continuous ampere rating.

C. Circuit Breaker Electronic Trip Units general characteristics:
1. Electronic (solid-state microprocessor based) trip unit circuit breakers: digital true RMS sensing trip units; interchangeable in the field within the frame size (field-replaceable rating plug to determine the breaker trip rating), field-adjustable settings and the following trip functions for circuit breaker trip sizes 200A - 1200A:
a. Instantaneous trip
b. Long- and short-time pickup levels
c. Long- and short-time delays adjustments with I2t response
d. Ground-fault pickup level, time delay, and I2t response.

D. As scheduled on the drawings, trip units shall have arc flash reduction settings (ARMS). Settings shall be activated by lockable selector switch with associated blue LED indicator light on the remote control panel. Arc flash reduction settings shall be adjustable. Provide blue LED indicator light when ARMS mode is activated for each circuit breaker locally.

E. Ground Fault protection equipment on breakers, where indicated: Integrally mounted relay and trip unit, push-to-test feature and ground fault indicator:
1. Ground-fault protection with at least three adjustable short-time delay settings and three trip-time delay bands; adjustable current pickup with maximum setting of 1200 amps. Arrange to provide protection for the following:
a. Three-wire circuit or system
2. Ground-fault settings for circuit breaker sensor sizes 1200 A or below shall be in nine bands from 0.2 to 1.0 times In. The ground-fault settings for circuit breakers above 1200 A shall be in minimum three bands up to 1200 A.
3. Ground-Fault Relay: UL 1053; self-powered type with mechanical ground-fault indicator, test function, tripping relay with internal memory, and 3-phase current transformer/sensor.

2.7 CONTROL POWER, COMPONENTS IDENTIFICATION, AND CONTROL WIRING

A. Control Circuits: 120 V, supplied through secondary disconnecting devices from control-power transformer.

B. Control-Power Fuses: Primary and secondary fuses for current-limiting and overload protection of transformer and fuses for protection of control circuits.

C. Control components mounted within assembly, such as relays, pushbuttons, switches, etc.: Suitably marked for identification, corresponding to appropriate designations on manufacturer's wiring diagrams.

D. Control Wiring: Factory installed, with bundling, lacing, and protection included; flexible conductors for #8 AWG and smaller, for conductors across hinges, and for conductors for interconnections between shipping units; insulated locking spade terminals for all control connections, except where saddle type terminals, integral to a device; current transformer secondary leads, connected to short circuit terminal blocks; terminal blocks with suitable numbering strips for group of control wires leaving switchboard, with wire markers at each end of control wiring.

2.8 ACCESSORY COMPONENTS AND FEATURES

A. Furnish portable test set to test functions of solid-state trip devices without removal from switchboard. Include relay and meter test plugs suitable for testing switchboard meters and switchboard class relays.

B. Furnish removable paddle for circuit breaker, for ease of manual operation.

C. Furnish accessory set including tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.

D. Lockout Devices: Circuit breakers with integral, lockout/tagout devices.

2.9 CUSTOMER METERING

A. Per requirements in Section 26 2713 - Electrical Metering.

PART 3 – EXECUTION – BY EQUIPMENT MANUFACTURER

3.1 DEMONSTRATION

A. Provide training session by manufacturer for one workday at a job location, to train the Owner's personnel in the operation and maintenance of switchboards.

PART 4 – EXECUTION – BY INSTALLING CONTRACTOR

4.1 COORDINATION

A. Instruct manufacturer about the location of incoming lugs, i.e., top or bottom feed based on incoming feeder entrance location.

B. Coordinate installation of housekeeping concrete pad based on actual equipment supplied:
   1. Concrete: Per requirements in Division 03 – Concrete.
   2. Dimensions: Per requirements in Section 26 0529 - Hangers and Supports for Electrical Systems.

C. Coordinate with miscellaneous trades for equipment foreign to the electrical installation to be outside of dedicated electrical space.

D. Verify with manufacturer that "touch-up" paint kit is available for repainting.

4.2 EXAMINATION

A. Examine areas and surface to receive switchboards for compliance with requirements, installation tolerances, and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Verify that space indicated for switchboard mounting meets code-required working clearances.

C. Notify Designer of any discrepancies prior to submittal of product data and shop drawings.

4.3 INSTALLATION

A. Install switchboard in accordance with NEMA PB 2.1 and ANSI/NECA 400.

B. Install engraved plastic nameplates for each switchboard, every instrument, overcurrent protective device and disconnect device. Attach nameplate to exterior of each switchboard using small corrosion-resistant metal screws and rivets. Do not use contact adhesive. Obtain nameplate language from Designer.

C. Provide printed operating instructions for switchboards, including control and key interlocking sequences and emergency procedures.

D. Install switchboards in dedicated electrical space per NFPA 70, and as indicated on drawings.

E. Tighten electrical connectors and terminal according to equipment manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

F. Apply temporary heat to maintain temperature according to manufacturer's written instructions.

4.4 CONNECTIONS

A. Ground switchboards according to Section 26 0526 - Grounding and Bonding for Electrical Systems.

B. Connect power and control wiring according to Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables.

4.5 FIELD QUALITY CONTROL

A. Inspect switchboards for physical damage, proper alignment, connections, anchorage, seismic restraints and grounding.

B. Test continuity of each circuit.

C. Test switchboards per requirements in Sections 26 0812 - Power Distribution Acceptance Tests.

4.6 REPAINTING

A. Remove paint splatters and other marks from surface of equipment.

B. Touch-up chips, scratches or marred finishes to match original finish, using manufacturer-supplied paint kit. Leave remaining paint with Owner.

4.7 ADJUSTING

A. Set field-adjustable circuit breakers trip settings or change the trip settings to values indicated on drawings or recommended by the overcurrent protective device coordination study provided by Designer.

4.8 CLEANING

A. Vacuum dirt and construction debris from interior and exterior of equipment; do not use compressed air to assist in cleaning.

END OF SECTION

SECTION 26 2713
ELECTRICAL METERING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Section includes equipment to allow for energy and demand metering by Owner.

1.2 REFERENCE STANDARDS

A. ANSI C12.1 – Code for Electricity Metering

B. ANSI C12.7 – Requirements For Watthour Meter Sockets

C. NEMA C12.9 – Test Switches For Transformer-Rated Meters

D. ANSI C12.10 – Watthour Meters

E. ANSI C12.11 – Instrument Transformers for Revenue Metering, 10 kV BIL Through 350 kV BIL (0.6 kV NSV Through 69 kV NSV)

F. ANSI C12.20 – Electricity Meters-0.2 and 0.5 Accuracy Classes

G. ANSI C39.1 – Requirements, Electrical Analog Indicating Instruments

H. IEEE C37.90.1 – Standard Surge Withstand Capability (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus

I. IEEE C57.13 – Standard Requirements for Instrument Transformers

J. IEEE C62.41.2 – Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits

K. NECA 1 – Standard Practices for Good Workmanship in Electrical Contracting

L. NECA 400 – Recommended Practice for Installing and Maintaining Switchboards

M. NEMA 250 – Enclosures for Electrical Equipment (1000 Volts Maximum)

N. NEMA AB 1 – Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit Breaker Enclosures

O. NEMA AB 3 – Molded-Case Circuit Breakers and Their Applications

P. NEMA EI 21.1 – Instrument Transformers for Revenue Metering (110KV BIL and Less)

Q. NEMA PB 2 – Dead-Front Distribution Switchboard

R. NFPA 70 – National Electrical Code

S. UL 467 – Grounding and Bonding Equipment

T. UL 486A-486B – Wire Connectors

U. UL 489 – Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit Breaker Enclosures

V. UL 891 – Dead-Front Switchboards
   1. ASTM D1535 – Standard Practice for Specifying Color by the Munsell System

1.3 SUBMITTALS

A. Submit shop drawing data sheets for each meter and other equipment provided under this section.

B. Submit shop drawing schematics for entire metering system architecture to clearly indicate conformance with the specification. This includes:
   1. Every meter in each switchboard including model number.
   2. Wiring connections between all devices including wiring type.
   3. Associated components including Ethernet gateway, protocol translator to include physical dimensions and heat rejection.

1.4 QUALITY ASSURANCE

A. Obtain metering equipment from one source and by single manufacturer.

B. Regulatory Requirements:
   1. Comply with NFPA 70 for components and installation.
   2. Furnish products listed and classified by a third party agency amongst those acceptable to the NCBCC (North Carolina Building Code Council) to Label Electrical & Mechanical Equipment.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Receive, store, and handle modular meter center as specified in NECA 400. Use factory installed lifting provisions. Handle carefully to avoid damage to assembly internal components, enclosure, and finish.

1.6 WARRANTY

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. General Energy Meter:

1. Square D – PowerLogic
2. Cutler Hammer - PowerXpert
3. GE - Entellisys

B. Power Quality Meter:
1. ION 9000T series
2. Cutler Hammer – Power Expert
3. GE – PQM II series

C. Trip Unit Meters:
1. Squared D – Micrologic 6.0H
2. Cutler Hammer – 1150+
3. GE – MicroEntelliGuard

2.2 EQUIPMENT FOR OWNER ELECTRICAL METERING

A. All circuit breaker meters shall have the following features:
1. Meters shall be:
a. Microprocessor based.
b. Digital readout
c. 3-phase for connection to 4-wire systems.
2. Meter shall display direct readout metered or calculated values of:
a. Volts (V)
b. Amps (A)
c. Apparent Power (VA)
d. Power Factor (PF)
e. Reactive Power (VAR)
f. Amps demand (Ad)
g. Real Power Demand (kWd)
h. Frequency (Hz)
i. Real Power Usage (kWHr)

B. PQM meters shall incorporate the following additional features:
1. Total Harmonic Distortion, Amps (THD)
2. Total Harmonic Distortion, Volts (THD)
3. Waveform Capture
4. Trending and forecasting
5. Alarm Summary
6. Voltage Flicker metering
7. Sag/swell metering
8. Provided with 10-pole test switch (nickel plated with cover), with 4 handles tied to voltage and 6 handles tied to current. Test switches shall comply with ANSI C12.9.

