



# ROANOKE COUNTY

## FINANCE & MANAGEMENT SERVICES DEPARTMENT PURCHASING DIVISION

### INVITATION FOR BID

#### IFB # 2022-083 Hidden Valley Middle Cooling Tower Replacement

**OPENING DATE: April 14, 2022**  
**OPENING TIME: 2:00 P.M.**

The Invitation to Bid and related documents may be obtained during normal business hours from the Purchasing Division, at the Roanoke County Administration Building, 5204 Bernard Drive, Suite 300F, Roanoke, VA 24018. This document may be viewed and/or downloaded from the County of Roanoke Purchasing Division's website at <https://www.roanokecountyva.gov/bids.aspx>. If you have any problems accessing the documents, you may contact Purchasing at (540) 772-2061.

A **mandatory** pre-bid conference will be held at 9:30 AM on April 7, 2022 at Hidden valley Middle School, 4902 Hidden Valley School Road, Roanoke VA 24018.

THIS PUBLIC BODY DOES NOT DISCRIMINATE  
AGAINST FAITH-BASED ORGANIZATIONS

DATE of IFB: March 31, 2022



## INVITATION FOR BID (IFB)

IFB No. 2022-083

Issue Date: March 31, 2022

Title: Hidden Valley Middle School Cooling Tower Replacement

Issued By: **County of Roanoke**  
**Roanoke County Administration Building**  
**Purchasing Division**  
**5204 Bernard Drive, SW, Suite 300-F**  
**Roanoke, VA 24018-0798**  
**Phone (540) 772-2061**  
**Email: KHoyt@roanokecountyva.gov**

Sealed Bids will be received on or before **2:00 P.M., April 14, 2022** for furnishing the services and/or items described herein. The time of receipt shall be determined by the time clock stamp in the Purchasing office.

All questions must be submitted in writing before 5:00 p.m., **April 8, 2022**. If necessary, an addendum will be issued and posted to the County website on the Current Bids/RFP Requests tab at <https://www.roanokecountyva.gov/bids.aspx>.

If proposals are hand delivered or mailed, send directly to the Purchasing Division at the address listed above. If the Roanoke County Administration Building is closed for business at the time scheduled for the proposal opening, the sealed proposal will be accepted and opened on the next business day of the County, at the originally scheduled hour.

**THIS PUBLIC BODY DOES NOT DISCRIMINATE AGAINST FAITH-BASED ORGANIZATIONS.**

The County reserves the right to cancel this IFB and/or reject any or all proposals and to waive any informalities in any proposal.

This section is to be completed by the Offeror and this page must be returned with the bid. In compliance with this Invitation For Bid and subject to all terms and conditions imposed herein, which are hereby incorporated herein by reference, the undersigned offers and agrees to furnish the services and/or items requested in this solicitation if the undersigned is selected as the successful Bidder. No Bid may be withdrawn within a period of sixty (60) days after Bid opening except for clerical errors, as set forth in part (1) of Section 2.2-4330(B), Virginia Code, 1950, as amended. Notices of bid withdrawal must be submitted in writing to the Purchasing Division.

My signature certifies that the bid as submitted complies with all requirements specified in this Invitation for Bid ("IFB"). If this Bid is accepted by the County, to provide the services and/or items in accordance with this Invitation for Bid and to execute a Contract/Purchase Order substantially similar to the attached Contract/Purchase Order Terms and Conditions for such services and/or items. My signature also certifies that by submitting a bid in response to this IFB, the Bidder represents that in the preparation and submission of this bid, the Bidder did not, either directly or indirectly, enter into any combination or arrangement with any person or business entity, or enter into any agreement, participate in any collusion, or otherwise take any action in the restraining of free, competitive bidding in violation of the Sherman Act (15 U.S.C. Section 1) or Sections 59.1-9.1 through 59.1-9.17 or Sections 59.1-68.6 through 59.1-68.8 of the Code of Virginia.

I hereby certify that I am authorized to sign as a legal representative for the business entity submitting this bid.

**Legal Name and Address of Firm:**

Date: \_\_\_\_\_



\_\_\_\_\_  
By: \_\_\_\_\_  
(Signature in Ink)  
\_\_\_\_\_  
Name: \_\_\_\_\_  
(Please Print)  
\_\_\_\_\_  
Zip: \_\_\_\_\_ Title: \_\_\_\_\_  
Phone: \_\_\_\_\_ FAX: \_\_\_\_\_  
Email: \_\_\_\_\_ Business License# \_\_\_\_\_  
Virginia State Corporation Commission Identification Number: \_\_\_\_\_



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**COUNTY OF ROANOKE, VIRGINIA**  
**INVITATION FOR BID NO. 2022-083**  
Hidden Valley Middle Cooling Tower Replacement

**SECTION 1. PURPOSE**

The purpose of this Invitation for Bid (IFB) is the procurement and installation of a cooling tower replacement at Hidden Valley Middle, within the Roanoke County Public School system.

The County of Roanoke, on behalf of Roanoke County Public Schools, invites any qualified Bidder to respond to this IFB by submitting a Bid for such work, service, and/or items consistent with the terms and conditions herein set forth.

**SECTION 2. BACKGROUND**

**Not Used.**

**SECTION 3. SERVICES AND/OR ITEMS REQUIRED**

**A description and/or listing of the services and/or items that the Successful Bidder will be required to provide to the County under this IFB are those that are set forth below and/or referred to in any way in the sample contract, any terms and conditions, and/or any attachments referred to in this IFB. Each Bidder should carefully read and review all such documents.**

**The following are the services and/or items that the Successful Bidder shall provide to the County of Roanoke:**

- A. Contractor is responsible for submitting plans, gathering permits, and calling for inspections by state and local jurisdiction.
- B. Contractor shall remove and properly dispose of existing electric boiler, piping, and accessories.
- C. Piping to be capped in a manner to allow operation of existing gas boiler.
- D. Removal and proper disposal of existing closed circuit cooling tower and all associated accessories and piping.
- E. A (10) page set of plans prepared by Lawrence Perry Associates dated 12-13-21 are to be utilized for all specifications and requirements. See Attachment F to this IFB.
- F. Contractor is to coordinate the schedule as to not disturb classroom instruction.
- G. Work may begin on site no earlier than May 27, 2022 and must be completed before July 31, 2022.
- H. No Bid Bond is required.

**SECTION 4. REQUIRED QUALIFICATIONS FOR BIDDERS**

**Not Used.**



## **SECTION 5. TERM OF CONTRACT OR TIME OF PERFORMANCE OR NOT USED**

- A. The Successful Bidder shall start the performance of any resultant Contract no earlier than May 27, 2022, and shall fully and completely perform the Contract on or before July 31, 2022, all in accordance with the Contract provisions. Liquidated damages will be established in the resulting contract document (see Attachment E, Section 41).
- B. All terms and conditions shall remain in force for the term of the Contract and for any renewal period unless modified by mutual agreement of both parties. Prices shall not be increased during the initial term of the Contract. Prices for any renewal periods will be subject to the mutual agreement of both parties.

## **SECTION 6. PAYMENT FOR SERVICES**

Payment(s) to the Successful Bidder shall be made in accordance with the provisions of the resultant Contract, subject to final approval by the County.

## **SECTION 7. GENERAL INSTRUCTIONS TO BIDDERS**

- A. Bids, to be considered, must be received by the County of Roanoke Purchasing Division, at the Roanoke County Administration Building, 5204 Bernard Drive, Suite 300F, Roanoke, VA 24018, at or before 2:00 p.m., local time, on April 14, 2022, at which time all Bids received will be publicly opened and read. **Bids received after 2:00 p.m. will NOT be accepted or considered.** The time of receipt shall be determined by the time clock stamp in the Purchasing Office, or if it is not working, such time shall be determined by the Purchasing official who is to open the bids.

Each Bid, **one (1) original, marked as such** and **two (2) copies, marked as such**, must be appropriately signed by an authorized representative of the Offeror, and must be submitted in a **SEALED** envelope or package. A removable media storage device containing two (2) digital copies of the proposal, one as submitted, and one **redacted to remove all confidential and proprietary material**, must be included in the proposal packet. The notation "**Hidden Valley Middle Cooling Tower Replacement**", **IFB No. 2022-083**, the bidders name, and the specified opening time and date must be clearly marked on the front of that sealed envelope or package.

### **FAXED OR E-MAILED BIDS ARE NOT ACCEPTABLE.**

The Invitation for Bid and related documents may be obtained during normal business hours from the Purchasing Division, at the Roanoke County Administration Building, 5204 Bernard Drive, Suite 300F, Roanoke, VA 24018. This document may be viewed and/or downloaded from the County of Roanoke Purchasing Division's website at <https://www.roanokecountyva.gov/bids.aspx>.

If you have any problems accessing the documents, you may contact Purchasing at (540) 772-2061.



If proposals are hand delivered or mailed, send directly to the Purchasing Division at the address listed above. If the Roanoke County Administration Building is closed for business at the time scheduled for the Bid opening, the sealed bid will be accepted and opened on the next business day of the County, at the originally scheduled hour.

All questions must be submitted before 5:00 P.M. on February 24, 2022. If necessary, an addendum will be issued and posted to the County website on the Current Bids/RFP Requests tab at <https://www.roanokecountyva.gov/bids.aspx>.

**A mandatory pre-bid conference will be held at 9:30 AM on April 7, 2022, at Hidden Valley Middle School (4902 Hidden Valley School Rd, Roanoke VA 24018).**

- B. If you download this IFB from the County website and intend to submit a proposal, you should notify Purchasing that you have done so. However, each Bidder is solely responsible for ensuring that such Bidder has the current, complete version of the IFB documents, including any addenda, before submitting a bid. Receipt by the bidder of such addendum should be acknowledged on the Bid Form and/or addendum. The County Purchasing Division or its designee will issue Addenda that will be posted to the County website on the Current Bid Opportunities tab at <https://www.roanokecountyva.gov/bids.aspx>.

C. **IMPORTANT NOTICE - ADDENDUMS AND NOTICES OF AWARD**

Vendors may visit <http://roanokecountyva.gov/list.aspx> to sign up to receive emails or text message notices about bids, proposals, addendums, bid tabulation and awards. Vendors can sign up to receive notification in selected commodity/service categories. It is the vendor's responsibility to keep information current in the system in order to receive the notifications. The sign up only requires an email address and/or a cell phone number for receiving text messages (if your phone is capable) and your choice of categories.

Although '**Notify Me**' will be the only way to receive automatic notification, all BIDS/RFP Information will continue to be posted on our website, and can be picked up at the Purchasing Division, 5204 Bernard Drive, Suite 300F, Roanoke, VA 24018. Phone # (540) 772-2061.

The County is not responsible for any IFB obtained from any source other than the County. Contact Kate Hoyt, by phone at 540-283-8149, or by email at [KHoyt@roanokecountyva.gov](mailto:KHoyt@roanokecountyva.gov).

- D. Payment terms and delivery date(s) must be shown on the submitted Bid, if applicable.
- E. All Bids are to be submitted in accordance with all terms, conditions, rules, regulations, requirements and specifications identified in and by this IFB.
- F. Bids are to be on the Form as provided with **OR** as **otherwise specified** in this IFB. If a Bid Form is provided, **no changes are to be made to the Bid Form**. Any changes to Bid amounts must be initialed.
- G. All Bids shall be signed by a person on behalf of the responding Bidder who is appropriately authorized to do so. The printed name of that authorized person should be



shown as well. Any Bid submitted should be in the complete legal name of the Bidder responding. No Bid will be considered from any Bidder not properly licensed as may be required by law.

- H. Except in cases of emergency, all bids for construction contracts shall be accompanied by a bid bond from a surety company selected by the bidder, which is legally authorized to do business in Virginia. (Waived for 2022-083)
- (1) A bid, payment or performance bond for contracts for goods or services other than construction may be required if provided in the Invitation for Bid.
  - (2) The amount of the bid bond shall not exceed five percent (5%) of the total amount of the bid.
  - (3) In lieu of a bid bond, a bidder may furnish a certified check or cash escrow in the face amount required for the bond.
  - (4) Upon award of any public construction contract exceeding \$100,000 awarded to any prime contractor, such contractor shall furnish:
    - i. Performance bond in the sum of the contract amount.
    - ii. Payment bond in the sum of the contract amount.
  - (5) Performance and/or payment bonds may be required for construction contracts below \$100,000 at the discretion of the County.
  - (6) In cases of emergency performance bonds/payment bonds are required within ten (10) calendar days of notice to proceed or project commencement.
- I. Bids that have been appropriately opened cannot be changed, adjusted, corrected or modified in any way other than complete withdrawal. The County's procedures for withdrawal of bids (whether construction or other than construction) is that set forth in Code of Virginia, §2.2-4330(A)&(B)(1), which allows withdrawal of a Bid due to an error such as an unintentional arithmetic error or an unintentional omission of a quantity of work, labor or material made directly in the compilation of a Bid, which unintentional arithmetic error or unintentional omission can be clearly shown by objective evidence drawn from inspection of original work papers, documents and materials used in the preparation of the Bid. Withdrawal must be requested within two days of the Bid opening by delivering to the County original work papers, documents, and materials used in preparation of the Bid.
- J. All Bids, appropriately received, will be evaluated by considering the requirements set forth in the IFB, the quality, workmanship, economy of operation, suitability for intended purpose, delivery, payment terms and price of product or service being requested in this Bid.
- K. Bids are to be submitted on the type, brand, make, and/or kind of product and/or service requested or its approved equal, to be solely determined by the County, unless otherwise specified. Should a Bid be for a product and/or service as an equal, the name, make, model and type of that which is being Bid must be clearly stated. The Bid must also be accompanied by descriptive literature of the product or service Bid to allow for evaluation. Failure to provide this information may result in the Bid being considered non-responsive and may not be considered.

It is not the intent of the specifications to be proprietary, nor to exclude any manufacturer or dealer. Deviations will be given consideration if they are considered to be suitable and acceptable for comparison. Any deviations must be submitted, in writing, with your



bid. Deviations discovered after bid award or material receipt, not stated in your bid, shall be grounds for disqualification and nullification of order. It is the responsibility of the Offeror to prove that the deviation is equal to the product/service specified. The County of Roanoke will make the final determination as to whether the product is equivalent.

- L. If an award is made for the item(s) and/or services requested, a notice of award will be made which will be posted for public review on the County of Roanoke Purchasing Division's website under Current Bid Opportunities at <https://www.roanokecountyva.gov/bids.aspx> or you may contact Purchasing directly at (540) 772-2061 to request a copy of the award notification.

Upon completion of the Contract, payment will be made only to the Successful Bidder at the address as shown on the Contract. If the remittance address is other than the address on the Bid, it must be clearly noted and explained in the Bid. Contract Price/Purchase Order (s) will be paid only when the items and/or services have been supplied to and approved by the County.