9. Provide data outlet adjacent to the meter in switchboard for meter connection to the building network.

C. Current Transformers
   1. Current Transformer shall be:
      a. 5 Amp secondary
      b. Primary ratio as shown on plans.
      c. Bar or window type

D. Potential Transformers
   1. Potential Transformers:
      a. 600V and below:
         1) External PTs not required.
         2) Provide fused potential connection.

E. Data Communications
   1. Meters shall be daisy-chain connected inside each switchboard and routed to an Ethernet gateway.
   2. Metering system data shall be mapped to building BAS/DCS system (using MODBUS protocol). Provide all work for that interface to include wiring and conduit to BAS/DCS cabinet.
   3. Ethernet ports for connection to local telecom patch panel.

F. Provide means to transmit data to central control systems. Refer to the drawings for all monitoring points.

PART 3 – EXECUTION – BY INSTALLING CONTRACTOR

3.1 INSTALLATION

A. Meters to be mounted inside associated equipment viewed interfaced with from the front of the enclosure.

3.2 WIRING INSTALLATION

A. Install wiring in conduit outside of the associated equipment.

3.3 ACCEPTANCE TESTING

A. Testing by equipment manufacturer and Contractor.

B. Owner shall approve metering set-up, programming, user interface, etc. prior to final acceptance.

3.4 ADJUSTING

A. Coordinate with Owner for metering interface with BAS/DCS cabinet. Provide all work per Owner's direction for that connectivity and make system operational.

B. Adjusting and programming of equipment shall be done by factory authorized representative.

C. Coordinate with BAS/DCS Controls Contractor shall provide the necessary software, programming, graphics, points, etc. to input the data from the PQMs to the BMS for graphing, charting, and trending the data. All energy management metering issues must be resolved prior to final inspection.

D. PQMs shall be verified by the NETA testing agent per Section 26 0812.

E. Make adjustments as necessary.

3.5 COORDINATION

A. Coordinate adjustment and programming of metering equipment with manufacturer.

3.6 EXAMINATION

A. Examine areas and surface to receive modular meter center for compliance with requirements, installation tolerances, and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Verify that space indicated for modular meter center mounting meets code-required working clearances.

C. Notify Designer of any discrepancies prior to submittal of product data and shop drawings.

3.7 INSTALLATION

A. Comply with installation requirements in NECA 1.

B. Install current transformer cabinets, meter cabinets or meter sockets to comply with requirements of electrical power utility company. Install empty conduits for metering leads and extend grounding connections as required by utility company.

C. Tighten electrical connectors and terminal according to equipment manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

3.8 FIELD WIRING

A. Install field wiring to complete the electricity metering installation.

3.9 CONNECTIONS

A. Ground metering equipment according to Section 26 0526 - Grounding and Bonding for Electrical Systems.

B. Connect power and control wiring according to Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables.

3.10 FIELD QUALITY CONTROL

A. Test continuity of each circuit.

B. Test metering equipment per requirements in Sections 26 0812 - Power Distribution Acceptance Tests and 26 0813 - Power Distribution Acceptance Test Tables.

C. Interpret test results in writing and submit to Designer.

D. Test Owner's electricity-metering installation for proper operation, accuracy, and usability of output data.

3.11 ADJUSTING

A. Adjustment and programming of metering equipment: By factory-authorized representative.

B. Compare meter display readings with readings taken with clamp on ammeter and handheld volt-meter.

C. Make adjustments as necessary.

3.12 CLEANING

A. Vacuum dirt and construction debris from interior and exterior of equipment; do not use compressed air to assist in cleaning.

END OF SECTION

SECTION 26 4300
SURGE PROTECTIVE DEVICES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide Surge Protective Device (SPD) system. Specified system shall be Type 1 to provide high energy surge current diversion and be suitable for application in ANSI/IEEE C62.41 Category A, B, and C environments. All SPDs shall be ANSI/UL 1449 4th Edition listed. An upstream overcurrent protective device SHALL NOT be required to obtain listed rating of SPD.

B. Refer to the drawings for location of SPDs.

1.2 REFERENCE STANDARDS

A. ANSI C62.41 Recommended Practice for Surge Voltage in Low-Voltage AC Power Circuits.

B. ANSI C62.45, Guide for Surge Testing for equipment connected to Low-Voltage AC Power Circuits.

C. ANSI/UL 1449 4th Edition

D. UL 1283 Electromagnetic Interference Filters

E. NEMA LS1-1992

1.3 SUBMITTALS

A. Submit shop drawings showing unit dimensions, detailed installation instructions, recommended replacement parts list and wiring configuration for equipment.

B. Equipment datasheets and documentation showing compliance with this specification.

C. Copies of documentation stating that the Surge Protection Device is listed and tested to UL 1449 and UL 1283.

D. Documentation of Voltage Protection Rating (VPR), surge current capacity, and noise rejection testing, for all modes of protection for each SPD module being submitted per section 1.6.

E. Copy of warranty statement.

1.4 QUALITY ASSURANCE

A. Provide test report copies of the following:

B. Perform let through voltage testing for ANSI/IEEE C62.41 Category C3 (combination wave) in accordance with ANSI C62.45.

C. Perform Noise Rejection testing as outlined in NEMA LS1-1992. Noise rejection is to be measured between 10 kHz and 100 MHz verifying the devices noise attenuation.

D. Perform surge current testing which produces the listed surge current waveforms for the device, verifying the suppressor components can survive published surge current rating on a per mode basis. Calculated results are not acceptable.

1.5 WARRANTY

A. Manufacturer shall provide minimum two year warranty. Warranty statement shall clearly establish the terms and conditions to the owner. Warranty period shall begin on date of final acceptance.

PART 2 - PRODUCTS

2.1 MATERIAL

A. Acceptable manufacturers for SPDs:
   1. ABB - Current Technology
   2. Vertiv
   3. Surge Suppression Inc
   4. Switchgear, Switchboard, Panelboard vendor

2.2 PERFORMANCE CHARACTERISTICS

A. Listed as a Type 1.

B. Operating voltage and frequency: Refer to the drawings.

C. Maximum Continuous Operating Voltage (MCOV): ≥115% of the nominal system operating voltage and as indicated in this specification.

D. Response time: ≤ 1 nanoseconds for all modes of protection.

E. EMI/RFI noise rejection high-performance filter: ≤ 50 dB across frequency spectrum.

F. Modes of Protection:
   1. 4-wire system with the following all modes of protection: L-L, L-N, L-G, N-G
   2. 3-wire system with the following all modes of protection: L-L, L-G

G. Nominal discharge surge current rating: 20kA

H. Minimum single pulse surge current capacity/mode based on 8 x 20 microsecond current waveform (unless noted otherwise in the drawings) shall be:
   1. Service Entrance Equipment: 250kA per mode
   2. Switchgear, Switchboards, and Motor Control Centers (≥2000A): 250kA per mode
   3. Switchboards and Motor Control Centers (<2000A): 150kA per mode
   4. Panelboards: 100kA per mode

I. Category C3 Sequential Surge Current Survivability:
   1. ≥10,000 sequential category surges without failure.

J. Fault Current (SCCR) Rating: 200kAIC (without the use of circuit breaker or fuse on ahead of SPD).

K. Voltage Protection Rating (VPR):

System Voltage	Mode	MCOV	ANSI/UL 1449 VPR Rating (6kV/3kA combination ring wave)
208/120V	L-N	150	700
	L-G	150	700
	N-G	0	700
	L-L	300	1200
480/277V	L-N	320	1200
	L-G	320	1200
	N-G	0	1200
	L-L	550	2000

2.3 OPERATING CONDITIONS

A. Temperature range: -40°C to +50°C (-40°F to 122°F).

B. Relative humidity range: 0 to 95%, non-condensing.

2.4 FABRICATION

A. SPD Modules:
   1. SPD modules shall consist of:
      a. Multiple gap-less, individually fused MOVs.

B. Monitoring Diagnostics:
   1. Provide audible and visual alarm. Alarm shall be activated under any SPD fault condition. There shall be an alarm silence button.
   2. Provide form C dry contacts (NC and NO) for capability of remote alarm communication. Provide all work for remote signal to BAS/DCS system upon alarm.
   3. The status of each MOV shall be monitored. Provide indicator LEDs to report the protection status of each mode. One color (i.e. green) LED indicates normal operation and different color LED (i.e. red) shall indicate damage has occurred and the SPD should be replaced.
   4. Provide LED to indicate SPD is working and receiving power.
   5. Monitoring shall be electrically isolated from the protected power supply.
   6. Measuring capability to indicate the percent of MOV protection remaining in SPD. Send alarm if more than 20% MOVs have failed.

7. Provide surge “event” counter visible from outside of SPD cabinet.

C. Internal Connections:
   1. Inter-unit connections shall utilize low impedance plated busbars or conductors.
   2. No plug-in component modules or printed circuit boards shall be used as surge current conductors. No small gage round wire or plug-in connections shall be used as surge current carrying conductor.
   3. All internal components shall be soldered or hardwired.

D. Disconnect Means:
   1. Magnetic circuit breaker in distribution equipment with parallel type connection. Rating/size of that disconnecting device shall be per SPD manufacturer recommendation if larger than indicated on the drawings.

PART 3 – EXECUTION – BY INSTALLING CONTRACTOR

3.1 APPLICATION OF SPD

A. Install parallel type SPD on load side of Service Entrance Equipment.

B. Install parallel type SPD on load side of Switchgear as shown on the drawings.

C. Install parallel type SPD on load side of Switchboards as shown on the drawings.

D. Install parallel type SPD on load side of panelboards as shown on the drawings.

3.2 INSTALLATION

A. Install per SPD manufacturer's written recommended practices.

B. Install parallel type SPD with #1 AWG minimum conductors.

C. Provide branch circuit breaker for SPD sized per manufacturer’s written recommendation. This coordination shall be the responsibility of the Contractor.