- M. All items, identified in this IFB, are to be quoted and provided **F.O.B. DESTINATION-INSIDE DELIVERY**, unless otherwise stated in this IFB. All furniture items, if any, are to be put together and set in place.

- N. The County reserves the right to cancel this IFB or reject any or all Bids, to waive any informalities in any Bid and to purchase any whole or part of the items and/ or services listed in the IFB.

- M. Each Bidder is to notify in writing the Purchasing Division if any of Bidder's owners, officers, employees, or agents, or their immediate family members, is currently or has been in the past year, an employee of the County of Roanoke or has any responsibility or authority with the County that might affect the procurement transaction or any claim resulting therefrom. If so, please provide the Purchasing Division with the complete name and address of each such person and their connection to the County of Roanoke. Each Bidder is advised that the Ethics in Public Contracting and Conflicts of Interests Act of the Code of Virginia, as set forth in this IFB, apply to this IFB. Such information should be provided in writing before the Bid opening date or may also be provided with the Bid response.

- N. **The attention of each Bidder is directed to VA Code Sections 54.1-1100 et seq. which requires certain licenses for contractors, tradesmen and others. Each Bidder is required to determine which license, if any, it is required to have under such sections. Each Bidder shall so state on the Bid Form, or in its response, if no Bid Form is provided, whether it has a VA license under such sections and, if so, the type of license and/or license number. Failure to include this information may result in the Bid being rejected as non-responsive.**

- O. **Bid Submittals shall include:**

1. **Invitation for Bid Signature Page (p. 2-3)**
2. **Attachment A: Bid Form** (Price shall include all labor, material, delivery costs, overhead and profit.)
3. **Any Required Attachments** (Attachments B, C, and D.)



#### 4. Signed copies of any Addenda issued.

##### **Failure to do so may result in the Bid being determined as non-responsive.**

Questions or concerns may be addressed by contacting Kate Hoyt by phone at 540-283-8149, or by email at KHoyt@roanokecountyva.gov.

- P. Ethics in Public Contracting. The provisions, requirements, and prohibitions as contained in Sections 2.2-4367 through 2.2-4377, of the Virginia Code, pertaining to bidders, offerors, contractors, and subcontractors are applicable to this IFB.
- Q. Conflict of Interests Act. The provisions, requirements, and prohibitions as contained in Sections 2.2-3100, et seq., of the Virginia Code are applicable to this IFB.
- R. The procurement provisions of the Virginia Public Procurement Act as well as the County Procurement Manual, apply to this RFP, unless specifically modified herein. The County's Procurement Manual can be reviewed on the County's electronic procurement website.
- S. The County may request clarification from any of the Bidders after review of the Bids received.
- T. The County is not liable for any costs incurred by any Bidder in connection with this IFB or any response by any Bidder to this IFB. The expenses incurred by a Bidder in the preparation, submission, and presentation of the Bid are the sole responsibility of the Bidder and may not be charged to the County.
- U. General and/or technical questions regarding the Scope of Services and/or items required, or procurement questions under this IFB may be directed to Kate Hoyt, Buyer, by phone at 540-283-8149, or by email at KHoyt@roanokecountyva.gov.
- V. Each Bidder is required to state if it has ever been debarred, fined, had a contract terminated, or found not be a responsible bidder or Offer or by any federal, state, or local government and/or private entity. If so, please give the details of each such matter and include this information with Bidder's response.
- W. **Data on Convictions for Certain Crimes and Child Abuse and Neglect Certification of Contractor:** The Consultant certifies that none of the persons who will provide services requiring direct contact with students on school property during school hours or during school-sponsored activities has been convicted of any of the following felony or misdemeanor offenses: felony sex or violence offenses, other felony offenses or misdemeanor sex offenses within the past ten years.

The Consultant further understands and acknowledges (1) that if he makes a materially false statement regarding any of the above offenses, he will be guilty of a Class 1 misdemeanor and may forfeit profits derived from the contract. Further, the Consultant understands and acknowledges that before any person is permitted to provide such services subsequent to this certification, he must complete a new certification regarding such person in a form satisfactory to Roanoke County and the Roanoke County School Board. **Data and Convictions information will be requested before the County of Roanoke/Schools enters into a contract when required.**



- X. Each Bidder who is a stock or Nonstock Corporation, Limited Liability Company, business trust, or a limited partnership or other business entity shall be authorized to transact business in the Commonwealth of Virginia as a domestic or foreign business entity if required by law. Each such Bidder shall include in its bid response the Identification Number issued to it by the Virginia State Corporation Commission (SCC) and should list its business entity name as it is listed with the SCC. Any Bidder that is not required to be authorized to transact business in the Commonwealth as a domestic or foreign business entity as required by law shall include in its bid response a statement describing why the Bidder is not required to be so authorized. (See Va. Code Section 2.2-4311.2).
- Y. Direct contact with any County employee without the permission of the Purchasing Manager or her designated representative, on the subject of this bid, is strictly forbidden. Violation of this Instruction may result in disqualification of Bid.

## **SECTION 8. MISCELLANEOUS**

- A. Ownership of all data, materials, and documentation originated and prepared for the County pursuant to the IFB shall belong exclusively to the County and be subject to public inspection in accordance with the *Virginia Freedom of Information Act*. The trade secrets or proprietary information submitted by the Bidder shall not be subject to public disclosure under the *Freedom of Information Act*, unless otherwise required by law or a court. **However, the Bidder must invoke the protection of Section 2.2-4342(F) of the Code of Virginia, in writing, either before or at the time the data or other material is submitted.** The written notice must SPECIFICALLY identify the data or materials to be protected and state the reason why protection is necessary. The proprietary or trade secret material submitted must be identified by some distinct method such as highlighting or underlining and must indicate only the specific words, figures, or paragraphs that constitute trade secret or proprietary information. The classification of an entire proposal document, line item prices, and/or total proposal prices as proprietary, or trade secrets, is NOT ACCEPTABLE and may result in REJECTION of the Bid.
- B. All Bidders shall be solely responsible for making sure that they have the most current and complete version of this IFB and all addenda that may have been issued for this IFB and that such Bidder has examined all such documents and data. Any interpretation, correction, or change of the IFB will be made by an addendum. Interpretations, corrections or changes of this IFB made in any other manner will not be binding and Bidders must not rely upon such interpretations, corrections, or changes. The County Purchasing Division or its designee will issue Addenda that will be posted to the County website on the Current Bid Opportunities tab at <https://www.roanokecountyva.gov/bids.aspx>.
- C. No Bidder shall confer on any public employee having official responsibility for a purchasing transaction any payment, loan, subscription, advance, deposit or money, service, or anything of more than nominal value, present or promised, unless consideration of substantially equal or greater value is exchanged.
- D. The County may make investigations to determine the ability of the Bidder to perform the work and/or provide the services and/or items as described in this IFB. The County of Roanoke reserves the right to reject any Bid if the Bidder fails to satisfy the County of Roanoke that it is qualified to carry out the obligations and requirements requested in this IFB.



- E. The Successful Bidder must comply with the nondiscrimination provisions of Virginia Code Section 2.2-4311, which are incorporated herein by reference.
- F. The Successful Bidder must comply with the drug-free workplace provisions of Virginia Code Section 2.2-4312, which are incorporated herein by reference.
- G. It is the policy of the County of Roanoke to maximize participation whenever possible by minority and women owned business enterprises in all aspects of County contracting opportunities.
- H. The Successful Bidder shall comply with all applicable County, State, and Federal laws, codes, provisions, and regulations. The successful Bidder shall not during the performance of any resultant contract knowingly employ an unauthorized alien as defined in the federal Immigration Reform and Control Act of 1986.
- I. Providers of any outside services and/or items shall be subject to the same conditions and requirements as the Successful Bidder in regards to law, code, or regulation compliance. The County reserves the right of approval for any subcontract work, including the costs thereof.

## **SECTION 9. EVALUATION FOR LOWEST RESPONSIVE AND RESPONSIBLE BIDDER**

To determine the lowest responsive and responsible Bidder with respect to this Bid, the following factors, among such others as will protect and preserve the interest of the County may be considered:

- A. Total extended Bid price as set forth on the Bid Form;
- B. The specified terms and discounts, if any, of the Bid;
- C. The ability, capacity and skill of the Bidder to perform the Contract and/or provide the services and/or items required;
- D. Whether the Bidder can perform the Contract and/or perform the services and/or provide the items promptly, or within the time specified, without delay or interference;
- E. The character, integrity, reputation, judgment, experience and efficiency of the Bidder;
- F. The quality of performance on previous contracts or services;
- G. The previous and existing compliance by the Bidder with laws and ordinances relating to other contracts, purchase orders, items and/or services provided by Bidder in other matters;
- H. The equipment and facilities available to the Bidder to perform the Contract and/or provide the services and/or items requested in the IFB;
- I. The sufficiency of the financial resources and ability of the Bidder to perform the Contract and/or provide the services and/or items requested in the IFB;



- J. The quality, availability, and adaptability of the supplies, materials, equipment and/or services the Bidder can provide for the particular use and/or work requested in the IFB; and
- K. The ability of the Bidder to provide future maintenance, parts, and service for the items requested in the IFB.

## **SECTION 10. CONTRACTOR'S AND SUBCONTRACTOR'S INSURANCE**

Successful Bidder, and any of its subcontractors, shall, at its sole expense, obtain and maintain during the life of the resulting Contract the insurance policies and/or bonds required. Any required insurance policies and/or bonds shall be effective prior to the beginning of any work or other performance by Successful Bidder, or any of its subcontractors, under any resultant Contract. All such insurance shall be primary and noncontributory to any insurance or self-insurance the County may have. The policies and coverages required are those as may be referred to in the Sample Contract attached to this IFB, but shall include workers' compensation coverage regardless of the number of employees, unless otherwise approved by the County's Risk Manager.

## **SECTION 11. NEGOTIATIONS WITH LOWEST RESPONSIVE AND RESPONSIBLE BIDDER**

If the bid by the lowest responsive and responsible bidder exceeds available funds, the County reserves the right to negotiate with the apparent lowest responsible bidder pursuant to County Code Chapter 17 (Ord. No. 3350, S2-30,12-14-82). State Code 2.2.4318. The conditions and procedures under which such negotiation may be undertaken are that the appropriate County officials shall determine that the lowest responsive and responsible bid exceeds available funds and notify such bidder in writing of its desire to negotiate. Thereafter, negotiations with the apparent low bidder may be held to obtain a Contract within available funds involving discussions of reduction of quantity, quality, or other cost saving mechanisms. Any such negotiated Contract shall be subject to final approval of the County, in the sole discretion of the County.

## **SECTION 12. BID AWARD**

If an award of a Contract is made, it will be awarded to the lowest responsive and responsible bidder. If an award of a contract is made, notification of such award will be posted for public review on the County of Roanoke Purchasing Division's website under Current Bid Opportunities at <https://www.roanokecountyva.gov/bids.aspx> or you may contact Purchasing directly at (540) 772-2061 to request a copy of the award notification.

## **SECTION 13. FAITH BASED ORGANIZATIONS**

Pursuant to Virginia Code Section 2.2-4343.1, be advised that the County does not discriminate against faith-based organizations.



## **SECTION 14. HOLD HARMLESS AND INDEMNITY**

Successful Bidder shall indemnify and hold harmless the County and its officers, agents, and employees against any and all liability, losses, damages, claims, causes of action, suits of any nature, costs, and expenses, including reasonable attorney's fees, resulting from or arising out of Successful Bidder's or its employees, agents, or subcontractors actions, activities, or omissions, negligent or otherwise, on or near County's property or arising in any way out of or resulting from any of the work or items to be provided under the Contract, and this includes, without limitation, any fines or penalties, violations of federal, state, or local laws or regulations, personal injury, wrongful death, or property damage claims or suits. Successful Bidder agrees to and shall protect, indemnify, and hold harmless all the parties referred to above from any and all demands for fees, claims, suits, actions, causes of action, settlement or judgments based on the alleged or actual infringement or violation of any copyright, trademark, patent, invention, article, arrangement, or other apparatus that may be used in the performance of the Contract.

## **SECTION 15. PROTESTS**

Any Bidder who wishes to protest or object to any award made or other decisions Pursuant to this IFB may do so only in accordance with the provisions of Sections 2.2-4357, 4358, 4359, 4360, 4363, and 4364 of the Code of Virginia, and only if such is provided for in such Code section. Any such protest or objection must be in writing signed by a representative of the entity making the protest or objection and contain the information required by the applicable Code Sections set forth above. Such writing must be delivered to the County Manager within the required time period.

## **SECTION 16. COOPERATIVE PROCUREMENT**

The procurement of goods and/or services provided for in this procurement is being conducted in accordance with Virginia Code Section 2.2-4304 and on behalf of other public bodies in Virginia. Unless specifically prohibited by the Successful Bidder, any resultant contract may be used by other public bodies in Virginia as allowed by Section 2.2-4304. The Successful Bidder shall deal directly with each public agency or body seeking to obtain any goods and/or services pursuant to this procurement or from this procurement and in accordance with Virginia Code Section 2.2-4304. The County of Roanoke shall not be responsible or liable for any costs, expenses, or any other matters of any type to either the Bidder or the public agency or body seeking to obtain any goods and/or services pursuant to this cooperative procurement provision.

## **SECTION 17. INFORMATION ON CONTRACT/PURCHASE ORDER TO BE AWARDED**

The **Sample Contract** marked as Attachment E to IFB No. 2022-083 contains terms and conditions that the County will include in any Contract that may be awarded, but such terms and conditions may be added to, deleted, or modified as may be agreed to between the County and the Successful Bidder. However, if a Bidder has any objections to any of the terms or conditions set forth in the Sample or any changes or additions thereto that the Bidder wants to discuss before submitting a bid, the Bidder should set forth such objections, changes, or additions in written correspondence to the Purchasing Division at least five (5) days before the bid opening date for



this IFB. Otherwise, submission of a bid by a Bidder will obligate such Bidder, if it is the Successful Bidder, to enter into a Contract containing the same or substantially similar terms and conditions as contained in such Attachment, and to comply with such terms and conditions. Also, such terms and conditions, together with the requirements of this IFB, shall be deemed to be a part of any resultant Contract/Purchase Order that may be issued by the County to the Successful Bidder.

**END.**



**IFB # 2022-083**  
**ATTACHMENT A: BID FORM/SPECIFICATIONS**

County of Roanoke  
Purchasing Division  
5204 Bernard Drive, SW, Suite 300-F  
Roanoke, VA 24018-0798

Bids containing any conditions, omissions, unexplained erasures, alterations or items not called for in the bid, or irregularities of any kind, may be rejected by the County as being nonresponsive. No changes are to be made to the Bid Form. Any changes to a Bid Amount must be initialed by the person signing the Bid Form.