D. Conductors for SPD shall be short and straight and shall not exceed 3 ft in length.

E. Input conductors twisted together to reduce inductance.

F. Avoid 90-degree bends in cable.

3.3 FIELD QUALITY CONTROL

A. Inspections before SPD startup:
   1. Visual Inspection:
      a. Verify installation per drawings and submittal datasheets.
      b. Verify phase, neutral, and ground conductors are properly sized and configured.
   2. Mechanical Inspection:
      a. Check all connections for tightness.

b. Check terminal screws, nuts and/or connectors for tightness.

3. Electrical Inspection:
   a. Confirm input voltage, frequency, and wiring configuration.
   b. Confirm phase, neutral and ground connections are proper.
   c. Confirm monitoring diagnostics features.
   d. Confirm controls connection for general alarm to BAS.

END OF SECTION

Cu FEEDER SCHEDULE - 15KV INSULATION CABLE

FEEDER TAG	# OF SETS	CURRENT CARRYING CONDUCTORS	GROUND CONDUCTOR	CONDUIT SIZE	FEEDER AMPACITY	COMMENTS
HV165NG	1	4 #2	1 #2	4"	165	600V GROUND
HV500NG	1	4 #750 KCMIL	1 #2	6"	475	600V GROUND

Cu FEEDER SCHEDULE - SERVICES

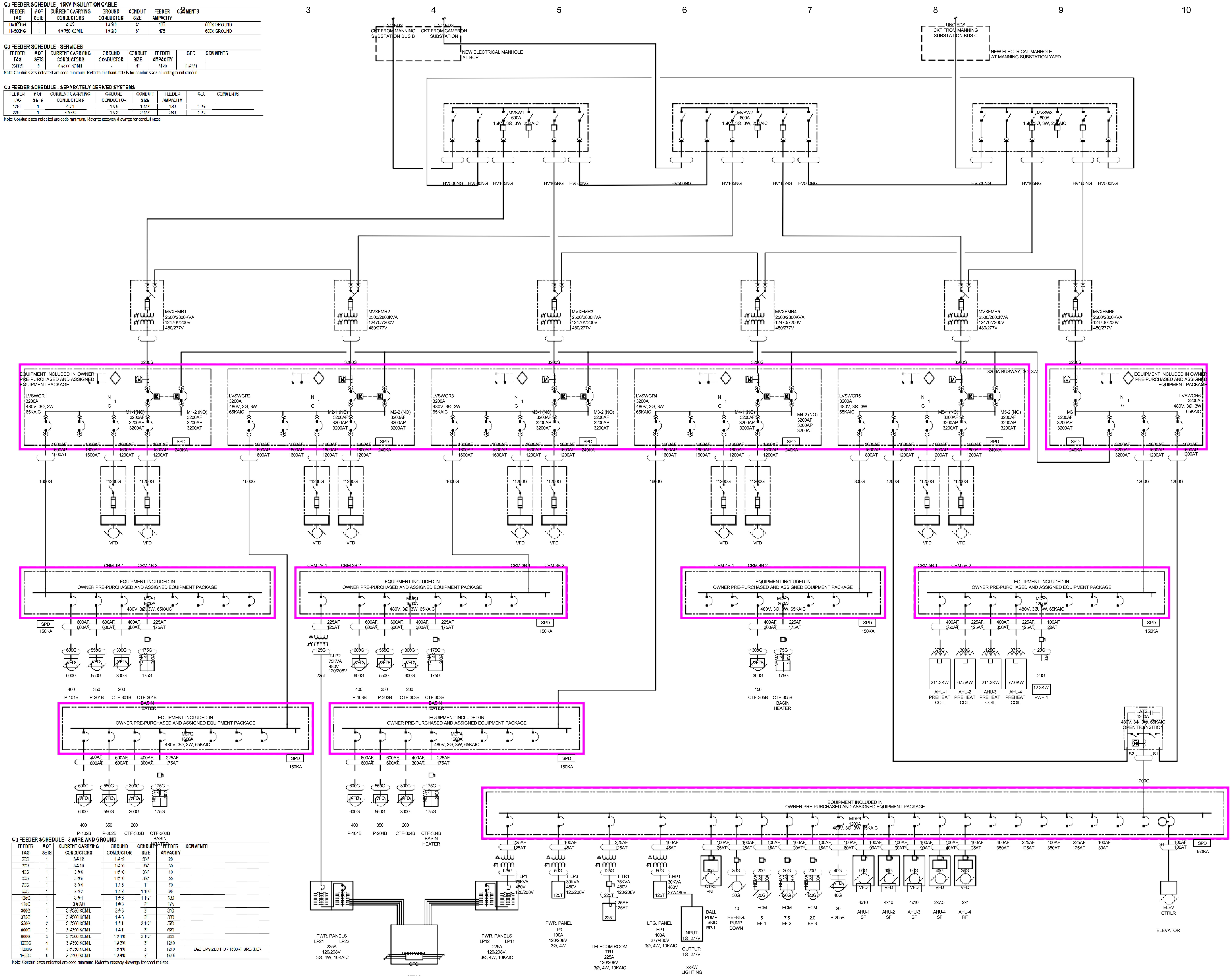
FEEDER TAG	# OF SETS	CURRENT CARRYING CONDUCTORS	GROUND CONDUCTOR	CONDUIT SIZE	FEEDER AMPACITY	GEC	COMMENTS
3200S	9	4 #400 KCMIL	-	4"	3420	1 #3/0	

Note: Conduit sizes indicated are code minimum. Refer to ductbank details for conduit sizes of underground conduit.

Cu FEEDER SCHEDULE - SEPARATELY DERIVED SYSTEMS

FEEDER TAG	# OF SETS	CURRENT CARRYING CONDUCTORS	GROUND CONDUCTOR	CONDUIT SIZE	FEEDER AMPACITY	GEC	COMMENTS
125T	1	4 #1	1 #6	1-1/2"	130	1 #8	
225T	1	4 #4/0	1 #4	2-1/2"	230	1 #2	

Note: Conduit sizes indicated are code minimum. Refer to raceway drawings for conduit sizes.



UNUSED CKT FROM MANNING SUBSTATION BUS B
UNUSED CKT FROM CAMERON SUBSTATION
NEW ELECTRICAL MANHOLE AT BCP
UNUSED CKT FROM MANNING SUBSTATION BUS C
NEW ELECTRICAL MANHOLE AT MANNING SUBSTATION YARD
MVSW1 600A 15KV, 3Ø, 3W, 25KAIC
MVSW2 600A 15KV, 3Ø, 3W, 25KAIC
MVSW3 600A 15KV, 3Ø, 3W, 25KAIC
HV500NG
HV165NG
MVXFMR1 2500/2800KVA 12470/7200V 480/277V
MVXFMR2 2500/2800KVA 12470/7200V 480/277V
MVXFMR3 2500/2800KVA 12470/7200V 480/277V
MVXFMR4 2500/2800KVA 12470/7200V 480/277V
MVXFMR5 2500/2800KVA 12470/7200V 480/277V
MVXFMR6 2500/2800KVA 12470/7200V 480/277V
3200S
EQUIPMENT INCLUDED IN OWNER PRE-PURCHASED AND ASSIGNED EQUIPMENT PACKAGE
LVSWGR1 3200A 480V, 3Ø, 3W 65KAIC
LVSWGR2 3200A 480V, 3Ø, 3W 65KAIC
LVSWGR3 3200A 480V, 3Ø, 3W 65KAIC
LVSWGR4 3200A 480V, 3Ø, 3W 65KAIC
LVSWGR5 3200A 480V, 3Ø, 3W 65KAIC
LVSWGR6 3200A 480V, 3Ø, 3W 65KAIC
3200A BUSWAY, 3Ø, 3W
SPD
240KA
VFD
MDP1 1600A 480V, 3Ø, 3W, 65KAIC
MDP2 1600A 480V, 3Ø, 3W, 65KAIC
MDP3 1600A 480V, 3Ø, 3W, 65KAIC
MDP4 1600A 480V, 3Ø, 3W, 65KAIC
MDP5 800A 480V, 3Ø, 3W, 65KAIC
MDP6 1200A 480V, 3Ø, 3W, 65KAIC
MDP7 1200A 480V, 3Ø, 3W, 65KAIC
150KA
P-101B
P-201B
CTF-301B
CTF-301B BASIN HEATER
P-103B
P-203B
CTF-303B
CTF-303B BASIN HEATER
CTF-305B
CTF-305B BASIN HEATER
AHU-1 PREHEAT COIL
AHU-2 PREHEAT COIL
AHU-3 PREHEAT COIL
AHU-4 PREHEAT COIL
EWH-1
T-LP2 75KVA 480V 120/208V
P-102B
P-202B
CTF-302B
CTF-302B BASIN HEATER
P-104B
P-204B
CTF-304B
CTF-304B BASIN HEATER
ATS 1200A 480V, 3Ø, 3W, 65KAIC OPEN TRANSITION
T-LP1 75KVA 480V 120/208V
T-LP3 30KVA 480V 120/208V
T-TR1 75KVA 480V 120/208V
T-HP1 30KVA 480V 277/480V
PWR. PANELS LP21 LP22 225A 120/208V 3Ø, 4W, 10KAIC
PWR. PANELS LP12 LP11 225A 120/208V 3Ø, 4W, 10KAIC
PWR. PANEL LP3 100A 120/208V 3Ø, 4W
TELECOM ROOM TR1 225A 120/208V 3Ø, 4W, 10KAIC
LTG. PANEL HP1 100A 277/480V 3Ø, 4W, 10KAIC
INPUT: 1Ø, 277V
OUTPUT: 1Ø, 277V
xxKW LIGHTING INVERTER
CTRLS
BALL PUMP SKID BP-1
REFRIG. PUMP DOWN
EF-1
EF-2
EF-3
P-205B
AHU-1 SF
AHU-2 SF
AHU-3 SF
AHU-4 SF
AHU-4 RF
ELEV CTRLR
ELEVATOR