I/We hereby propose to furnish and install HVAC cooling tower at Hidden Valley Middle School, in accordance with the enclosed general terms, conditions and specifications contained in IFB No. 2022-083. The Bid Form must be completed in blue or black ink. Discrepancies in the multiplication of units of work and the unit prices will be resolved in favor of the correct multiplication of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum. My/Our prices are as follows:

PRICES QUOTED SHALL BE FOB DESTINATION. Freight charges shall be included in the bid price.

**TOTAL TURNKEY PROJECT COST: \$\_\_\_\_\_**

**\_\_\_\_\_ (Initial) I/We can furnish, deliver, and install all items/work within the timeframe provided herein: between May 27, 2022 and July 31, 2022.**

My/Our payment terms are: net 30. If Bidder offers a cash discount for prompt payment, it will only be considered in determining the lowest responsible Bidder if the Bidder allows at least twenty (20) days for the prompt payment after the goods or services are received or after the invoice is rendered, whichever is later.

To aid in the evaluation of bids, bidders must submit the original Bid Form and two copies of the Bid Form, Attachments, and detailed specification sheets, if applicable. If you fail to do so, your bid may be considered non-responsive and rejected.

Have you complied with this requirement? ☐ Yes / ☐ No.

Indicate whether your business \_\_\_\_\_ IS or \_\_\_\_\_ IS NOT located in Roanoke County. If it is, please include a copy of your Roanoke County business license with your bid.

I/We acknowledge the receipt of:

Addendum No. \_\_\_\_\_ Dated \_\_\_\_\_.  
Addendum No. \_\_\_\_\_ Dated \_\_\_\_\_.  
Addendum No. \_\_\_\_\_ Dated \_\_\_\_\_.  
Addendum No. \_\_\_\_\_ Dated \_\_\_\_\_.



**ATTACHMENT B: Virginia State Corporation Commission (SCC) Registration Information**

**The attention of each Bidder is directed to VA Code sections 54.1-1100, et seq. which requires certain licenses for contractors, tradesmen, and others. Each Bidder is required to determine which license, if any, it is required to have under such sections. Complete the following:**

Bidder \_\_\_ does have or \_\_\_ does not have a Virginia Contractor's License. (Check appropriate block)

If Bidder has a Virginia Contractor's License, circle the class Bidder has and list the number.

Licensed "Class A", "Class B", or "Class C" Virginia Contractor Number: \_\_\_\_\_

If Bidder has another type of Virginia License, please list the type and number:

Type of license: \_\_\_\_\_ and number: \_\_\_\_\_.

Bidder is a \_\_\_ resident or \_\_\_ nonresident of Virginia. (Check appropriate blank.) See VA Code Sections 54.1-1100, et seq.

The attention of each Bidder is directed to Virginia Code Section 2.2-4311.2 which requires a bidder organized or authorized to transact business in the Commonwealth of Virginia pursuant to Title 13.1 or Title 50 of the Code of Virginia, as amended, or as otherwise required by law, shall include in its bid the Identification Number issued to such bidder by the Virginia State Corporation Commission (SCC). Furthermore, any bidder that is not required to be authorized to transact business in the Commonwealth of Virginia as a domestic or foreign business entity under Title 13.1 or Title 50 or as otherwise required by law shall include in its bid a statement describing why the bidder is not required to be so authorized. Please complete the following by checking the appropriate line that applies and providing the requested information:

- A. \_\_\_\_\_ Bidder is a Virginia business entity organized and authorized to transact business in Virginia by the SCC and such bidder's/offeree's Identification Number issued to it by the SCC is: \_\_\_\_\_.
- B. \_\_\_\_\_ Bidder is an out-of-state (foreign) business entity that is authorized to transact business in Virginia by the SCC and such bidder's Identification Number issued to it by the SCC is: \_\_\_\_\_.
- C. \_\_\_\_\_ Bidder does not have an Identification Number issued to it by the SCC and such bidder is not required to be authorized to transact business in Virginia by the SCC for the following reason(s):

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Please attach additional sheets of paper if you need more space to explain why such bidder is not required to be authorized to transact business in Virginia.

**Signature page required with submittal of bid**



IFB # 2022-083  
**ATTACHMENT C: Direct Contact with Students Form**

Name of Bidder: \_\_\_\_\_

Pursuant to Va. Code § [22.1-296.1](#), as a condition of awarding a contract for the provision of services that require the contractor, his employees or subcontractors to have **direct contact with students** on school property during regular school hours or during school-sponsored activities, the school board shall require the contractor to provide certification that all persons who will provide such services have not been convicted of a felony or any offense involving the sexual molestation or physical or sexual abuse or rape of a child.

Any person making a materially false statement regarding any such offense shall be guilty of a Class 1 misdemeanor and, upon conviction, the fact of such conviction shall be grounds for the revocation of the contract to provide such services and, when relevant, the revocation of any license required to provide such services.

I further understand and acknowledge (1) that if I make a materially false statement regarding any of the above offenses, I will be guilty of a Class 1 misdemeanor and (2) that before any person is permitted to provide such services subsequent to this certification, I must complete a new certification regarding such person.

**As part of this submission, I certify that the employees of, or subcontractors to, the above mentioned contractor that will be providing services that require direct contact with students to the School Board under the resulting contract will have not been convicted of a felony or any offense involving the sexual molestation or physical or sexual abuse or rape of a child. Furthermore, I understand that the duty to certify is ongoing and extends to future employees and employees of subcontractors for the duration of the contract.**

\_\_\_\_\_  
*Signature of Authorized Representative*

\_\_\_\_\_  
*Printed Name of Authorized Representative*

\_\_\_\_\_  
*Printed Name of Vendor  
(If different than Representative)*

\_\_\_\_\_  
*Date*



**ATTACHMENT D: NOTICE OF PROPRIETARY INFORMATION FORM**

Confidentiality References Protection in Accordance with the Code of Virginia, Section 2.2-4342

Section Title	Page #	Reason(s) for Withholding from Disclosure

**INSTRUCTIONS:** Identify the data or other materials to be protected and state the reasons by using the codes listed below. Indicate the specific words, figures, or paragraphs that constitute trade secrets or proprietary materials. The classification of an entire bid or proposal document, line item prices, and/or total bid or proposal prices as proprietary or trade secret is not acceptable and will result in rejection of the bid or proposal.

- A) This page contains information relating to "trade secrets", and "proprietary information" including processes. Operations, style of work, or apparatus. Identify confidential statistical data. Amount or source of any income...of any person (or) partnership. See Virginia Public Procurement Act. Section 2.2-4342. Unauthorized disclosure of such information would violate the Trade Secrets Act 18 U.S.C. 1905.
- B) This page contains proprietary information including confidential, commercial or financial information, which was provided to the Government on a voluntary basis and is of the type that would not customarily release to the public. See Virginia Public Procurement Act, Section 2.2-4342; 5 U.S.C. 552 (b) (4); 12 C.F.R. 309.5(c) (4).
- C) This page contains proprietary information including confidential, commercial or financial information. The disclosure of such information would cause substantial harm to competitive position and impair the Government's ability to obtain necessary information from contractors in the future. 5 U.S.C. See Virginia Public Procurement Act. Section 2.2-4342; 552 (b) (4)12 C.F.R. 309.5(c) (4).



**ATTACHMENT E: SAMPLE CONTRACT and TERMS AND CONDITIONS**



**COUNTY OF ROANOKE, VIRGINIA  
SAMPLE CONTRACT BETWEEN COUNTY OF ROANOKE AND  
FOR HIDDEN VALLEY MIDDLE SCHOOL COOLING TOWER  
REPLACEMENT**

This Contract # 2022-083 is dated \_\_\_\_\_, between the County of Roanoke, Virginia, hereinafter referred to as the "County" or "Owner", and legal name/address of contractor, hereinafter referred to as the "Contractor," Choose an item. .

**WITNESSETH:**

WHEREAS, Contractor has been awarded this nonexclusive Contract by the County for furnishing all equipment, materials, goods, labor, and services necessary for purchase and installation of rooftop HVAC units at Clearbrook Elementary School and associated work in accordance with this Contract and the documents referred to herein, all such items or services also being referred to hereinafter as the Work or Project.

**NOW, THEREFORE, THE COUNTY AND THE CONTRACTOR AGREE AS FOLLOWS:**

**SECTION 1. WORK/ SERVICES TO BE PROVIDED AND DOCUMENTS.**

For and in consideration of the money hereinafter specified to be paid by the County to the Contractor for the Work provided for in this Contract to be performed by the Contractor, the Contractor hereby covenants and agrees with the County to fully perform the services, provide any materials called for to construct, and complete the Work called for by this Contract in a good and workmanlike manner in accordance with this Contract and the documents referred to herein in order to fully and properly complete this Contract within the time stipulated, time being made of the essence for this Contract. It is also agreed by the parties hereto that the documents to this Contract consist of this Contract and the following documents listed below (Contract Documents), all of which are and constitute a part of this Contract as if attached hereto or set out in full herein, viz:

1. Insurance Requirements (Exhibit 1).
2. Scope of Work/Fee Schedule (Exhibit 2).
3. Bid Form Completed by Contractor and dated \_\_\_\_\_ (Exhibit 3). **(To be provided after selection of Successful Bidder.)**
4. Invitation for Bid No. 2022-083, which is incorporated herein by reference.

The parties agree that if there are any differences between the provisions of the above referenced documents, the provisions of the County documents and this Contract will control over any Contractor supplied documents or information.



## **SECTION 2. CONTRACT AMOUNT.**

The County agrees to pay the Contractor for the Contractor's complete and satisfactory performance of the Work/ Service, in the manner and at the time set out in this Contract, but the total amount for all such requests will not exceed \$ \_\_\_\_\_, as provided for in this Contract and that this Contract amount may be increased or decreased by additions and/or reductions in the Work as may be authorized and approved by the County, and the Contract amount may be decreased by the County's assessment of any damages against the Contractor, as may be provided for in this Contractor or by law, and the County retains the right of setoff as to any amounts of money the Contractor may owe the County. However, Contractor further acknowledges and agrees that any request for Contractor to perform Work under this Contract is in the sole discretion of the County and that there is no guarantee of any minimum amount of Work that may be requested by the County and that no Work may be requested.

## **SECTION 3. TERM OF CONTRACT.**

- A. All contracted work shall be performed between May 27, 2022 and July 31, 2022 per the specifications of IFB 2022-083.
- B. All terms and conditions shall remain in force for the term of this Contract and for any renewal period unless modified by mutual agreement of both parties. Prices shall not be increased during the initial term of this Contract.

## **SECTION 4. TIME OF PERFORMANCE.**

The Contractor shall commence the Work to be performed under this Contract on such date as is established and fixed for such commencement by written notice (which may be initially given verbally in an emergency situation) to proceed given by the County representative to the Contractor, and the Contractor covenants and agrees to fully construct, perform, and complete the Work and/or provide the goods called for by this Contract established by such notice. The Contractor further agrees that the Work shall be started promptly upon receipt of such notice and shall be prosecuted regularly, diligently, and uninterruptedly at a rate of progress that will ensure full completion thereof in the shortest length of time consistent with the Contract Documents and that Contractor will cooperate and coordinate with the other County contractors or employees doing other work or using the area where Contractor is working.

## **SECTION 5. PAYMENT.**

- A. The County and Contractor agree that the County/Schools will only pay the Contractor for time actually spent and materials actually provided on the Project requested and accepted by the County. Invoices for services rendered and accepted shall be submitted by Contractor directly to the payment address of the requesting RCPS department/division. Payment of such invoices shall be the responsibility of the department/division.
- B. The County agrees to pay Contractor for the Contractor's complete and satisfactory performance of the Work, in the manner and at the time set out in this Contract. The County



retains the right to setoff as to any amounts of money Contractor may owe the County. A written progress report may be requested by the County to accompany payment request and, if so, such progress report shall detail the work completed. Also, sufficient documentation of all costs, expenses, materials supplies, and/or hours worked may be requested by the County and, if so, may be required prior to the processing of any such request for payment. Payment will only be made for work actually performed, services actually supplied, and/or materials or goods furnished to the County, all of which need to be approved and accepted by the County prior to such payment, unless otherwise provided for in the Contract documents. Once a payment request has been received the County, the County will process such payment request. If there are any objections or problems with the payment request, the County will notify the Contractor of such matters. If the payment request is approved and accepted by the County, payment will be made by the County to the Contractor not more than 30 days after such request has been approved.

- C. The services the Contractor may be requested to provide the County are those items set forth in Exhibit 2 (Scope of Work) and/or Exhibit 3 (Bid Form), which list of services may be amended by the mutual agreement of the parties. The prices to be paid to the Contractor for such services provided to and accepted by the County under the provisions of this Contract shall be the current price(s) as set forth in Exhibit 3 (Bid Form). Unless otherwise stated in this Contract, the price(s) shall include all applicable charges such as pick up, delivery, printing, packaging, shipping, and other charges.

#### **SECTION 6. SALES TAX EXEMPTION.**

The County is exempt from payment of State Sales and Use Tax on all tangible personal property purchased or leased for the County's use or consumption. The Virginia Sales and Use Tax Certificate of Exemption number is 217-074292-9. The County's tax-exempt status shall not inure to the benefit of Vendor. Vendor shall be liable for all applicable local, state and federal taxes that may arise or be due under this Agreement.

#### **SECTION 7. FREE ON BOARD, RISK OF LOSS, AND TITLE.**

All prices include F.O.B Destination, inside delivery, unless otherwise noted in this Contract. The risk of loss from any casualty, regardless of cause, shall be on the Contractor until the items have been delivered to County personnel making the request and accepted by the County. The risk of loss shall also be on the Contractor during the return of any items to the Contractor. Title to the items shall pass to the County upon receipt and acceptance of such items by the County.

#### **SECTION 8. INSPECTION.**

The County shall have a reasonable time after receipt of items / services provided and before payment to inspect all items for conformity to this Contract. If all or some of the items delivered to the County do not fully conform to the provisions hereof, the County shall have the right to reject and return such nonconforming items, at the sole cost of the Contractor.



## **SECTION 9. WARRANTY OF MATERIAL AND WORKMANSHIP.**

Contractor agrees that all items provided to the County will be new, or if an item is refurbished or remanufactured, such item will meet the industry standards for such item and the item shall be clearly labeled as refurbished or remanufactured, and that all such items include such warranties as may be provided by Virginia law together with any warranties provided by the manufacturer of the item. Contractor shall use reasonable commercial efforts to assist the County in processing warranty claims against a manufacturer. Contractor also agrees that the services provided under this Contract shall be completed in a professional, good and workmanlike manner, with the degree of skill and care that is required by like contractors in Virginia. Further, Contractor warrants that such services shall be completed in accordance with the applicable requirements of this Contract and shall be correct and appropriate for the purposes contemplated in this Contract. Contractor agrees that Contractor shall repair or replace, at Contractor's sole expense, and to the satisfaction of the County, any items, material, equipment, or part of the item that is found by the County to be defective or not in accordance with the terms of this Contract.

- A. The Contractor warrants that, unless otherwise specified, all material and equipment incorporated in the Work under the Contract shall be new, in first class condition, and in accordance with the Contract Documents. The Contractor further warrants that all workmanship shall be of the highest quality and in accordance with the Contract Documents and shall be performed by persons qualified at their respective trades.
- B. Work not conforming to these warranties shall be considered defective.
- C. These warranties of material and workmanship are separate and independent from and in addition to any of the Contractor's other guarantees or obligations in this Contract or that may arise by law.
- D. The Design-Builder agrees to assign to Roanoke County at the time of final completion of the Work all manufacturer's warranties relating to equipment, materials, and labor used in the Work and further agrees to perform the Work in such manner so as to preserve any and all such manufacturer's warranties. If necessary as a matter of law, the Design-Builder may retain the right to enforce directly any such manufacturers' warranties during the one-year period following the date of Substantial Completion.

## **SECTION 10. PAYMENTS TO OTHERS BY CONTRACTOR.**

The Contractor agrees that Contractor will comply with the requirements of Section 2.2-4354 of the Virginia Code regarding Contractor's payment to other entities and the Contractor will take one of the two actions permitted therein within 7 days after receipt of amounts paid to Contractor by the County. Contractor further agrees that the Contractor shall indemnify and hold the County harmless for any lawful claims resulting from the failure of the Contractor to make prompt payments to all persons supplying the Contractor equipment, labor, tools, or material in connection with the work provided for in the Contract. In the event of such claims, the County may, in the County's sole discretion, after providing written notice to the Contractor, withhold from any



payment request or final payment the unpaid sum of money deemed sufficient to pay all appropriate claims and associated costs in connection with the Contract and make such payment, if the County determines it to be appropriate to do so.

#### **SECTION 11. HOLD HARMLESS AND INDEMNITY.**

Contractor shall indemnify and hold harmless the County and its officers, agents, and employees against any and all liability, losses, damages, claims, causes of action, suits of any nature, costs, and expenses, including reasonable attorney's fees, resulting from or arising out of Contractor's or its employees, agents, or subcontractors actions, activities, or omissions, negligent or otherwise, on or near County's property or arising in any way out of or resulting from any of the work or items to be provided under this Contract, and this includes, without limitation, any fines or penalties, violations of federal, state, or local laws or regulations, personal injury, wrongful death, or property damage claims or suits. Contractor agrees to and shall protect, indemnify, and hold harmless all the parties referred to above from any and all demands for fees, claims, suits, actions, causes of action, settlement or judgments based on the alleged or actual infringement or violation of any copyright, trademark, patent, invention, article, arrangement, or other apparatus that may be used in the performance of this Contract.

#### **SECTION 12. COMPLIANCE WITH LAWS AND REGULATIONS, PERMITS, AND IMMIGRATION LAW.**

- A. **Regulations:** The Contractor shall fully comply with all local, state, and federal ordinances, laws, and regulations, including without limitation all applicable building and fire code sections of the Occupational Safety and Health Act (OSHA), and the Virginia Uniform Statewide Building Code, and obtain all required licenses and permits, including business license, building permits, and pay all charges and expenses connected therewith. Contractor further agrees that Contractor does not, and shall not during the performance of this Contract; knowingly employ an unauthorized alien as defined in the federal Immigration Reform and Control Act of 1986.
- B. **Permits and Licenses:** The Contractor shall, at its sole cost, obtain all required permits and license from the appropriate authorities, including the County of Roanoke. This includes, but is not limited to, all permits for any excavations in any public right-of-way. No delay or extension of time or any claim for additional compensation of any type shall be granted for failure to obtain any required permits.
- C. **Litter:** In accordance with the Virginia Anti-Litter Law, receptacles sufficient to contain employees' litter and construction wastes capable of being spread by wind or water shall be located on the construction site. The number and size of receptacles required shall be determined by the Contractor.
- D. **Asbestos License:** The Contractor, if not licensed as an asbestos abatement contractor or a Roofing, Flooring, and Siding (RFS) contractor in accordance with Section 54.1-514, of the Code of Virginia, shall have all asbestos related work performed by subcontractors



who are duly licensed as asbestos contractors or RFS contractors as appropriate for the work required.

**SECTION 13. INDEPENDENT CONTRACTOR.**

The relationship between Contractor and the County is a contractual relationship. It is not intended in any way to create a legal agency or employment relationship. Contractor shall, at all times, maintain its status as an independent contractor and both parties acknowledge that neither is an agent, partner or employee of the other for any purpose. Contractor shall be responsible for causing all required insurance, workers' compensation (regardless of number of employees) and unemployment insurance to be provided for all of its employees and subcontractors. Contractor will be responsible for all actions of any of its subcontractors, and that they are properly licensed.

**SECTION 14. REPORTS, RECORDS, AND AUDIT.**

Contractor agrees to maintain all books, records, electronic data, and other documents relating to this Contract for a period of five (5) years after the end of each fiscal year covered by this Contract. The County, its authorized employees, agents, representatives, and/or state auditors shall have full access to and the right to request, examine, copy, and/or audit any such materials during the term of the Contract and such retention period, upon prior written notice to Contractor. This includes the County's right to audit and/or examine any of the Contractor's documents and/or data as the County deems appropriate to protect the County's interests.

**SECTION 15. INSURANCE REQUIREMENTS.**

Contractor and any of its subcontractors involved in this Contract shall maintain the insurance coverage's set forth in Exhibit 1 to this Contract and provide the proof of such insurance coverage as called for in Exhibit 1, including workers' compensation coverage regardless of the number of Contractor's employees. Such insurance coverage shall be obtained at the Contractor's sole expense and maintained during the life of the Contract and shall be effective prior to the beginning of any work or other performance by the Contractor under this Contract. Additional insured endorsements, if required, must be received by the County within 30 days of the execution of this Contract or as otherwise required by the County's Risk Manager.

**SECTION 16. DEFAULT.**

If Contractor fails or refuses to perform any of the terms of this Contract, including poor services, work or materials, the County may, by written notice to Contractor, terminate this Contract in whole or in part. In addition to any right to terminate, the County may enforce any remedy available at law or in equity in connection with such default, and Contractor shall be liable for any damages to the County resulting from Contractor's default. The County further reserves the right to immediately obtain such work or services from other entities in the event of Contractor's default.

**SECTION 17. NONWAIVER.**

Contractor agrees that the County's waiver or failure to enforce or require performance of any term or condition of this Contract or the County's waiver of any particular breach of this Contract



by the Contractor extends to that instance only. Such waiver or failure is not and shall not be a waiver of any of the terms or conditions of this Contract or a waiver of any other breaches of the Contract by the Contractor and does not bar the County from requiring the Contractor to comply with all the terms and conditions of the Contract and does not bar the County from asserting any and all rights and/or remedies it has or might have against the Contractor under this Contract or by law.

#### **SECTION 18. FORUM SELECTION AND CHOICE OF LAW.**

This Contract shall be governed by, and construed in accordance with, the laws of the Commonwealth of Virginia, without application of Virginia's conflict of law provisions. Venue for any litigation, suits, and claims arising from or connected with this Contract shall only be proper in the Roanoke County Circuit Court, or in the Roanoke County General District Court if the amount in controversy is within the jurisdictional limit of such court, and all parties to this Contract voluntarily submit themselves to the jurisdiction and venue of such courts, regardless of the actual location of such parties. The provisions of this Contract shall not be construed in favor of or against either party, but shall be construed according to their fair and customary meaning as if both parties jointly prepared this Contract.

#### **SECTION 19. SEVERABILITY.**

If any provision of this Contract, or the application of any provision hereof to a particular entity or circumstance, shall be held to be invalid or unenforceable by a court of competent jurisdiction, the remaining provisions of this Contract shall not be affected and all other terms and conditions of this Contract shall be valid and enforceable to the fullest extent permitted by law.

#### **SECTION 20. NONDISCRIMINATION.**

- A. During the performance of this Contract, Contractor agrees as follows:
  - i. Contractor will not discriminate against any employee or applicant for employment because of race, religion, color, sex, national origin, age, disability, or any other basis prohibited by state or federal law relating to discrimination in employment, except where there is a bona fide occupational qualification reasonably necessary to the normal operation of the Contractor. Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this nondiscrimination clause.
  - ii. Contractor in all solicitations or advertisements for employees placed by or on behalf of Contractor will state that Contractor is an equal opportunity employer.
  - iii. Notices, advertisements and solicitations placed in accordance with federal law, rule or regulation shall be deemed sufficient for the purpose of meeting the requirements of this section.
- B. Contractor will include the provisions of the foregoing Section A (i, ii, and iii) in every subcontract or purchase order of over \$10,000, so that the provisions will be binding upon each subcontractor or vendor.



## **SECTION 21. DRUG-FREE WORKPLACE.**

- A. During the performance of this Contract, Contractor agrees to (i) provide a drug-free workplace for Contractor's employees; (ii) post in conspicuous places, available to employees and applicants for employment, a statement notifying employees that the unlawful manufacture, sale, distribution, dispensation, possession, or use of a controlled substance or marijuana is prohibited in the workplace and specifying the actions that will be taken against employees for violations of such prohibition; (iii) state in all solicitations or advertisements for employees placed by or on behalf of Contractor that Contractor maintains a drug-free workplace; and (iv) include the provisions of the foregoing clauses in every subcontract or purchase order of over \$10,000, so that the provisions will be binding upon each subcontractor or vendor.
- B. For the purposes of this section, "drug-free workplace" means a site for the performance of work done in connection with a specific contract awarded to a contractor, the employees of whom are prohibited from engaging in the unlawful manufacture, sale, distribution, dispensation, possession or use of any controlled substance or marijuana during the performance of the contract.

## **SECTION 22. FAITH BASED ORGANIZATIONS.**

Pursuant to Virginia Code Section 2.2-4343.1, be advised that the County does not discriminate against faith-based organizations.

## **SECTION 23. DATA ON CONVICTIONS FOR CERTAIN CRIMES**

The Vendor certifies that none of the persons who will provide services requiring direct contact with students on school property during school hours or during school-sponsored activities has been convicted of any of the following felony or misdemeanor offenses: felony sex or violence offenses, other felony offenses or misdemeanor sex offenses within the past ten years. Upon request by the Schools, Vendor shall provide specific documentation to verify that it has conducted requisite criminal conviction checks on its employees, agents, sub-contractors, and assigns. Schools reserve the right to remove or deny entrance to any employee, agent, sub-contractor, or assign of Vendor when School determines, in its sole discretion, that such person poses a risk to health or safety of others on School property.

The Consultant further understands and acknowledges (1) that if he makes a materially false statement regarding any of the above offenses, he will be guilty of a Class 1 misdemeanor and may forfeit profits derived from the contract. Further, the Consultant understands and acknowledges that before any person is permitted to provide such services subsequent to this certification, he must complete a new certification regarding such person in a form satisfactory to Roanoke County and the Roanoke County School Board. Data and Convictions information will be requested before the County of Roanoke/Schools enters into a contract / when required.



#### **SECTION 24. ASSIGNMENT.**

Contractor may not assign or transfer this Contract in whole or in part except with the prior written consent of the County, which consent shall not be unreasonably withheld. If consent to assign is given, no such assignment shall in any way release or relieve the Contractor from any of the covenants or undertakings contained in this Contract and the Contractor shall remain liable for the Contract during the entire term thereof.

#### **SECTION 25. CONTRACTUAL DISPUTES.**

Contractual claims, whether for money or for other relief, including any disputes as to change orders or extra work, shall be submitted, in writing, no later than sixty (60) calendar days after final payment or payment designated as a final payment; however, written notice of the Contractor's intention to file such claim must be given at the time of the occurrence or beginning of the work upon which the claim is based. Such notice is a condition precedent to the assertion of any such claim by the Contractor. A written decision upon any such claims will be made by Board of Supervisors or designee (hereafter BOS) within thirty (30) calendar days after submittal of the claim and any practically available additional supporting evidence required by the BOS. The Contractor may not institute legal action prior to receipt of the County's decision on the claim unless the BOS fails to render such decision within one hundred twenty (120) calendar days from submittal of its claim. The decision of the BOS shall be final and conclusive unless the Contractor within six (6) months of the date of the final decision on a claim or from expiration of the 120 day time limit, whichever occurs first, initiates legal action as provided in Section 2.2 -4364, of the Code of Virginia. Failure of the County to render a decision within said one hundred twenty (120) calendar days shall not result in the Contractor being awarded the relief claimed nor shall it result in any other relief or penalty. The sole result of the County's failure to render a decision within said one hundred twenty (120) calendar days shall be Contractor's right to immediately institute legal action. No administrative appeals procedure pursuant to Section 2.2 -4365, of the Code of Virginia, has been established for contractual claims under this Contract.

#### **SECTION 26. SUCCESSORS AND ASSIGNS.**

The terms, conditions, provisions, and undertakings of this Contract shall be binding upon and inure to the benefit of each of the parties hereto and their respective successors and assigns.

#### **SECTION 27. HEADINGS.**

The captions and headings in this Contract are for convenience and reference purposes only and shall not affect in any way the meaning and interpretation of this Contract.

#### **SECTION 28. COUNTERPART COPIES.**

This Contract may be executed in any number of counterpart copies, each of which shall be deemed an original, but all of which together shall constitute a single instrument.



**SECTION 29. AUTHORITY TO SIGN.**

The persons who have executed this Contract represent and warrant that they are duly authorized to execute this Contract on behalf of the party for whom they are signing.

**SECTION 30. NOTICES.**

All notices must be given in writing and shall be validly given if sent by certified mail, return receipt requested, or by a nationally recognized overnight courier, with a receipt, addressed as follows (or any other address that the party to be notified may have designated to the sender by like notice):

To RCPS:	Roanoke County Public Schools Attn: Chris Lowe, Director Facilities & Operations 5937 Cove Road Roanoke, Virginia 24019
Email:	<a href="mailto:rcps@rcps.us">rcps@rcps.us</a>
Copy to:	County of Roanoke Purchasing Division Attn: Kate Hoyt 5204 Bernard Drive, SW, Suite 300-F Roanoke, Virginia 24018
Email:	<a href="mailto:KHoyt@roanokecountyva.gov">KHoyt@roanokecountyva.gov</a>
If to Contractor:	_____ Attn: _____, President/CEO _____ _____
Email Address:	_____
Phone:	_____

Notices shall be deemed to be effective one day after sending if sent by overnight courier or three (3) days after sending it by certified mail, return receipt requested.