Cu FEEDER SCHEDULE - 3 WIRE AND GROUND

FEEDER TAG	# OF SETS	CURRENT CARRYING CONDUCTORS	GROUND CONDUCTOR	CONDUIT SIZE	FEEDER AMPACITY	COMMENTS
20G	1	3 #12	1 #12	3/4"	20	
30G	1	3 #10	1 #10	3/4"	30	
40G	1	3 #8	1 #10	3/4"	40	
55G	1	3 #6	1 #10	3/4"	55	
70G	1	3 #4	1 #8	1"	70	
85G	1	[illegible]	1 #8	1-1/4"	85	
125G	1	3 #1	1 #6	1 1/2"	130	
175G	1	3 #2/0	1 #6	2"	175	
300G	1	3 #350 KCMIL	[illegible]	3"	310	
375G	1	3 #500 KCMIL	1 #3	3"	380	
550G	2	3 #300 KCMIL	1 #1	2 1/2"	570	
600G	2	3 #350 KCMIL	1 #1	3"	620	
800G	3	3 #300 KCMIL	1 #1/0	2 1/2"	855	
1200G	4	3 #350 KCMIL	1 #3/0	3"	1240	
1200G	4	3 #350 KCMIL	1 #4/0	3"	1240	[illegible]
1600G	5	3 #400 KCMIL	1 #4/0	3"	1675	

Note: Conduit sizes indicated are code minimum. Refer to raceway drawings for conduit sizes.

Affiliated Engineers

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NC Lic. No. C-2982

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 032783 BARTON A. HOO[illegible] 03/28/25

Sheet Keynotes:

1 NEUTRAL BUS ONLY IN SERVICE ENTRANCE MAIN SECTION FOR N-G BOND.

GENERAL NOTES:

1. REFER TO SPECIFICATION 01 0013 FOR SCOPE RESPONSIBILITY MATRIX.

Rev	Date	Description of Issue
C	03/28/25	OWNER PREPURCHASED EQUIPMENT-BID SET-REV 1
B	02/18/25	OWNER PREPURCHASED EQUIPMENT-BID SET
A	12/06/24	DESIGN DEVELOPMENT

Project

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

Chilled Water Infrastructure Expansion

SCO# 22-25588-02A
CODE: 42123-355 / 42323-305
UNC BLDG. NO XXX

Sheet Title

SINGLE LINE DIAGRAM

Scale: NONE

Date: 12/06/24 | Drawn By: WGE

Project No.: 23480-01 | Checked By: BAH

Sheet No.: 1

Vendor: _____

B.E.401

4 5 6 7 8 9 10

Bid Number: 65-3000012349 Vendor: _____

SWITCHGEAR SCHEDULE — LVSWGR4

Location: Electrical Service 1204
Rear Accessible: Yes Nema Rating: 1
Bus Rating: 3200A kAIC Rating: 65
Voltage: 480 Phase 3 Wire 3
Remarks - Service entrace rated. Neutral-Ground bond in Section 3

Main Circuit Breaker: M4-1

Frame Rating:	3200A
Trip Rating:	3200A
Breaker Type:	PB
Functional Trip:	LSIG
Breaker Option 1:	K
Breaker Option 2:	AFR
Breaker Option 3:	MTU

Remarks - Section No. 3
Key interlock with M4-2

Main Circuit Breaker: M4-2

Frame Rating:	3200A
Trip Rating:	3200A
Breaker Type:	PB
Functional Trip:	LSIG
Breaker Option 1:	K
Breaker Option 2:	AFR
Breaker Option 3:	MTU

Remarks - Section No. 4
Key interlock with M4-1

Connected Load, KVA	2387.2
Connected Load, Amps	2871.3
Demand Load, KVA	2542.4
Demand Load, Amps	3058.1

Sect. No.	Unit No.	Description	Circuit Breaker Description: Pole	Frame	Plug	Trip	Type	Func	Opt 1	Opt 2	Opt 3	Connected Load (kVA)	Demand Load (kVA)	Comments
1	A	PREPARED SPACE	3	1600										
1	B	SPARE	3	1600	1600	1600	PB	LSIG	AFR	MTU				
1	C	PREPARED SPACE	3	1600										
1	D	MDP4	3	1600	1600	1600	PB	LSIG	AFR	MTU		957.2	937.4	
2	A	CRM-4B-1	3	1600	1600	1600	PB	LSIG	AFR	MTU		700.0	875.0	
2	B	CRM-4B-2	3	1600	1600	1600	PB	LSIG	AFR	MTU		730.0	730.0	
2	C	PREPARED SPACE	3	1600										
2	D	PREPARED SPACE	3	1600										
3	A	METER												
3	B	MAIN M4-1												UTILITY SOURCE
3	D	SPD	3	100	100	60	MC							
4	A													
4	B	MAIN M4-2												ALTERNATE SOURCE VIS BUSWAY
4	D													

Notes:
1 Provide Main-Main UL1558 Switchgear with drawout power circuit breakers. Main breakers shall be manually operated and key interlocked. Provide AFR selection switch and indicator lights.
2 All meters, relays, alarms, etc. shall be daisy chain connected back to a central ethernet gateway, which shall be connected to the BAS network for remote monitoring by Owner from existing campus SCADA system
3 Meter data and alarms shall also be data mapped to BAS system.
4 Provide plaque at MAIN cubicles identifying all servcies to the building. Exact language shall be determined by AHJ.
5 Provide keyed interlock between Main breakers to allow only one main breaker to close at one time.

TYPE
PB = Power Breaker
IC = Insulated Case Breaker
MC = Fixed Molded Case Breaker

Circuit Breaker Functional Trip Option:
LI = Long-Instantaneous Settings
LSI = Long-Short-Instantaneous Settings
LSIG = Long-Short-Instantaneous-Ground Fault Settings
LSIA = Long-Short-Instantaneous-Ground Fault Alarm Settings

Circuit Breaker Option Legend
AFR = Arc Flash Reduction Mode
K = Key Interlock
MT = Meter
MTU = Meter Integral to Trip Unit
SPD = Surge Protective Device
ST = Shunt Trip

SWITCHGEAR SCHEDULE — LVSWGR1

Location: Electrical Service 1204
Rear Accessible: Yes Nema Rating: 1
Bus Rating: 3200A kAIC Rating: 65
Voltage: 480 Phase 3 Wire 3
Remarks - Service entrace rated. Neutral-Ground bond in Section 3

Main Circuit Breaker: M1-1

Frame Rating:	3200A
Trip Rating:	3200A
Breaker Type:	PB
Functional Trip:	LSIG
Breaker Option 1:	K
Breaker Option 2:	AFR
Breaker Option 3:	MTU

Remarks - Section No. 3.
Key interlock with M1-2

Main Circuit Breaker: M1-2

Frame Rating:	3200A
Trip Rating:	3200A
Breaker Type:	PB
Functional Trip:	LSIG
Breaker Option 1:	K
Breaker Option 2:	AFR
Breaker Option 3:	MTU

Remarks - Section No. 4.
Key interlock with M2-1

Connected Load, KVA	2387.2
Connected Load, Amps	2871.3
Demand Load, KVA	2549.9
Demand Load, Amps	3067.1

Sect. No.	Unit No.	Description	Circuit Breaker Description: Pole	Frame	Plug	Trip	Type	Func	Opt 1	Opt 2	Opt 3	Connected Load (kVA)	Demand Load (kVA)	Comments
1	A	PREPARED SPACE	3	1600										
1	B	SPARE	3	1600	1600	1600	PB	LSIG	AFR	MTU				
1	C	PREPARED SPACE	3	1600										
1	D	MDP1	3	1600	1600	1600	PB	LSIG	AFR	MTU		957.2	937.4	
2	A	CRM-1B-1	3	1600	1600	1200	PB	LSIG	AFR	MTU		700.0	700.0	
2	B	CRM-1B-2	3	1600	1600	1200	PB	LSIG	AFR	MTU		730.0	912.5	
2	C	PREPARED SPACE	3	1600										
2	D	PREPARED SPACE	3	1600										
3	A	METER												
3	B	MAIN M1-1												UTILITY SOURCE
3	D	SPD	3	100	100	60	MC							
4	A													
4	B	MAIN M1-2												ALTERNATE SOURCE VIS BUSWAY
4	D													

Notes:
1 Provide Main-Main UL1558 Switchgear with drawout power circuit breakers. Main breakers shall be manually operated and key interlocked. Provide AFR selection switch and indicator lights.
2 All meters, relays, alarms, etc. shall be daisy chain connected back to a central ethernet gateway, which shall be connected to the BAS network for remote monitoring by Owner from existing campus SCADA system
3 Meter data and alarms shall also be data mapped to BAS system.
4 Provide plaque at MAIN cubicles identifying all servcies to the building. Exact language shall be determined by AHJ.
5 Provide keyed interlock between Main breakers to allow only one main breaker to close at one time.