**SECTION 31. PROTECTING PERSONS AND PROPERTY.**

- A. **Protection on Site:** The Contractor expressly undertakes both directly and through its Subcontractor(s), to take every reasonable precaution at all times for the protection of all persons and property which may come on the jobsite or be affected by the Contractor's operation in connection with the Work.



- B. **Safety and Health Precautions:** The Contractor shall be solely responsible for initiating, maintaining, and supervising all safety and health precautions and programs in connection with the Work, including but not limited to provision of appropriate sanitation facilities, if applicable.
- C. **Protecting the Public:** The Contractor shall in all cases protect the public and the Work, during its execution, by posting and maintaining, at its expense, appropriate signs, barricades, barriers, lights, flagmen, and other safety devices in accordance with the current edition of the "Virginia Work Area Protection Manual".
- D. **Protecting the Work and Adjacent Property:** The Contractor shall continuously maintain adequate protection of all the Work from damage and shall protect the County's property from injury or loss arising in connection with this Contract. The Contractor shall adequately protect adjacent property to prevent any damage to it or loss of use and enjoyment by its owners. The Contractor shall provide and maintain all passageways, guard fences, lights, and other facilities for protection required by public authority, local conditions, any of the Contract Documents or erected for the fulfillment of its obligations for the protection of persons and property.
- E. **Emergencies:** In an emergency affecting the safety or life of persons or of the Work, or of the adjoining property, the Contractor, without special instruction or authorization from County, shall act, at Contractor's discretion, to prevent such threatened loss or injury. Also, should Contractor, to prevent threatened loss or injury, be instructed or authorized to act by County, Contractor shall so act immediately, without appeal.

### **SECTION 32. CONTRACT SUBJECT TO FUNDING.**

This Contract is subject to funding and/or appropriations from federal, state, and/or local governments and/or agencies. If any such funding is not provided, withdrawn, or otherwise not made available for this Contract, the Contractor agrees that the County may terminate this Contract on seven (7) days written notice to Contractor, without any penalty or damages being incurred by the County. Contractor further agrees to comply with any applicable requirements of any grants and/or agreements providing such funding.

### **SECTION 33. SUSPENSION OR TERMINATION OF CONTRACT BY COUNTY.**

The County, at any time, may order Contractor to immediately stop work on this Contract, and/or by seven days (7) written notice may terminate this Contract, with or without cause, in whole or in part, at any time. Upon receipt of such notice, the Contractor shall immediately discontinue all services affected (unless the notice directs otherwise), and deliver to the County all data (including electronic data), drawings, specifications, reports, project deliverables, estimates, summaries, and such other information and materials as may have been accumulated by the Contractor in performing this Contract whether completed or in process (unless otherwise directed by the notice).



1. If the termination or stop work order is due to the failure of the Contractor to fulfill any of its Contract obligations, the County may take over the Work and prosecute the same to completion by contract or otherwise. In such case, the Contractor shall be liable to the County for any damages allowed by law, and upon demand of County shall promptly pay the same to County.
2. Should the Contract be terminated or work is stopped not due in any way to the fault of the Contractor, the Contractor shall only be entitled to compensation for services actually performed and materials actually supplied prior to notice of termination or to stop work and which are approved by the County and any applicable federal or state approving agency. No profit, overhead, or any other costs of any type are allowed after the date of such notice of termination or stop work order.
3. The rights and remedies of the County provided in this Section are in addition to any other rights and remedies provided by law or under this Contract and County may pursue any and all such rights and remedies against Contractor as it deems appropriate.

#### **SECTION 34. ETHICS IN PUBLIC CONTRACTING.**

The provisions, requirements, and prohibitions as contained in Sections 2.2-4367 through 2.2-4377, of the Va. Code, pertaining to bidders, offerors, contractors, and subcontractors are applicable to this Contract.

#### **SECTION 35. COMPLIANCE WITH STATE LAW; FOREIGN AND DOMESTIC BUSINESSES AUTHORIZED TO TRANSACT BUSINESS IN THE COMMONWEALTH OF VIRGINIA.**

Contractor shall comply with the provisions of Virginia Code Section 2.2-4311.2, as amended, which provides that a contractor organized as a stock or nonstock corporation, limited liability company, business trust, or limited partnership or registered as a registered limited liability partnership shall be authorized to transact business in the Commonwealth as a domestic or foreign business entity if so required by Title 13.1 or Title 50 or as otherwise required by law. Contractor shall not allow its existence to lapse or its certificate of authority or registration to transact business in the Commonwealth, if so required under Title 13.1 or Title 50, to be revoked or cancelled at any time during the term of the Contract. The County may void the Contract if the Contractor fails to remain in compliance with the provisions of this section.

#### **SECTION 36. OWNERSHIP OF REPORTS AND DOCUMENTS.**

Contractor agrees that all reports and any other documents (including electronic data) prepared for, obtained in connection with, and/or required to be produced in connection with this Contract shall be delivered by the Contractor to the County and all such items shall become the sole property of the County. The Contractor agrees that the County shall own all rights of any type in and to all such items, including but not limited to copyrights and trademarks, and the County may reproduce, copy, and use all such items as the County deems appropriate, without any restriction or limitation



on their use and without any cost or charges to the County from Contractor. Contractor hereby transfers and assigns all such rights and items to the County. Contractor further agrees Contractor will take any action and execute any documents necessary to accomplish the provisions of this Section. The Contractor also warrants that Contractor has good title to all materials, equipment, documents, and supplies which it uses in the Work or for which it accepts payment in whole or in part.

#### **SECTION 37. CONDITIONS AT SITE.**

- A. **Existing Conditions:** The Contractor shall have visited the site prior to bidding and is responsible for having ascertained pertinent local conditions such as location, accessibility, and general character of the site, and the character and extent of existing improvements and work within or adjacent to the site. Claims as a result of failure to have done so will not be considered by the County and will be the sole responsibility of the Contractor.
- B. **Hidden Conditions:** If, in the performance of the Contract, hidden physical conditions of a building being modified are exposed revealing unusual or materially different conditions than those ordinarily encountered or inherent in work of this nature, or if subsurface or latent conditions at the site are found which are materially different from those frequently present in the locality, from those indicated in the Contract Documents, or from those inherent in work of the character required by the Contract, the Contractor must report such conditions to County before the conditions are disturbed. Upon such notice, or upon his own observation of such conditions, County will make such changes in the Contract Documents as he finds necessary to conform to the different conditions. Any change in the cost of the Work or the time needed for completion must be requested.
- C. **Suspected Hazardous Material:** If the Contractor, during the course of the project, observes the existence of any material which it suspects or knows to be hazardous to human health or the environment, the Contractor shall promptly notify County. County will provide the Contractor with instructions regarding the situation. The Contractor shall not perform any work involving the material or any work causing the material to be less accessible prior to receipt of special instructions from County.

#### **SECTION 38. STANDARDS FOR MATERIAL INSTALLATION AND WORKMANSHIP.**

- A. **Material and Equipment:** Unless otherwise specifically provided in this Contract, all equipment, material, and accessories incorporated in the Work are to be new and in first class condition. The Contractor shall furnish to County for approval the name of the manufacturer, the model number, and other identifying data and information respecting the performance, capacity, nature, and rating of the machinery and mechanical and other equipment which the Contractor contemplates incorporating in the Work. Machinery, equipment, material, and articles installed or used without required approval may be subject to subsequent rejection by the County.



- B. Hazardous Substances:** Unless specifically approved by the County or required by the specifications, the Contractor shall not incorporate any material into the Work that contains asbestos or any material known by the Contractor to contain a substance known to be hazardous to health when the building and/or site is occupied by the County. If the Contractor becomes aware that a material required by the specifications contains asbestos or other hazardous substances, it shall notify the County and County immediately and shall take no further steps to acquire or install any such material without first obtaining County approval. (See also Sections 2.2 and 8.3 of these General Conditions.)
- C. Workmanship:** The workmanship shall be of the highest quality found in the building industry in every respect. All items of Work shall be done by workers skilled in the particular task to which they are assigned. In the acceptance or rejection of work, no allowance will be made for lack of skill on the part of workers. Poor or inferior workmanship (as determined by County, or other inspecting authorities) shall be removed and replaced to conform to the highest quality standards of the trades concerned, or otherwise corrected to the satisfaction of the County, or other inspecting authority, at the Contractor's sole expense.
- D. Instructions for Installation:** Under the various sections of the specifications, where specified items are supplied with the manufacturer's printed instructions, recommendations, or directions for installation, or where such instructions, recommendations, or directions are available, installation of the specified items shall be in strict accordance with the manufacturer's printed instructions unless those instructions contradict the drawings or specifications, in which case County will be notified by Contractor for an interpretation and decision.
- E. Installation Procedures Without Instructions:** Where neither the manufacturer's printed instructions are available for installation of specific items, nor are specific code or standards given by reference to govern the installation of specific items; and where there is doubt concerning the installation procedures to be followed or the quality of workmanship to be maintained in the installation of specific items, the Contractor shall consult County for approval of the installation procedures Contractor proposes to follow or the specific standards governing the quality of workmanship Contractor proposes to maintain during the installation of the items in question.
- F. Codes and Standards:** Under the various sections of the specifications, where reference is made to specific codes or standards governing the installation of specified items, installation shall in all cases be in strict accordance with the referenced codes and standards. Where no reference is made to specific codes or standards, installation shall conform to the generally recognized applicable standards for first-class installation of the specific item to be installed. Contractors are expected to be proficient and skilled in their respective trades and knowledgeable of the National Fire Protection Association (NFPA), the current edition of the Virginia Uniform Statewide Building Code (USBC) and its referenced technical codes and standards, Occupational Safety and Health Act (OSHA) and other codes and standards applicable to installations and associated work by its trade and/or that are applicable to the Work.



## **SECTION 39. USE OF PREMISES AND REMOVAL OF DEBRIS**

**Jobsite Coordination:** The Contractor shall perform the Contract in such a manner as not to interrupt or interfere with the operation of any existing activity on the premises or with the work of any other contractor.

**Storage of Material:** The Contractor shall store apparatus, material, supplies, and equipment in such orderly fashion at the site of the Work as will not unduly interfere with the progress of its Work or the work of any other contractor.

**Jobsite Appearance:** The Contractor expressly undertakes, either directly or through its Subcontractor(s), to clean up frequently all refuse, rubbish, scrap material, and debris caused by his operations, to the end that at all times the jobsite shall present a neat, orderly, and workmanlike appearance. No such refuse, rubbish, scrap material, and debris shall be left within the completed Work nor buried on the building site, but shall be properly protected and removed from the site and properly disposed of in a licensed landfill or otherwise as required by law.

**Final Cleaning:** The Contractor expressly undertakes, either directly or through its Subcontractor(s), before final payment, to remove all surplus material, false work, temporary structures, including foundations thereof, and debris of every nature resulting from its operations and to put the site in a neat, orderly condition, to thoroughly clean and leave reasonably dust free all finished surfaces including all equipment, piping, etc., on the interior of all buildings included in the Contract; and to thoroughly clean all glass installed under the Contract including the removal of all paint and mortar splatter and other defacements. If a Contractor fails to clean up at the completion of the Work, the County may do so and charge for costs thereof to the Contractor in accordance with these General Conditions.

**Erosion Control:** During and at completion of the Work, the Contractor shall prevent site soil erosion, the runoff of silt and/or debris carried by water from the site, and the blowing of dust or debris off the site in accordance with the applicable requirements and standards of the Virginia Erosion and Sediment Control Handbook, latest edition, and of the Contract Documents.

## **SECTION 40. DAMAGES TO THE WORK AREA**

- A. **Damage to the Work:** The Contractor shall have charge of and be solely responsible for the entire Work and be liable for all damages to the Work including, but not limited to any of the damages hereafter mentioned, and to any property in the vicinity of the Work, until its completion and acceptance by County.
- i. Where the work involves alterations, renovations, or modifications to any existing building, the Contractor shall familiarize itself with the structural condition of such building before proceeding with any work. It shall be the Contractor's responsibility to take all necessary safeguards to protect and maintain all parts of the building in a safe condition at all times during the process of construction and to protect from damage those portions of the building that are to remain.
  - ii. Under no condition shall any load be placed on any part of a building, whether new or existing, in excess of the load the structure will safely support, and no structural member(s) shall be cut or altered without the written consent of County.



- iii. The Contractor shall conduct all operations in such a manner as to avoid damage to existing work and surfaces within any existing building that are to remain. Any and all damaged work and surfaces shall be repaired, replaced, or restored to their original condition at the time when this work was started, and the expense of such work shall be borne by the Contractor.
- B. **Damage to Utilities:** The respective Utility Company shall be given a minimum of forty-eight (48) hours' notice prior to any adjustment of utilities, and the Contractor shall comply with the provisions of the Virginia Underground Utilities Damage Prevention Act, Section 56-265.14 et seq., of the Code of Virginia.
  - a. Damages that may occur to the utilities during the Work shall be the sole responsibility of the Contractor.
- C. **Relocation of Utilities:** Should any utilities require adjustment during the Work, it shall be the Contractor's responsibility to have such utilities relocated as a part of the Work and to contact and cooperate with the respective Utility Company in performance of such operations.
- D. **Damage to Other Work and Existing Structures:** The Contractor shall take into account all other work which shall be done by other parties on the jobsite, either now known or which may become necessary during the progress of the Work, and shall be responsible for any damage done to the other work. Damage to concrete curbs, gutters, sidewalks, or any existing facility that may occur during the construction shall be repaired or replaced by the Contractor, at its sole expense, as directed by and to the satisfaction of County.
- E. **Weather Damage:** Damage with respect to the Work caused by the weather shall be the responsibility of the Contractor.
- F. **Blasting:** Any damage that may occur due to blasting shall be the sole responsibility of the Contractor.

#### **SECTION 41. LIQUIDATED DAMAGES**

the following provisions shall apply:

- i. Subject to the provisions of the General Conditions granted for extension of time allowed for completion of the Work, if the Work is not substantially completed by the date required in the Contract, the Contractor shall owe to the County, not as a penalty but as step one liquidated damages, \$100.00 for step one liquidated damages for each and every calendar day of delay in substantial completion.
- ii. Once the Work is substantially complete, the accrual of step one liquidated damages shall stop and the Contractor shall have thirty (30) calendar days in which to achieve Final Acceptance of the Work.
- iii. If Final Acceptance of the Work is not achieved by the thirtieth (30th) calendar day after substantial completion, and if any extension of time is not granted by the County, the Contractor shall owe to the County, not as a penalty but as step two



liquidated damages, \$100.00 as step two liquidated damages for each and every calendar day of delay in Final Acceptance. All such liquidated damages set forth in this Section are in addition to any other damages the County may be entitled to recover from the Contractor.

**SECTION 42. ENTIRE CONTRACT.**

This Contract, including any attachments, exhibits, and referenced documents, constitutes the complete understanding between the parties. This Contract may be modified only by written agreement properly executed by the parties.

THIS AGREEMENT may be modified in writing by mutual agreement of both parties.

IN WITNESS WHEREOF, the parties hereto have signed this Contract by their authorized representatives.

(Full Legal Name of Vendor)

By\_\_\_\_\_

\_\_\_\_\_  
Printed Name and Title

COUNTY OF ROANOKE, VIRGINIA

By\_\_\_\_\_

\_\_\_\_\_  
Printed Name and Title



**CONTRACT 2022-083**  
**BETWEEN COUNTY OF ROANOKE AND [VENDOR NAME]**  
**FOR HIDDEN VALLEY MIDDLE COOLING TOWER REPLACEMENT**

**EXHIBIT 1: SAMPLE CONTRACTOR'S INSURANCE AND BOND REQUIREMENTS**

**REFERENCE: IFB # 2022-083**

**INSURANCE REQUIREMENTS SECTION**

The Contractor shall comply with the insurance requirements set forth in the Contract, including the items set forth below:

- A. Neither the Contractor nor any subcontractor shall commence work under this Contract until the Contractor has obtained and provided proof of the required insurance coverages to the County, and such proof has been approved by the County. The Contractor confirms to the County that all subcontractors have provided Contractor with proof of such insurance, or will do so prior to commencing any work under this Contract.
- B. Contractor, including all subcontractors, shall, at its and/or their sole expense, obtain and maintain during the life of this Contract the insurance policies and/or coverages required by this section. The County and its officers, employees, agents, assigns, and volunteers shall be added as an additional insureds, by endorsement, to the general liability and automobile coverages of any such policies and such insurance coverages shall be primary and noncontributory to any insurance and/or self-insurance such additional insureds may have. The Contractor shall immediately notify in writing the County of any changes, modifications, and/or termination of any insurance coverages and/or policies required by this Contract. The Contractor shall provide to the County with the signed Contract an Acord certificate of insurance which states in the description of operations section one of the two paragraphs below:
  - (1) The County and its officers, employees, agents, assigns, and volunteers are additional insureds by endorsement as coverage under this policy includes ISO endorsement CG 20 33 which provides that the insured status of such entities is automatic if required by a contract or a written agreement. (If additional insured status is automatic under a different coverage form, Contractor must attach a copy of the coverage form to its certificate. Any required insurance policies shall be effective prior to the beginning of any work or other performance by Contractor and any subcontractors under this Contract).

OR

- (2) ISO endorsement CG 20 10 will be issued, prior to the beginning of any work or other performance by Contractor under this Contract, to the County and its officers, employees, agents, assigns, and volunteers naming them as an additional insured under the general liability coverage. (A copy of the binder confirming the issuance



must be attached to the certificate. Any required insurance policies shall be effective prior to the beginning of any work or other performance by Contractor and any subcontractors under this Contract).

However, if B (1) or (2) cannot be provided, the County's Risk Manager, in such Manager's sole discretion, may approve such other certificate of insurance or insurance document(s) that the Risk Manager deems acceptable. The County of Roanoke shall also be named as the Certificate Holder.

**C. The following insurance coverages and limits are required in order to provide services or materials to Roanoke County general government agencies and the Roanoke County Public Schools. These limits may be adjusted depending on the type of service or materials being provided and the exposure to risk.**

The Successful Offeror shall carry Liability Insurance in the amount specified below, including contractual liability assumed by the Successful Offeror, and shall deliver a Certificate of Insurance from carriers acceptable to the owner specifying such limits. The Certificate shall show the County of Roanoke and Roanoke County Public Schools, their supervisory boards and members thereof, officers, agents, employees and volunteers as additional insureds by endorsement, on the Commercial General Liability, Automobile Liability and Excess/Umbrella Liability coverage. The additional insured status shall be endorsed to the coverage with the provision that this coverage "is primary to all other coverage the County of Roanoke and/or Roanoke County Public Schools may possess." A Certificate of Insurance evidencing the additional insured status must be presented to the County of Roanoke and/or Roanoke County Public Schools along with a copy of the Endorsement prior to work or services beginning.

The coverage shall be provided by a carrier(s) rated "Excellent" by A.M. Best. In addition, the insurer shall agree to give the County 30 days' notice of its decision to cancel coverage.

**(1) Workers' Compensation**

Statutory Virginia Limits

Employers' Liability Insurance

- \$100,000 for each Accident by employee
- \$100,000 for each Disease by employee
- \$500,000 policy limit by Disease

**(2) Commercial General Liability - Combined Single Limit**

- \$1,000,000 each occurrence including contractual liability for specified agreement
- \$2,000,000 General Aggregate (other than Products/Completed Operations)
- \$2,000,000 General Liability-Products/Completed Operations
- \$1,000,000 Personal and Advertising injury
- \$ 100,000 Fire Damage Legal Liability



Coverage must include Broad Form property damage and (XCU) Explosion, Collapse and Underground Coverage

- (3) **Business Automobile Liability** – including owned, non-owned and hired car coverage
- Combined Single Limit - \$1,000,000 each accident

Compliance by the Contractor with the foregoing requirements as to carrying insurance shall not relieve the Contractor of their liabilities provisions of the Contract

- D. Contractual Liability covers the following indemnity agreement: “The Successful Offeror agrees to indemnify, defend and hold harmless the County of Roanoke and Roanoke County Public Schools, their supervisory boards and members thereof, officers, agents, employees and volunteers from any claims, damages, suits, actions, liabilities and costs of any kind or nature, including attorneys’ fees, arising from or caused by the provision of any services, the failure to provide any services or the use of any services or materials furnished (or made available) by the Successful Offeror, provided that such liability is not attributable to the County or School Division’s sole negligence.”
- E. The continued maintenance of the insurance policies and coverages required by the Agreement is a continuing obligation, and the lapse and/or termination of any such policies or coverages without approved replacement policies and/or coverages being obtained shall be grounds for termination of the Consultant/Contractor for default.
- F. Nothing contained in the insurance requirements is to be construed as limiting the liability of the Consultant/Contractor, and/or its subcontractors, or their insurance carriers. The County does not in any way represent that the coverages or the limits of insurance specified are sufficient or adequate to protect the Consultant/Contractor’s interest or liabilities, but are merely minimums. The obligation of the Consultant/Contractor, and its subcontractors, to purchase insurance shall not in any way limit the obligations of the Consultant/Contractor in the event that the County or any of those named above should suffer any injury or loss in excess of the amount actually recoverable through insurance.
- G. The classification code numbers appearing on the Commercial General Liability coverage parts shall not exclude the symbols "X-C-U".
- H. The intent of this insurance specification is to provide the coverage required and the limits expected for each type of coverage. With regard to the Business Automobile Liability and Commercial General Liability, the total amount of coverage can be accomplished through any combination of primary and excess/umbrella insurance. However, the total insurance protection provided for Commercial General Liability or for Business Automobile Liability, either individually or in combination with the Excess/Umbrella Liability, must total \$1,000,000 per occurrence. This insurance shall apply as primary insurance with respect to any other insurance or self-insurance programs afforded the County of Roanoke and Roanoke County Public Schools. This policy shall be endorsed to be primary with respect to the additional insured.



I. The certificate holders on the Accord form Certificates of Insurance shall be:

Roanoke County School Board  
5937 Cove Road,  
Roanoke, VA 24019  
Attn: Purchasing Dept.

J. **Claims Made Policies**

If the liability insurance has been issued on a "claims made" basis, the Successful Offeror must either:

- (1) Agree to provide certificates of insurance evidencing the above coverage for a period of three (3) years after final payment under the Agreement for General Liability policies. This certificate shall evidence a "retroactive date" no later than the beginning of the Offeror's work; or
- (2) Purchase the extended reporting period endorsement for the policies and provide certificates of insurance and a copy of the endorsement.

**BOND REQUIREMENTS SECTION**

The Contractor shall comply with the bond requirements set forth in the Contract, including the items set forth below:

- A. Except in cases of emergency, all bids for construction contracts shall be accompanied by a bid bond from a surety company selected by the bidder, which is legally authorized to do business in Virginia.
- (1) A bid, payment or performance bond for contracts for goods or services other than construction may be required if provided in the Invitation for Bid.
  - (2) The amount of the bid bond shall not exceed five percent (5%) of the total amount of the bid.
  - (3) In lieu of a bid bond, a bidder may furnish a certified check or cash escrow in the face amount required for the bond.
  - (4) Upon award of any public construction contract exceeding \$100,000 awarded to any prime contractor, such contractor shall furnish:
    - i. Performance bond in the sum of the contract amount.
    - ii. Payment bond in the sum of the contract amount.
  - (5) Performance and/or payment bonds may be required for construction contracts below \$100,000 at the discretion of the County.



- (6) In cases of emergency performance bonds/payment bonds are required within ten (10) calendar days of notice to proceed/project commencement.

**END**



**CONTRACT 2022-083  
BETWEEN COUNTY OF ROANOKE AND VENDOR NAME  
FOR HIDDEN VALLEY MIDDLE SCHOOL REPLACEMENT**

**EXHIBIT 2: SCOPE OF WORK/FEE SCHEDULE**

**REFERENCE: IFB# 2022-083**

The services, work, and/or items that the Contractor shall provide in a timely and proper manner in accordance with the Contract include, but are not necessarily limited to, the following:

Reference IFB 2022-083 Specifications



**IFB # 2022-083**

**ATTACHMENT F: PROJECT PLANS**



# HIDDEN VALLEY MIDDLE SCHOOL COOLING TOWER REPLACEMENTS

4902 HIDDEN VALLEY SCHOOL RD.  
ROANOKE, VA 24018

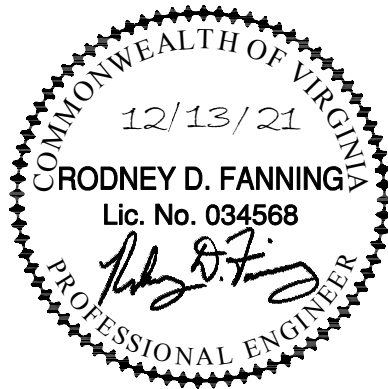
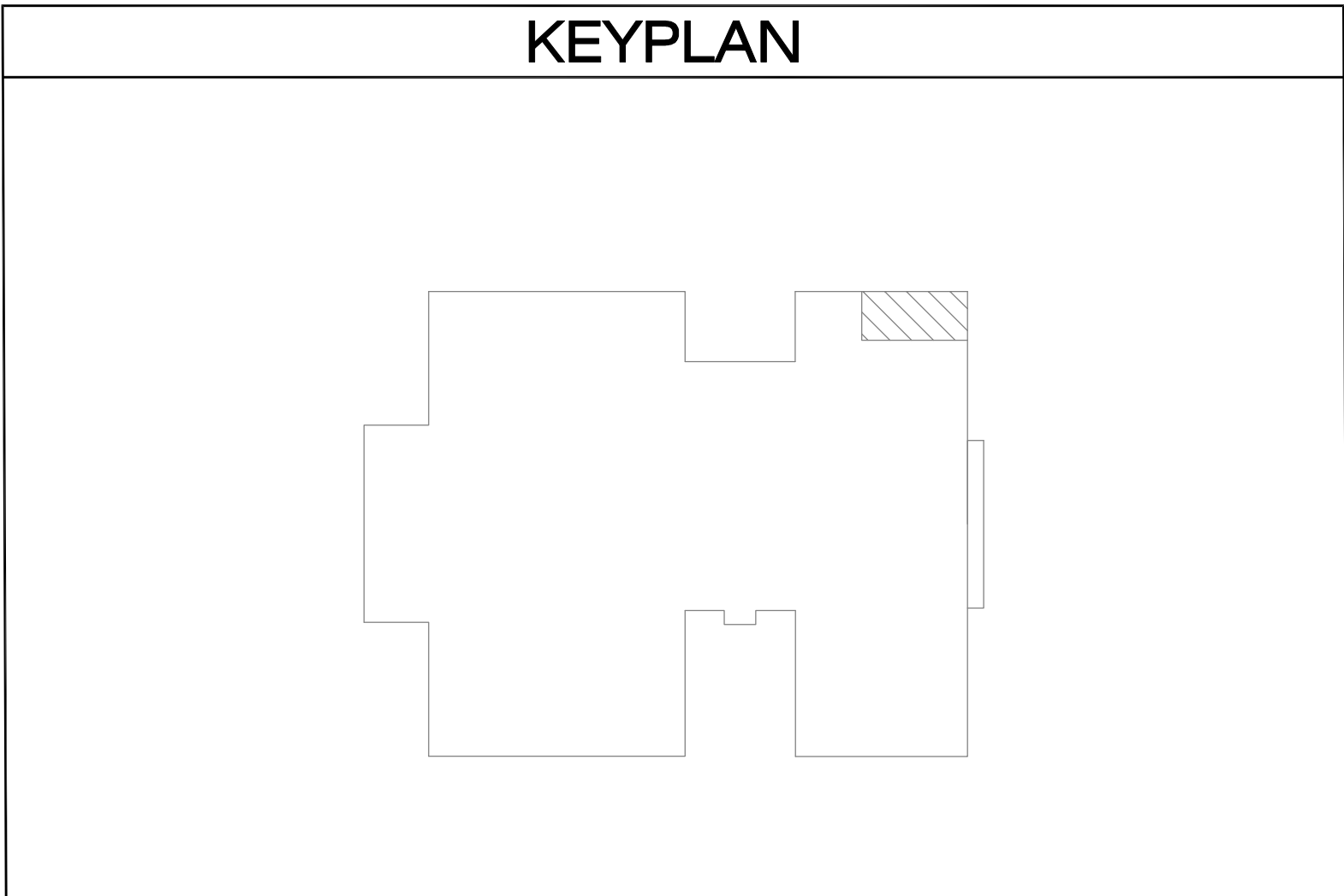


HIDDEN VALLEY  
MIDDLE SCHOOL

INDEX OF DRAWINGS	
T1	TITLE SHEET
MD1	PARTIAL FLOOR PLAN - HVAC - DEMOLITION
M0	HVAC LEGEND, GENERAL NOTES, DETAILS, FLOW DIAGRAM, AND SCHEDULES
M1	PARTIAL FLOOR PLAN AND SECTION VIEWS
M2	HVAC SPECIFICATIONS
E0	ELECTRICAL LEGEND, ABBREVIATIONS, GENERAL NOTES AND SPECIFICATIONS
E1	PARTIAL FLOOR PLAN - ELECTRICAL - DEMOLITION
E2	PARTIAL FLOOR PLAN - ELECTRICAL - NEWWORK
E3	PARTIAL POWER RISER DIAGRAMS AND PANELBOARDS
S1	COOLING TOWER SUPPORT FRAME