TYPE
PB = Power Breaker
IC = Insulated Case Breaker
MC = Fixed Molded Case Breaker

Circuit Breaker Functional Trip Option:
LI = Long-Instantaneous Settings
LSI = Long-Short-Instantaneous Settings
LSIG = Long-Short-Instantaneous-Ground Fault Settings
LSIA = Long-Short-Instantaneous-Ground Fault Alarm Settings

Circuit Breaker Option Legend
AFR = Arc Flash Reduction Mode
K = Key Interlock
MT = Meter
MTU = Meter Integral to Trip Unit
SPD = Surge Protective Device
ST = Shunt Trip

SWITCHGEAR SCHEDULE — LVSWGR5

Location: Electrical Service 1204
Rear Accessible: Yes Nema Rating: 1
Bus Rating: 3200A kAIC Rating: 65
Voltage: 480 Phase 3 Wire 3
Remarks - Service entrace rated. Neutral-Ground bond in Section 3

Main Circuit Breaker: M5-1

Frame Rating:	3200A
Trip Rating:	3200A
Breaker Type:	PB
Functional Trip:	LSIG
Breaker Option 1:	K
Breaker Option 2:	AFR
Breaker Option 3:	MTU

Remarks - Section No. 3
Key interlock with M5-2

Main Circuit Breaker: M5-2

Frame Rating:	3200A
Trip Rating:	3200A
Breaker Type:	PB
Functional Trip:	LSIG
Breaker Option 1:	K
Breaker Option 2:	AFR
Breaker Option 3:	MTU

Remarks - Section No. 4
Key interlock with M5-1

Connected Load, KVA	2114.8
Connected Load, Amps	2543.7
Demand Load, KVA	2271.3
Demand Load, Amps	2731.9

Sect. No.	Unit No.	Description	Circuit Breaker Description: Pole	Frame	Plug	Trip	Type	Func	Opt 1	Opt 2	Opt 3	Connected Load (kVA)	Demand Load (kVA)	Comments
1	A	PREPARED SPACE	3	1600										
1	B	PREPARED SPACE	3	1600										
1	C	MDP5	3	1600	1600	1600	PB	LSIG	AFR	MTU		287.6	224.5	
1	D	MDP6 (VIA ATS-S2)	3	1600	1600	1200	PB	LSIG	AFR	MTU		397.2	434.3	
2	A	CRM-5B-1	3	1600	1600	1600	PB	LSIG	AFR	MTU		700.0	700.0	
2	B	CRM-5B-2	3	1600	1600	1600	PB	LSIG	AFR	MTU		730.0	912.5	
2	C	PREPARED SPACE	3	1600										
2	D	PREPARED SPACE	3	1600										
3	A	METER												UTILITY SOURCE
3	B	MAIN M5-1												
3	D	SPD												
4	A													ALTERNATE SOURCE VIS BUSWAY
4	B	MAIN M5-2												
4	D													

Notes:
1 Provide Main-Main UL1558 Switchgear with drawout power circuit breakers. Main breakers shall be manually operated and key interlocked. Provide AFR selection switch and indicator lights.
2 All meters, relays, alarms, etc. shall be daisy chain connected back to a central ethernet gateway, which shall be connected to the BAS network for remote monitoring by Owner from existing campus SCADA system
3 Meter data and alarms shall also be data mapped to BAS system.
4 Provide plaque at MAIN cubicles identifying all servcies to the building. Exact language shall be determined by AHJ.
5 Provide keyed interlock between Main breakers to allow only one main breaker to close at one time.

TYPE
PB = Power Breaker
IC = Insulated Case Breaker
MC = Fixed Molded Case Breaker

Circuit Breaker Functional Trip Option:
LI = Long-Instantaneous Settings
LSI = Long-Short-Instantaneous Settings
LSIG = Long-Short-Instantaneous-Ground Fault Settings
LSIA = Long-Short-Instantaneous-Ground Fault Alarm Settings

Circuit Breaker Option Legend
AFR = Arc Flash Reduction Mode
K = Key Interlock
MT = Meter
MTU = Meter Integral to Trip Unit
SPD = Surge Protective Device
ST = Shunt Trip

SWITCHGEAR SCHEDULE — LVSWGR2

Location: Electrical Service 1204
Rear Accessible: Yes Nema Rating: 1
Bus Rating: 3200A kAIC Rating: 65
Voltage: 480 Phase 3 Wire 3
Remarks - Service entrace rated. Neutral-Ground bond in Section 3

Main Circuit Breaker: M2-1

Frame Rating:	3200A
Trip Rating:	3200A
Breaker Type:	PB
Functional Trip:	LSIG
Breaker Option 1:	K
Breaker Option 2:	AFR
Breaker Option 3:	MTU

Remarks - Section No. 3
Key interlock with M2-2

Main Circuit Breaker: M2-2

Frame Rating:	3200A
Trip Rating:	3200A
Breaker Type:	PB
Functional Trip:	LSIG
Breaker Option 1:	K
Breaker Option 2:	AFR
Breaker Option 3:	MTU

Remarks - Section No. 4
Key interlock with M2-1

Connected Load, KVA	2387.2
Connected Load, Amps	2871.3
Demand Load, KVA	2549.9
Demand Load, Amps	3067.1

Sect. No.	Unit No.	Description	Circuit Breaker Description: Pole	Frame	Plug	Trip	Type	Func	Opt 1	Opt 2	Opt 3	Connected Load (kVA)	Demand Load (kVA)	Comments
1	A	PREPARED SPACE	3	1600										
1	B	SPARE	3	1600	1600	1600	PB	LSIG	AFR	MTU				
1	C	PREPARED SPACE	3	1600										
1	D	MDP2	3	1600	1600	1600	PB	LSIG	AFR	MTU		957.2	937.4	
2	A	CRM-2B-1	3	1600	1600	1200	PB	LSIG	AFR	MTU		700.0	700.0	
2	B	CRM-2B-2	3	1600	1600	1200	PB	LSIG	AFR	MTU		730.0	912.5	
2	C	PREPARED SPACE	3	1600										
2	D	PREPARED SPACE	3	1600										
3	A	METER												
3	B	MAIN M2-1												UTILITY SOURCE
3	D	SPD	3	100	100	60	MC							
4	A													
4	B	MAIN M2-2												ALTERNATE SOURCE VIS BUSWAY
4	D													

Notes:
1 Provide Main-Main UL1558 Switchgear with drawout power circuit breakers. Main breakers shall be manually operated and key interlocked. Provide AFR selection switch and indicator lights.
2 All meters, relays, alarms, etc. shall be daisy chain connected back to a central ethernet gateway, which shall be connected to the BAS network for remote monitoring by Owner from existing campus SCADA system
3 Meter data and alarms shall also be data mapped to BAS system.
4 Provide plaque at MAIN cubicles identifying all servcies to the building. Exact language shall be determined by AHJ.
5 Provide keyed interlock between Main breakers to allow only one main breaker to close at one time.

TYPE
PB = Power Breaker
IC = Insulated Case Breaker
MC = Fixed Molded Case Breaker

Circuit Breaker Functional Trip Option:
LI = Long-Instantaneous Settings
LSI = Long-Short-Instantaneous Settings
LSIG = Long-Short-Instantaneous-Ground Fault Settings
LSIA = Long-Short-Instantaneous-Ground Fault Alarm Settings

Circuit Breaker Option Legend
AFR = Arc Flash Reduction Mode
K = Key Interlock
MT = Meter
MTU = Meter Integral to Trip Unit
SPD = Surge Protective Device
ST = Shunt Trip

SWITCHGEAR SCHEDULE — LVSWGR3

Location: Electrical Service 1204
Rear Accessible: Yes Nema Rating: 1
Bus Rating: 3200A kAIC Rating: 65
Voltage: 480 Phase 3 Wire 3
Remarks - Service entrace rated. Neutral-Ground bond in Section 3

Main Circuit Breaker: M3-1

Frame Rating:	3200A
Trip Rating:	3200A
Breaker Type:	PB
Functional Trip:	LSIG
Breaker Option 1:	K
Breaker Option 2:	AFR
Breaker Option 3:	MTU

Remarks - Section No. 3
Key interlock with M3-2

Main Circuit Breaker: M3-2

Frame Rating:	3200A
Trip Rating:	3200A
Breaker Type:	PB
Functional Trip:	LSIG
Breaker Option 1:	K
Breaker Option 2:	AFR
Breaker Option 3:	MTU

Remarks - Section No. 4
Key interlock with M3-1

Connected Load, KVA	2462.2
Connected Load, Amps	2961.5
Demand Load, KVA	2624.9
Demand Load, Amps	3157.3

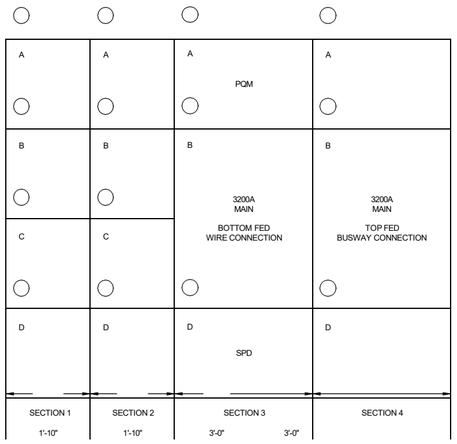
Sect. No.	Unit No.	Description	Circuit Breaker Description: Pole	Frame	Plug	Trip	Type	Func	Opt 1	Opt 2	Opt 3	Connected Load (kVA)	Demand Load (kVA)	Comments
1	A	PREPARED SPACE	3	1600										
1	B	SPARE	3	1600	1600	1600	PB	LSIG	AFR	MTU				
1	C	PREPARED SPACE	3	1600										
1	D	MDP3	3	1600	1600	1600	PB	LSIG	AFR	MTU		1032.2	1012.4	
2	A	CRM-3B-1	3	1600	1600	1600	PB	LSIG	AFR	MTU		700.0	700.0	
2	B	CRM-3B-2	3	1600	1600	1600	PB	LSIG	AFR	MTU		730.0	912.5	
2	C	PREPARED SPACE	3	1600										
2	D	PREPARED SPACE	3	1600										
3	A	METER												
3	B	MAIN M3-1												UTILITY SOURCE
3	D	SPD	3	100	100	60	MC							
4	A													
4	B	MAIN M3-2												ALTERNATE SOURCE VIS BUSWAY
4	D													

Notes:
1 Provide Main-Main UL1558 Switchgear with drawout power circuit breakers. Main breakers shall be manually operated and key interlocked. Provide AFR selection switch and indicator lights.
2 All meters, relays, alarms, etc. shall be daisy chain connected back to a central ethernet gateway, which shall be connected to the BAS network for remote monitoring by Owner from existing campus SCADA system
3 Meter data and alarms shall also be data mapped to BAS system.
4 Provide plaque at MAIN cubicles identifying all servcies to the building. Exact language shall be determined by AHJ.
5 Provide keyed interlock between Main breakers to allow only one main breaker to close at one time.

TYPE
PB = Power Breaker
IC = Insulated Case Breaker
MC = Fixed Molded Case Breaker

Circuit Breaker Functional Trip Option:
LI = Long-Instantaneous Settings
LSI = Long-Short-Instantaneous Settings
LSIG = Long-Short-Instantaneous-Ground Fault Settings
LSIA = Long-Short-Instantaneous-Ground Fault Alarm Settings

Circuit Breaker Option Legend
AFR = Arc Flash Reduction Mode
K = Key Interlock
MT = Meter
MTU = Meter Integral to Trip Unit
SPD = Surge Protective Device
ST = Shunt Trip



1 EQUIPMENT TYPICAL ELEVATION & SCHEDULES - LVSWGR1, 2, 3, 4, 5
SCALE: NOT TO SCALE

NOTE:
ALL EQUIPMENT SHOWN ON THIS SHEET PART OF OWNER PRE-PURCHASE PACKAGE.
REFER TO PROJECT MANUAL APPENDIX FOR ADDITIONAL INFORMATION.

Rev	Date	Description
C	03/28/25	OWNER PREPURCHASED EQUIPMENT-BID SET-REV 1
B	02/18/25	OWNER PREPURCHASED EQUIPMENT-BID SET
A	12/06/24	PRELIMINARY

Project

THE UNIVERSITY of NORTH CAROLINA at CHAPEL HILL

Chilled Water Infrastructure Expansion

SCO# 22-25588-02A
CODE: 42123-355 / 42323-305
UNC BLDG. NO XXX

Sheet Title
EQUIPMENT SCHEDULES & ELEVATIONS

Scale
NONE

Date 12/06/24 Drawn By WGE
Project No. 23480-01 Checked By BAH

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 032783 BRIAN A. HOWARD 03/28/25

Sheet Keynotes:

SWITCHGEAR SCHEDULE

LVSWGR6

Location:	Electrical Service 1204						
Rear Accessible:	No	Nema Rating:	1				
Bus Rating:	3200A	kAIC Rating:	65				
Voltage:	480	Phase	3	Wire	3		
Remarks - Service entrace rated. Neutral-Ground bond in Section 1							

Main Circuit Breaker: M6	
Frame Rating:	3200A
Trip Rating:	3200A
Breaker Type:	PB
Functional Trip:	LSIG
Breaker Option 1:	AFR
Breaker Option 2:	MTU
Breaker Option 3:	

Remarks - Section No. 1. Meter on main.

Connected Load, KVA	976.6
Connected Load, Amps	1174.7
Demand Load, KVA	1013.7
Demand Load, Amps	1219.3

Sect. No.	Unit No.	Description	Circuit Breaker Description Pole	Frame	Plug	Trip	Type	Func	Opt 1	Opt 2	Opt 3	Connected Load (kVA)	Demand Load (kVA)	Comments
1	A	METER												
1	B	MAIN M6												UTILITY SOURCE
1	D	SPD	3	100	100	60	MC							
2	A	PREPARED SPACE	3	800										
2	B	3200A BUSWAY	3	3200	3200	3200	PB	LSIG	AFR	MTU				ALTERNATE FEED TO LVSWGR1-5
2	D	PREPARED SPACE	3	800										
3	A	MDP7	3	1600	1600	1200	PB	LSIG	AFR	MTU		579.4	579.4	
3	B	PREPARED SPACE	3	1600										
3	C	PREPARED SPACE	3	1600										
3	D	MDP6 (VIA ATS-S1)	3	1600	1600	1200	PB	LSIG	AFR	MTU		397.2	434.3	

Notes:
1 Provide UL1558 Switchgear with drawout power circuit breakers.
2 All meters, relays, alarms, etc. shall be daisy chain connected back to a central ethernet gateway, which shall be connected to the BAS network for remote monitoring by Owner from existing campus SCADA system
3 Meter data and alarms shall also be data mapped to BAS system.
4 Provide plaque at MAIN cubicles identifying all servcies to the building. Exact language shall be determined by AHJ.
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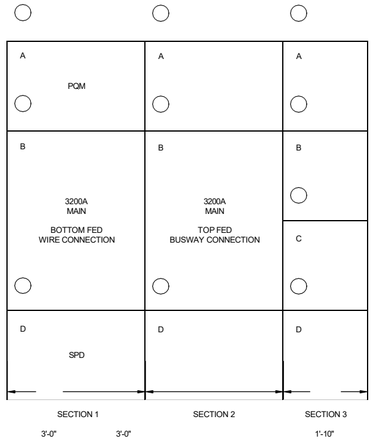
TYPE
PB = Power Breaker
IC = Insulated Case Breaker
MC = Fixed Molded Case Breaker

Circuit Breaker Functional Trip Option:
LI = Long-Instantaneous Settings
LSI = Long-Short-Instantaneous Settings
LSIG = Long-Short-Instantaneous-Ground Fault Settings
LSIA = Long-Short-Instantaneous-Ground Fault Alarm Settings

Circuit Breaker Option Legend
AFR = Arc Flash Reduction Mode
K = Key Interlock
MT = Meter
MTU = Meter Integral to Trip Unit
SPD = Surge Protective Device
ST = Shunt Trip



1 **EQUIPMENT ELEVATION & SCHEDULES - LVSWGR6**
SCALE: NOT TO SCALE

AUTOMATIC TRANSFER SWITCH

Tag	Load	Location	NEC 700 System Branch	Volts	Amps	Poles	Neutral	Cycle Rating	Withstand Rating	Transition Scheme	Transfer Scheme	Bypass Isolation	Primary Source	Alternate Source	PQM (1)	Front Access Only	Max Dimensions L" x D" x H"
ATS	MDP6	ELEC SERVICE 1204	OPTIONAL	480	1200	3	-	3	65KA	OPEN	-	YES	LVSWGR6	LVSWGR5	YES	NO	38" x 72" x 91"

NOTE:
1 Refer to 26 2713 for Power Quality Meter specification

ATS NAME	TIME DELAYS TDNE	TDES	TDEN	TDEC	DTTD	TDEF	DROPOUT OV	UV	OF	UF	UB	PICKUP RANGE VOLTAGE		FREQUENCY	
ATS	3 SECONDS	-	OFF	-	-	1 SECONDS	528V	408V	60.5HZ	58.5HZ	10%	432V	518V	59.5HZ	60.5HZ

LEGEND
TDNE= TIME DELAY TRANSFER TO EMERGENCY SOURCE
TDES= TIME DELAY ENGINE START
TDEN= TIME DELAY RETRANSFER TO NORMAL SOURCE
TDEC= TIME DELAY ENGINE COOLDOWN
DTTD= DELAYED TRANSFER TIME DELAY
TDEF= TIME DELAY EMERGENCY FAIL
OV= OVERVOLTAGE
UV= UNDERVOLTAGE
OF= OVERFREQUENCY
UF= UNDERFREQUENCY
UB= VOLTAGE UNBALANCE
DROPOUT= WHEN SOURCE IS CONSIDERED BAD
PICKUP= WHEN SOURCE BECOME ACCEPTABLE

SWITCHGEAR POINTS LIST

GENERAL
PROVIDE ALL WORK TO COMMUNICATE THE FOLLOWING POINTS TO FACILITY BAS SYSTEM AS INDICATED BELOW:

DEVICE	DESCRIPTION	BAS SYSTEM MONITOR	CONTROL	TREND	ALARM
LVSWGR1, -2, -3, -4, -5, -6					
PQM	VOLTAGE A-B	X		X	
PQM	VOLTAGE B-C	X		X	
PQM	VOLTAGE C-A	X		X	
PQM	VOLTAGE, 3-PH AVERAGE	X		X	
PQM	CURRENT A	X		X	
PQM	CURRENT B	X		X	
PQM	CURRENT C	X		X	
PQM	CURRENT, 3-PH AVERAGE	X		X	
PQM	FREQUENCY	X		X	
PQM	REAL POWER A	X		X	
PQM	REAL POWER B	X		X	
PQM	REAL POWER C	X		X	
PQM	REAL POWER (KW) TOTAL	X		X	
PQM	REACTIVE POWER A	X		X	
PQM	REACTIVE POWER B	X		X	
PQM	REACTIVE POWER C	X		X	
PQM	REACTIVE POWER (KVAR) TOTAL	X		X	
PQM	APPARENT POWER A	X		X	
PQM	APPARENT POWER B	X		X	
PQM	APPARENT POWER C	X		X	
PQM	APPARENT POWER (KVA) TOTAL	X		X	
PQM	POWER FACTOR	X		X	
PQM	TOTAL HARMONIC DISTORTION, VOLTAGE	X		X	
PQM	TOTAL HARMONIC DISTORTION, CURRENT	X		X	
PQM	TOTAL DEMAND DISTORTION	X		X	
PQM	WAVEFORM CAPTURE ON ALARM				X
PQM/RELAY	UNDERVOLTAGE				X
PQM/RELAY	OVERVOLTAGE				X
PQM/RELAY	UNDERFREQUENCY				X
PQM/RELAY	OVERFREQUENCY				X
PQM/RELAY	PHASE IMBALANCE				X
TRIP UNIT - ALL FDR BREAKERS	CURRENT A	X			
TRIP UNIT - ALL FDR BREAKERS	CURRENT B	X			
TRIP UNIT - ALL FDR BREAKERS	CURRENT C	X			
TRIP UNIT - ALL FDR BREAKERS	CURRENT, 3-PH AVERAGE	X			
SPD	SPD ALARM	X			X
ARMS MODE	ACTIVATE ARMS (ON/OFF)	X			X