CODE DATA
CODE GOVERNING NEW WORK: 2018 VIRGINIA EXISTING BUILDING CODE (VEBC)
CODE GOVERNING ORIGINAL WORK: VIRGINIA FIRE SAFETY REGULATIONS (PART ONE FOR BUILDINGS CONSTRUCTED BETWEEN APRIL 12, 1949 AND SEPTEMBER 1, 1973)
CODE MODIFICATIONS FOR EXISTING WORK: NONE KNOWN

REFERENCE INFORMATION	
RENOVATION AREA GROSS:	1,041 SF
FIRE SUPPRESSION:	NONE
FIRE ALARM:	EXISTING



REVISION	DATE

HIDDEN VALLEY MIDDLE SCHOOL  
COOLING TOWER REPLACEMENTS  
ROANOKE, VIRGINIA

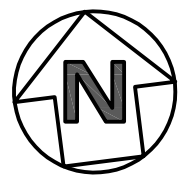
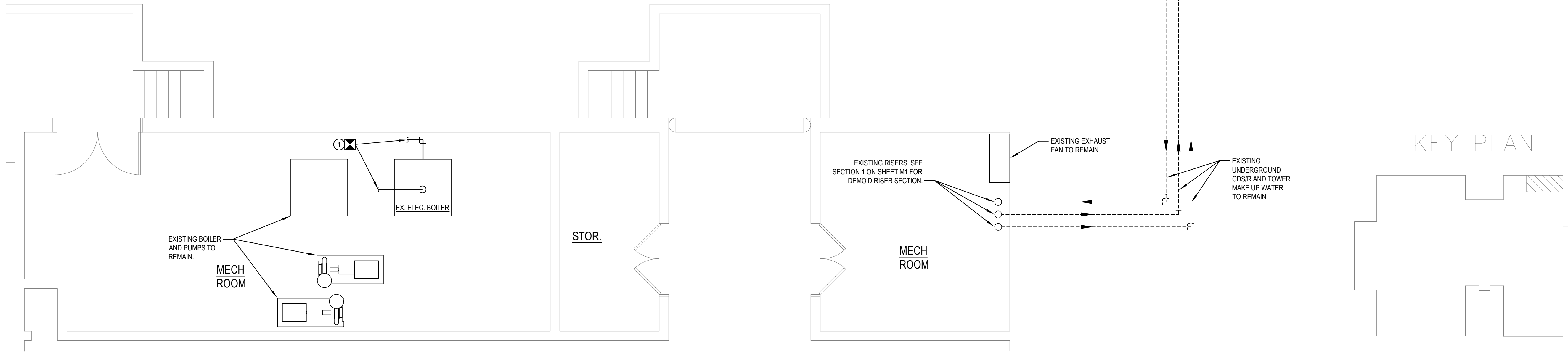
TITLE SHEET

DESIGNED RWR/JTO	DRAWN RWR/JTO
CHECKED RDF/WAM	APPROVED LPA
COMM. NO. 21101.51	DATE 12-13-21
SHEET T1	



DEMOLITION NOTES: ○

1. REMOVE EXISTING ELECTRIC BOILER AND ASSOCIATED PIPING AND ACCESSORIES. PIPING TO BE CAPPED AT MAIN IN A MANNER TO ALLOW OPERATION OF EXISTING GAS BOILER.
2. EXISTING FENCE TO BE REUSED.
3. REMOVE EXISTING CLOSED CIRCUIT COOLING TOWER AND ALL ASSOCIATED ACCESSORIES AND PIPING.
4. EXISTING COOLING TOWER SUPPLY, RETURN, AND MAKE UP WATER PIPING TO BE REMOVED AS REQUIRED. VERTICAL PIPING FROM UNDERGROUND TO BE CONNECTED TO NEW PIPING FOR NEW TOWER. SEE SHEET M1.
5. REMOVE EXISTING DRAIN PIPING FROM COOLING TOWER. EXISTING HUB DRAIN TO REMAIN.

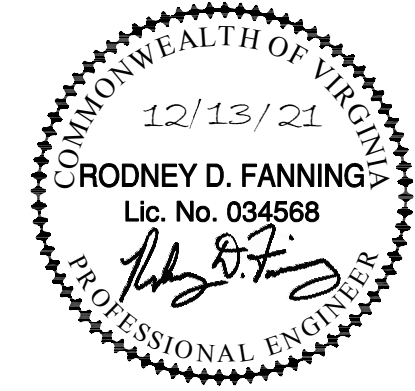


PARTIAL FLOOR PLAN - DEMO - HVAC

SCALE: 1/4" = 1'-0"



( IN FEET )  
1/4" = 1'-0"



REVISION	DATE

HIDDEN VALLEY MIDDLE SCHOOL  
COOLING TOWER REPLACEMENTS  
ROANOKE, VIRGINIA  
PARTIAL FLOOR PLAN - HVAC - DEMOLITION

DESIGNED RWR	DRAWN RWR
CHECKED RDF	APPROVED RDF
COMM. NO. 21101.51	DATE 12-13-21

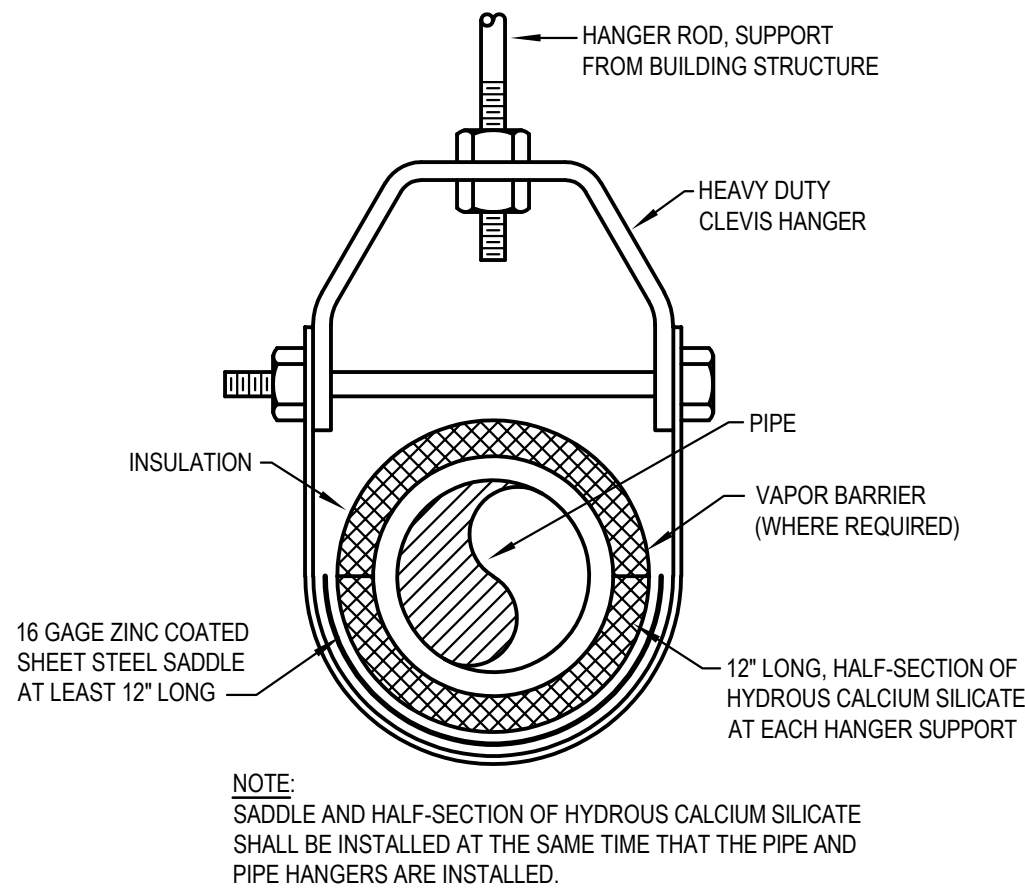
SHEET  
MD1



PUMPS: BELL & GOSSETT OR EQUAL										
MARK	SERVICE	PUMP TYPE	CAPACITY (GPM)	HEAD		MOTOR HP	RPM	NPSHr	VOLTS / PH	SERIES
				FT. H2O				FT. H2O		
CDP-1	COOLING TOWER WATER	END SUCTION	1152	55		20	1800	14.5	480 / 3	e-1510
CDP-2	COOLING TOWER WATER	END SUCTION	1152	55		20	1800	14.5	480 / 3	e-1510
NOTES: 1. PUMP OPERATION TO ALTERNATE.										

HEAT EXCHANGER: MUELLER	
UNIT MARK	HX-1
HOT SIDE, HEAT PUMP LOOP	--
FLOW RATE, GPM	1280
EWI / LWT, ° F	99 / 90
MAX WATER PRESSURE DROP, PSI	9.2
COLD SIDE, COOLING TOWER LOOP	--
FLOW RATE, GPM	1152
EWI / LWT, ° F	95 / 85
MAX WATER PRESSURE DROP, PSI	7.8
NUMBER OF PLATES	294
FRAME LENGTH, IN	82
ESTIMATED UNIT WEIGHT, LBS	7,380
MODEL NUMBER	ACCU-THERM 80M HV

COOLING TOWER: MARLEY	
UNIT MARK	CT-1
NUMBER OF CELLS	2
PROCESS WATER FLOW RATE, GPM	1152
EWI / LWT, ° F	95 / 85
EAT, ° F WB	78
FAN MOTOR HP, PER CELL	7.5
AIR FLOW, CFM, PER CELL	57,700
SUMP HEATER, KW, PER CELL	12
UNIT ELECTRICAL, V / Ph	480 / 3
SHORT CIRCUIT CURRENT RATING, kAIC	22
ESTIMATED UNIT WEIGHT, LBS, TOTAL	25,130
MODEL NUMBER	AV6807
NOTES: 1. TOWER FANS TO INCLUDE VFD'S IN NEMA-3R ENCLOSURE.	



PIPE SUPPORT DETAIL  
NO SCALE

GENERAL NOTES:

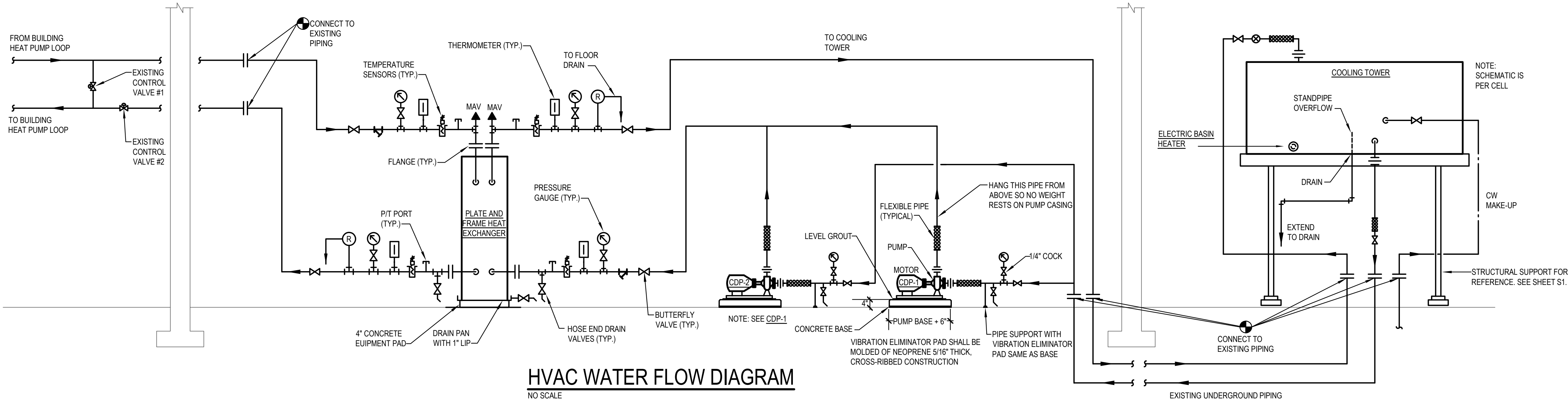
- DRAWINGS ARE DIAGRAMMATIC IN NATURE. ALL PIPING SHALL BE COORDINATED WITH OTHER NEW AND EXISTING DUCTS, PIPES, LIGHTS, STRUCTURAL SYSTEM, AND FRAMING BEFORE INSTALLATION. PIPE OFFSETS SHALL BE PROVIDED AS REQUIRED.
- ALL EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S PUBLISHED INSTRUCTIONS.
- CONTRACTOR SHALL SEAL AND FLASH ALL PENETRATIONS IN EXISTING WALLS.
- VERIFY WALL OPENINGS WITH STRUCTURE.
- VERIFY THE LOCATION OF ALL SENSORS, PANELS AND CONTROL INSTRUMENTS WITH THE OWNER PRIOR TO ROUGH-IN.
- VERIFY LOCATIONS OF NEW AND EXISTING EQUIPMENT AND ROUTE OF PIPING WITH EXISTING CONDITIONS.
- CONTRACTOR SHALL PROVIDE ALL SUPPORTS REQUIRED TO MOUNT MECHANICAL EQUIPMENT AND PIPING.
- WHERE PIPE CONNECTIONS ARE SHOWN CONNECTING TO EXISTING, CONTRACTOR SHALL DETERMINE EXACT LOCATIONS AND CONNECTION SIZES PRIOR TO INSTALLATION.
- PIPE INSULATION ON EXISTING PIPING THAT IS DAMAGED OR REMOVED FOR NEW WORK SHALL BE REPLACED, REPAIRED AND SEALED AS REQUIRED TO MATCH EXISTING.
- EXPOSED PIPING RUNOUTS SHALL BE INSTALLED IN PRACTICAL ALIGNMENT WITH THE BUILDING AND SHALL BE ADEQUATELY SECURED TO THE BUILDING STRUCTURE.
- PIPING SHALL NOT BE INSTALLED ABOVE ELECTRICAL PANELS. COORDINATE INSTALLATION OF PIPING WITH EXISTING ELECTRICAL PANELS.

DEMOLITION NOTES:

- THE CONTRACTOR SHALL REMOVE OR ALTER AS NECESSARY ALL EXISTING PIPING, EQUIPMENT AND APPURTENANCES THAT ARE NOT REQUIRED FOR THE EXISTING SYSTEMS TO REMAIN. CONTRACTOR SHALL VISIT THE SITE TO DETERMINE THE SCOPE OF THIS WORK AND VERIFY EXISTING CONDITIONS PRIOR TO SUBMITTING BIDS.
- EXISTING EQUIPMENT SHALL BE TURNED OVER TO THE OWNER, UNLESS DIRECTED OTHERWISE AND LOCATED AS DIRECTED BY THE OWNER. ALL OTHER ITEMS TO BE REMOVED SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND REMOVED FROM THE PREMISES.
- INSULATION ON EXISTING PIPING THAT IS DAMAGED OR REMOVED DUE TO THE DEMOLITION WORK SHALL BE REPLACED AND SEALED AS REQUIRED.