ATS POINTS LIST

GENERAL
PROVIDE ALL WORK TO COMMUNICATE THE FOLLOWING POINTS TO THE LOCAL HMI AND FACILITY

DEVICE	DESCRIPTION	LOCAL DISPLAY MONITOR	CONTROL	TREND	ALARM	BAS MONITOR	CONTROL	TREND	ALARM
ATS									
GENERAL	SOURCE 1 AVAILABLE	X				X			
GENERAL	SOURCE 1 CONNECTED	X				X			
GENERAL	SOURCE 2 AVAILABLE	X				X			
GENERAL	SOURCE 2 CONNECTED	X				X			X
PQM - ATS	FREQUENCY	X				X			
PQM - ATS	VOLTAGE A-B	X				X			
PQM - ATS	VOLTAGE B-C	X				X			
PQM - ATS	VOLTAGE C-A	X				X			
PQM - ATS	VOLTAGE, 3-PH AVERAGE	X				X		X	
PQM - ATS	CURRENT A	X				X		X	
PQM - ATS	CURRENT B	X				X		X	
PQM - ATS	CURRENT C	X				X		X	
PQM - ATS	CURRENT, 3-PH AVERAGE	X				X		X	
PQM - ATS	APPARENT POWER TOTAL	X				X		X	
PQM - ATS	REAL POWER TOTAL	X				X		X	
PQM - ATS	POWER FACTOR	X				X		X	

MONITOR: COMMUNICATE AND DISPLAY INFORMATION
CONTROL: COMMANDABLE BY OPERATOR ACTION
TREND: RECORD DATA FOR HISTORICAL ACCESS
ALARM: WARN OR ALERT OPERATIONS OF FAILURE

NOTE:
ALL EQUIPMENT SHOWN ON THIS SHEET PART OF OWNER PRE-PURCHASE PACKAGE.

REFER TO PROJECT MANUAL APPENDIX FOR ADDITIONAL INFORMATION.

C	03/28/25	OWNER PREPURCHASED EQUIPMENT-BID SET-REV 1
B	02/19/25	OWNER PREPURCHASED EQUIPMENT - BID SET
A	12/06/24	DESIGN DEVELOPMENT
Rev		

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NORTH CAROLINA REGISTERED PROFESSIONAL ENGINEER SEAL 032783 BRYAN A. HOLT
03/28/25

Sheet Keynotes:

Project
THE UNIVERSITY of NORTH CAROLINA at CHAPEL HILL
Chilled Water Infrastructure Expansion
SCO# 22-25588-02A
CODE: 42123-355 / 42323-305
UNC BLDG. NO XXX

Sheet Title
EQUIPMENT SCHEDULES & ELEVATIONS

Scale: NONE
Date: 12/06/24
Drawn By: WGE
Project No.: 23480-01
Checked By: BAH

4 5 6 8 9 10

Bid Number: 65-3000012349 Vendor: _____

DISTRIBUTION SWITCHBOARD SCHEDULE — MDP6

Bus Rating	1200A	Volts	480			kAIC Rating:	65	Location:	Electrical Service 1204
Main Circuit Breaker	MLO	Phase	3	Wire	3	Nema Rating:	1	Mounting:	Floor

Remarks -

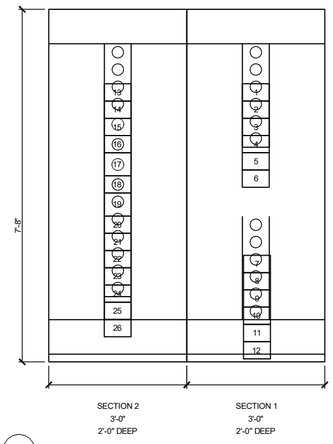
Cct. No.	Description	Circuit Breaker Description							Load Type	Connected Load (KVA)	Demand Load (KVA)
		Pole	Frame	Trip	Func	Opt 1	Opt 2	Opt 3			
1	LP11/LP12 (VIA T-LP1)	3	225	125	LSI				G	75.0	75.0
2	LP3 (VIA T-LP3)	3	100	45	LSI				G	30.0	30.0
3	TR1 (VIA T-TR1)	3	225	125	LSI				G	15.0	15.0
4	HP1 (VIA T-HP1)	3	100	45	LSI				G	30.0	30.0
5	BALL PUMP SKID BP-1	3	100	25	LI				M	11.6	11.6
6	REFRIGERANT PUMP DOWN	3	100	25	LI				M	11.6	11.6
7	EF-1	3	100	15	LI				M	6.3	6.3
8	EF-2	3	100	20	LI				M	9.1	9.1
9	EF-3	3	100	15	LI				M	2.8	2.8
10	P-205B	3	100	60	LI				M	22.4	22.4
11	AHU-1 SF	3	100	90	LI				M	49.5	61.8
12	AHU-2 SF	3	100	90	LI				M	49.5	61.8
13	AHU-3 SF	3	100	90	LI				M	49.5	61.8
14	AHU-4 SF	3	100	40	LI				M	20.6	20.6
15	AHU-4 RF	3	100	25	LI				M	14.2	14.2
16	ELEVATOR	3	100	100	LI	ST			M	0.0	0.0
17	SPARE	3	400	350	LSI						
18	SPARE	3	225	125	LSI						
19	SPARE	3	400	350	LSI						
20	SPARE	3	225	125	LSI						
21	SPARE	3	100	30	LI						
22	SPARE	3	225	225	LSI						
23	SPARE	3	225	225	LSI						
24	SPARE	3	100	100	LI						
25	SPARE	3	100	100	LI						
26	SPACE	3	225								
27											
28											
29											
30											
31											
32											

Circuit Breaker Functional Trip Option:
LI = Long-Instantaneous Settings
LSI = Long-Short-Instantaneous Settings
LSIG = Long-Short-Instantaneous-Ground Fault Settings
LSIA = Long-Short-Instantaneous-Ground Fault Alarm Settings

Total Connected Load, KVA	397.2
Total Connected Load, Amps	477.8
Total Demand Load, KVA	434.3
Total Demand Load, Amps	522.4

Load Type Legend
R = Receptacle
L = Lighting
M = Motor
G = General

Circuit Breaker Option Legend
ST = Shunt Trip
BL = Breaker Lock
GF = GFCI (5mA)
EG = Equipment Ground (30mA)
FR = 100% Rated
AF = Arc Fault



2 **EQUIPMENT ELEVATION & SCHEDULE - MDP6**
SCALE: NOT TO SCALE

DISTRIBUTION SWITCHBOARD SCHEDULE — MDP5

Bus Rating	800A	Volts	480			kAIC Rating:	65	Location:	Electrical Service 1204
Main Circuit Breaker	MLO	Phase	3	Wire	3	Nema Rating:	1	Mounting:	Floor

Remarks - Basin heater and other chilled water equipment will not have coincident peak demand. Demand calculations assume 0KVA for basin heater.

Cct. No.	Description	Circuit Breaker Description							Load Type	Connected Load (KVA)	Demand Load (KVA)
		Pole	Frame	Trip	Func	Opt 1	Opt 2	Opt 3			
1	SPACE	3	600								
2	SPACE	3	600								
3	CTF-305B	3	400	300	LSI				M	179.6	224.5
4	SPACE	3	225								
5	SPACE	3	225								
6	SPACE	3	225								
7	SPACE	3	225								
8	CTF-305B BASIN HEATER	3	225	175	LSI	EG			G	108.0	0.0
9	SPARE	3	225	225	LSI						
10	SPARE	3	225	225	LSI						
11	SPARE	3	225	225	LSI						
12	SPARE	3	100	100	LI						
13											
14											
15											
16											

Circuit Breaker Functional Trip Option:
LI = Long-Instantaneous Settings
LSI = Long-Short-Instantaneous Settings
LSIG = Long-Short-Instantaneous-Ground Fault Settings
LSIA = Long-Short-Instantaneous-Ground Fault Alarm Settings

Total Connected Load, KVA	287.6
Total Connected Load, Amps	345.9
Total Demand Load, KVA	224.5
Total Demand Load, Amps	270.0

Load Type Legend
R = Receptacle
L = Lighting
M = Motor
G = General

Circuit Breaker Option Legend
ST = Shunt Trip
BL = Breaker Lock
GF = GFCI (5mA)
EG = Equipment Ground (30mA)
FR = 100% Rated
AF = Arc Fault

DISTRIBUTION SWITCHBOARD SCHEDULE — MDP7

Bus Rating	1200A	Volts	480			kAIC Rating:	65	Location:	Electrical Service 1204
Main Circuit Breaker	MLO	Phase	3	Wire	3	Nema Rating:	1	Mounting:	Floor

Remarks -

Cct. No.	Description	Circuit Breaker Description							Load Type	Connected Load (KVA)	Demand Load (KVA)
		Pole	Frame	Trip	Func	Opt 1	Opt 2	Opt 3			
1	AHU-1 PREHEAT COIL	3	400	350	LSI				G	211.3	211.3
2	AHU-2 PREHEAT COIL	3	400	300	LI				G	67.5	67.5
3	AHU-3 PREHEAT COIL	3	225	125	LI				G	211.3	211.3
4	AHU-4 PREHEAT COIL	3	400	350	LI				G	77.0	77.0
5	EWH-1	3	100	20	LI				G	12.3	12.3
6	SPACE	3									
7	SPACE	3									
8	SPACE	3									
9	SPACE	3									
10	SPACE	3									
11	SPACE	3									
12	SPACE	3									
13	SPARE	3	225	225	LSI						
14	SPARE	3	225	225	LSI						
15	SPARE	3	100	100	LI						
16	SPARE	3	100	100	LI						

Circuit Breaker Functional Trip Option:
LI = Long-Instantaneous Settings
LSI = Long-Short-Instantaneous Settings
LSIG = Long-Short-Instantaneous-Ground Fault Settings
LSIA = Long-Short-Instantaneous-Ground Fault Alarm Settings

Total Connected Load, KVA	579.4
Total Connected Load, Amps	696.9
Total Demand Load, KVA	579.4
Total Demand Load, Amps	696.9

Load Type Legend
R = Receptacle
L = Lighting
M = Motor
G = General

Circuit Breaker Option Legend
ST = Shunt Trip
BL = Breaker Lock
GF = GFCI (5mA)
EG = Equipment Ground (30mA)
FR = 100% Rated
AF = Arc Fault

DISTRIBUTION SWITCHBOARD SCHEDULE — MDP3

Bus Rating	1600A	Volts	480			kAIC Rating:	65	Location:	Electrical Service 1204
Main Circuit Breaker	MLO	Phase	3	Wire	3	Nema Rating:	1	Mounting:	Floor

Remarks - Basin heater and other chilled water equipment will not have coincident peak demand. Demand calculations assume 0KVA for basin heater.

Cct. No.	Description	Circuit Breaker Description							Load Type	Connected Load (KVA)	Demand Load (KVA)
		Pole	Frame	Trip	Func	Opt 1	Opt 2	Opt 3			
1	P-103B	3	600	600	LSI				M	352.9	441.2
2	P-203B	3	600	600	LSI				M	316.7	316.7
3	CTF-303B	3	400	300	LSI				M	179.6	179.6
4	PREPARED SPACE	3									
5	PREPARED SPACE	3									
6	PREPARED SPACE	3									
7	PREPARED SPACE	3									
8	CTF-303B BASIN HEATER	3	225	175	LSI	EG			G	108.0	0.0
9	T-LP2	3	225	125	LSI				G	75.0	75.0
10	SPARE	3	225	225	LSI						
11	SPARE	3	100	100							
12	SPARE	3	100	100							
13											
14											
15											
16											

Circuit Breaker Functional Trip Option:
LI = Long-Instantaneous Settings
LSI = Long-Short-Instantaneous Settings
LSIG = Long-Short-Instantaneous-Ground Fault Settings
LSIA = Long-Short-Instantaneous-Ground Fault Alarm Settings

Total Connected Load, KVA	1032.2
Total Connected Load, Amps	1241.5
Total Demand Load, KVA	1012.4
Total Demand Load, Amps	1217.8

Load Type Legend
R = Receptacle
L = Lighting
M = Motor
G = General

Circuit Breaker Option Legend
ST = Shunt Trip
BL = Breaker Lock
GF = GFCI (5mA)
EG = Equipment Ground (30mA)
FR = 100% Rated
AF = Arc Fault

DISTRIBUTION SWITCHBOARD SCHEDULE — MDP4

Bus Rating	1600A	Volts	480			kAIC Rating:	65	Location:	Electrical Service 1204
Main Circuit Breaker	MLO	Phase	3	Wire	3	Nema Rating:	1	Mounting:	Floor

Remarks - Basin heater and other chilled water equipment will not have coincident peak demand. Demand calculations assume 0KVA for basin heater.

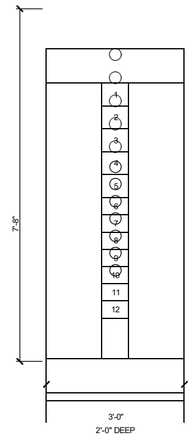
Cct. No.	Description	Circuit Breaker Description							Load Type	Connected Load (KVA)	Demand Load (KVA)
		Pole	Frame	Trip	Func	Opt 1	Opt 2	Opt 3			
1	P-104B	3	600	600	LSI				M	352.9	441.2
2	P-204B	3	600	600	LSI				M	316.7	316.7
3	CTF-304B	3	400	300	LSI				M	179.6	179.6
4	PREPARED SPACE	3									
5	PREPARED SPACE	3									
6	PREPARED SPACE	3									
7	PREPARED SPACE	3									
8	CTF-304B BASIN HEATER	3	225	175	LSI	EG			G	108.0	0.0
9	SPARE	3	225	225	LSI						
10	SPARE	3	225	225	LSI						
11	SPARE	3	100	100							
12	SPARE	3	100	100							
13											
14											
15											
16											

Circuit Breaker Functional Trip Option:
LI = Long-Instantaneous Settings
LSI = Long-Short-Instantaneous Settings
LSIG = Long-Short-Instantaneous-Ground Fault Settings
LSIA = Long-Short-Instantaneous-Ground Fault Alarm Settings

Total Connected Load, KVA	957.2
Total Connected Load, Amps	1151.3
Total Demand Load, KVA	937.4
Total Demand Load, Amps	1127.5

Load Type Legend
R = Receptacle
L = Lighting
M = Motor
G = General

Circuit Breaker Option Legend
ST = Shunt Trip
BL = Breaker Lock
GF = GFCI (5mA)
EG = Equipment Ground (30mA)
FR = 100% Rated
AF = Arc Fault



1 **EQUIPMENT TYPICAL ELEVATION & SCHEDULES - MDP1, 2, 3, 4, 5, 7**
SCALE: NOT TO SCALE

DISTRIBUTION SWITCHBOARD SCHEDULE — MDP1

Bus Rating	1600A	Volts	480			kAIC Rating:	65	Location:	Electrical Service 1204
Main Circuit Breaker	MLO	Phase	3	Wire	3	Nema Rating:	1	Mounting:	Floor

Remarks - Basin heater and other chilled water equipment will not have coincident peak demand. Demand calculations assume 0KVA for basin heater.

Cct. No.	Description	Circuit Breaker Description							Load Type	Connected Load (KVA)	Demand Load (KVA)
		Pole	Frame	Trip	Func	Opt 1	Opt 2	Opt 3			
1	P-101B	3	600	600	LSI				M	352.9	441.2
2	P-201B	3	600	600	LSI				M	316.7	316.7
3	CTF-301B	3	400	300	LSI				M	179.6	179.6
4	PREPARED SPACE	3	800								
5	PREPARED SPACE	3	800								
6	PREPARED SPACE	3	225								
7	PREPARED SPACE	3	225								
8	CTF-301B BASIN HEATER	3	225	175	LSI	EG			G	108.0	0.0
9	SPARE	3	225	225	LSI						
10	SPARE	3	225	225	LSI						
11	SPARE	3	100	100	LI						
12	SPARE	3	100	100	LI						
13											
14											
15											
16											

Circuit Breaker Functional Trip Option:
LI = Long-Instantaneous Settings
LSI = Long-Short-Instantaneous Settings
LSIG = Long-Short-Instantaneous-Ground Fault Settings
LSIA = Long-Short-Instantaneous-Ground Fault Alarm Settings

Total Connected Load, KVA	957.2
Total Connected Load, Amps	1151.3
Total Demand Load, KVA	937.4
Total Demand Load, Amps	1127.5

Load Type Legend
R = Receptacle
L = Lighting
M = Motor
G = General

Circuit Breaker Option Legend
ST = Shunt Trip
BL = Breaker Lock
GF = GFCI (5mA)
EG = Equipment Ground (30mA)
FR = 100% Rated
AF = Arc Fault

DISTRIBUTION SWITCHBOARD SCHEDULE — MDP2

Bus Rating	1600A	Volts	480			kAIC Rating:	65	Location:	Electrical Service 1204
Main Circuit Breaker	MLO	Phase	3	Wire	3	Nema Rating:	1	Mounting:	Floor

Remarks - Basin heater and other chilled water equipment will not have coincident peak demand. Demand calculations assume 0KVA for basin heater.

Cct. No.	Description	Circuit Breaker Description							Load Type	Connected Load (KVA)	Demand Load (KVA)
		Pole	Frame	Trip	Func	Opt 1	Opt 2	Opt 3			
1	P-102B	3	600	600	LSI				M	352.9	441.2
2	P-202B	3	600	600	LSI				M	316.7	316.7
3	CTF-302B	3	400	300	LSI				M	179.6	179.6
4	PREPARED SPACE	3	800								
5	PREPARED SPACE	3	800								
6	PREPARED SPACE	3	225								
7	PREPARED SPACE	3	225								
8	CTF-302B BASIN HEATER	3	225	175	LSI	EG			G	108.0	0.0
9	SPARE	3	225	225	LSI						
10	SPARE	3	225	225	LSI						
11	SPARE	3	100	100							
12	SPARE	3	100	100							
13											
14											
15											
16											

Circuit Breaker Functional Trip Option:
LI = Long-Instantaneous Settings
LSI = Long-Short-Instantaneous Settings
LSIG = Long-Short-Instantaneous-Ground Fault Settings
LSIA = Long-Short-Instantaneous-Ground Fault Alarm Settings

Total Connected Load, KVA	957.2
Total Connected Load, Amps	1151.3
Total Demand Load, KVA	937.4
Total Demand Load, Amps	1127.5

Load Type Legend
R = Receptacle
L = Lighting
M = Motor
G = General

Circuit Breaker Option Legend
ST = Shunt Trip
BL = Breaker Lock
GF = GFCI (5mA)
EG = Equipment Ground (30mA)
FR = 100% Rated
AF = Arc Fault

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03/28/25

Sheet Keynotes:

NOTE:

ALL EQUIPMENT SHOWN ON THIS SHEET PART OF OWNER PRE-PURCHASE PACKAGE.

REFER TO PROJECT MANUAL APPENDIX FOR ADDITIONAL INFORMATION.

Rev	Date	Description
C	03/28/25	OWNER PREPURCHASED EQUIPMENT-BID SET-REV 1
B	02/18/25	OWNER PREPURCHASED EQUIPMENT - BID SET
A	12/20/24	[illegible]

Project

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

Chilled Water Infrastructure Expansion
SCO# 22-25588-02A
CODE: 42123-355 / 42323-305
UNC BLDG. NO XXX

Sheet Title
EQUIPMENT SCHEDULES & ELEVATIONS

Scale: NONE

Date: 12/06/24
Drawn By: WGE

Project No.: 23480-01
Checked By: BAH

4 5 6 8 9 10