HVAC LEGEND

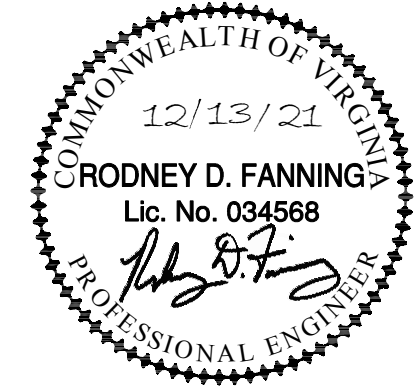
ABOVE	ABV	
BALANCING VALVE		
CHECK VALVE		
CIRCUIT SETTER		
CONDENSER WATER PUMP	CDP	
CONDENSER WATER RETURN PIPE	CDR	
CONDENSER WATER SUPPLY PIPE	CDS	
DRAIN PIPE	D	
CUBIC FEET PER MINUTE	CFM	
DIRECTION OF SLOPE DOWN		
DEGREES FAHRENHEIT	°F	
DIAMETER	" DIA	
DIRECTION OF FLOW		
DOMESTIC COLD WATER PIPE	CW	
DRY BULB	DB	
ENTERING WATER TEMPERATURE	EWI	
EXISTING, REMOVE FROM THIS POINT		
FEET	FT	
FEET PER MINUTE	FFM	
FLEXIBLE PIPE CONNECTION		
FLOOR	FL	
FROM	FRM	
GALLONS PER MINUTE	GPM	
GLOBE VALVE	GBV	
HORSEPOWER	HP	
INCH	IN	
LEAVING WATER TEMPERATURE	LWT	
MANUAL AIR VENT	MAV	
NEW CONNECTED TO EXISTING		
NORMALLY CLOSED	NC	
NORMALLY OPEN	NO	
PIPING INDICATION WITH RESPECT TO FLOW		
BOTTOM TAKEOFF		
SIDE CONNECTION		
TOP TAKEOFF		
TURN DOWN OR FROM BELOW		
TURN UP OR DOWN		
TURN UP OR FROM ABOVE		
POUNDS		
POUNDS PER SQUARE INCH GAGE	LBS PSIG	
PRESSURE DROP	PD	
PRESSURE GAUGE		
PRESSURE RELIEF VALVE		
REVOLUTIONS PER MINUTE	RPM	
SERVICE VALVE		
STRAINER		
THERMOMETER		
THOUSAND BTU PER HOUR	MBH	
TWO-WAY CONTROL VALVE		
UNION		



HVAC WATER FLOW DIAGRAM

NO SCALE

NOTE:  
VALVES AND INSTRUMENTS SHALL BE MOUNTED WHERE ACCESSIBLE FOR SERVICE.



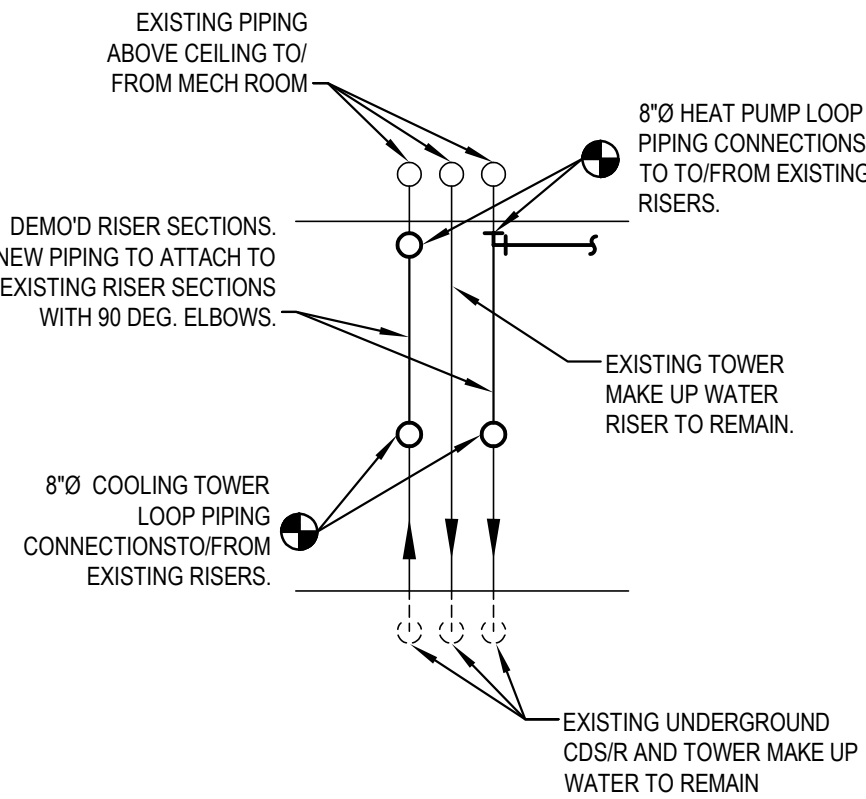
REVISION	DATE

DESIGNED RWR	DRAWN RWR
CHECKED RDF	APPROVED RDF
COMM. NO. 21101.51	DATE 12-13-21
SHEET M0	

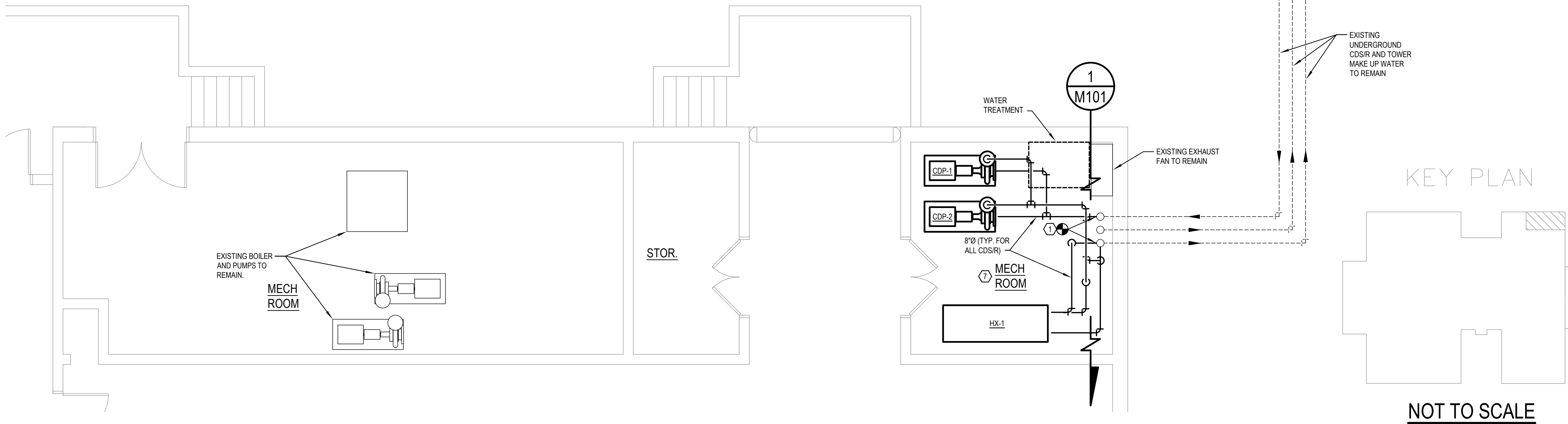
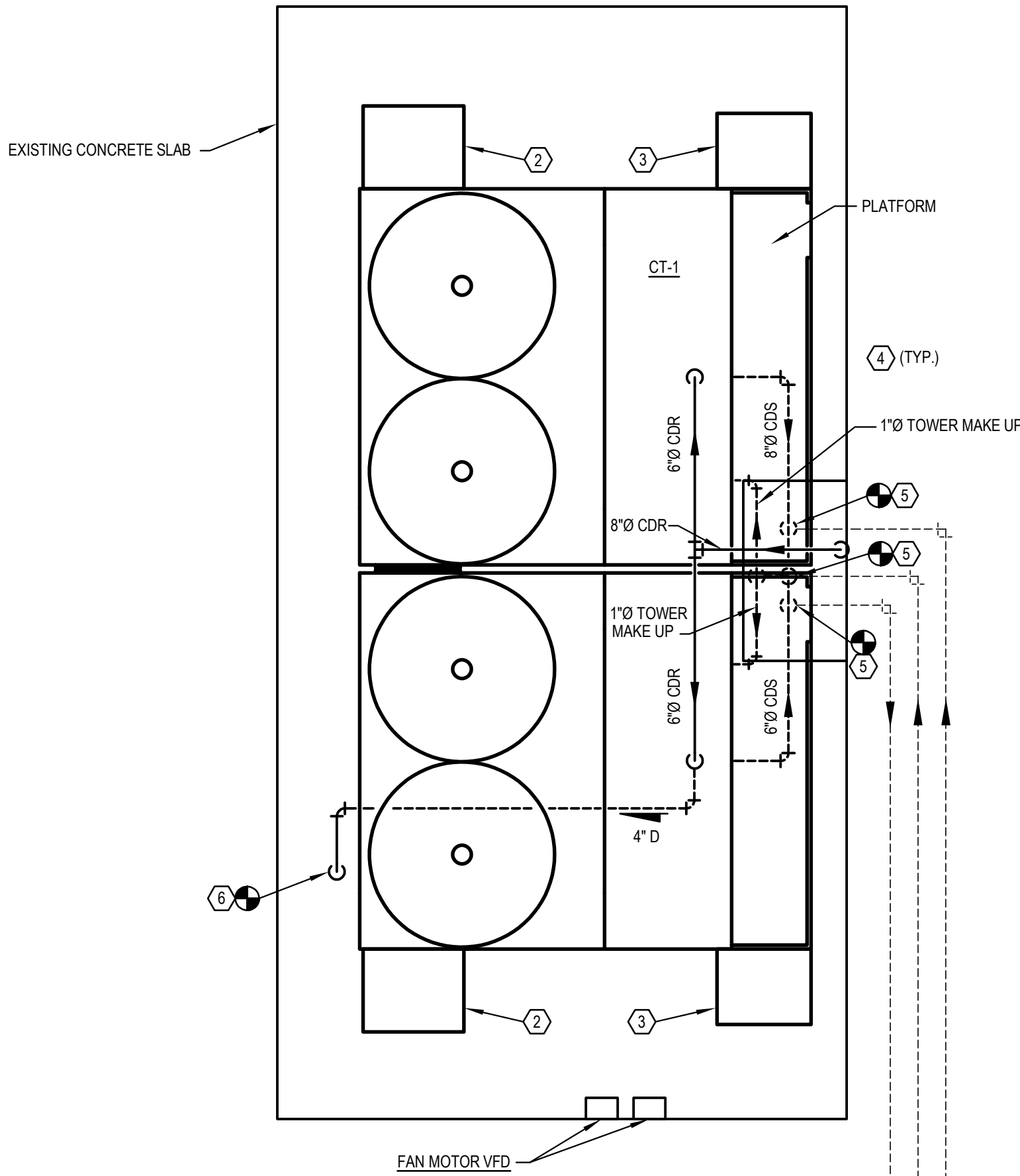


PLAN NOTES: ◯

- FOUR NEW 8"Ø CONNECTIONS TO EXISTING RISERS. SEE SECTION 1 ON THIS SHEET.
- ACCESS PLATFORM.
- PROVIDE TOWER LADDER WITH SAFETY CAGE AND LADDER EXTENSION.
- ALL EXTERIOR PIPING TO INCLUDE HEAT TRACE BY RAYCHEM XL SERIES, CHROMALOX SRF SERIES, OR EQUAL, SIZED BY THE MANUFACTURER TO MAINTAIN A 40 DEG. F. PIPELINE TEMPERATURE WITH 0 DEG. F. HEAT TRACE SYSTEM SHALL BE SELF-REGULATING, ELECTRIC-HEATING TYPE, U.L. LISTED, AND PROVIDED WITH ALL REQUIRED ACCESSORIES. PROVIDE TRACING CORE CONSISTING OF PARALLEL COPPER WIRES, EITHER SEPARATED BY A SELF-REGULATING SEMI-CONDUCTIVE CORE OR WRAPPED WITH A SELF-REGULATING SEMI-CONDUCTIVE FIBER. HEAT TRACE OUTPUT SHALL DECREASE WITH AN INCREASE IN AMBIENT TEMPERATURE. CONSTANT-WATTAGE TRACING IS NOT ACCEPTABLE. PROVIDE TRACING POWER CORD WEATHERPROOF AND HARD-WIRED TO CONTROLLER AND EXTENDED TO PIPING BEING PROTECTED. PROVIDE END OF CIRCUIT RELAY FOR EACH HEAT TRACING CIRCUIT TO TRANSMIT A SIGNAL INDICATING THAT POWER IS APPLIED TO CIRCUIT. ALL WORK SHALL BE COORDINATED WITH ELECTRICAL CONTRACTOR BEFORE INSTALLATION. HEAT TRACE SHALL BE 277V.
- CONNECT COOLING TOWER SUPPLY, RETURN, AND MAKE UP WATER TO EXISTING VERTICAL PIPING.
- CONNECT COOLING TOWER DRAIN TO EXISTING HUB DRAIN.
- COORDINATE EQUIPMENT AND PIPING WITH LIGHTS IN THIS ROOM.

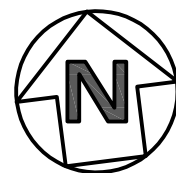


1 RISER PIPING CONNECTIONS  
SCALE: 1/4" = 1'-0"

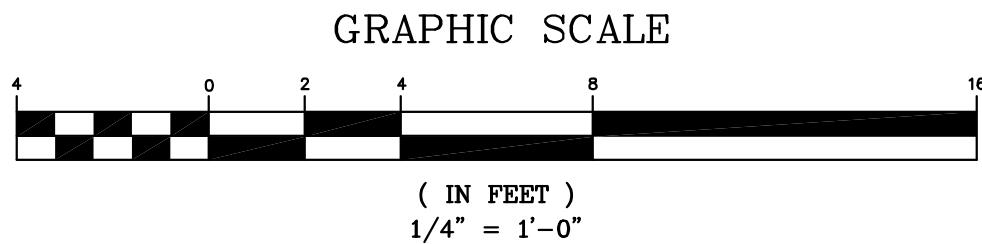


KEY PLAN

NOT TO SCALE



PARTIAL FLOOR PLAN - HVAC  
SCALE: 1/4" = 1'-0"



HIDDEN VALLEY MIDDLE SCHOOL  
COOLING TOWER REPLACEMENTS  
ROANOKE, VIRGINIA

PARTIAL FLOOR PLAN AND SECTION VIEWS - HVAC

DESIGNED	RWR	DRAWN	RWR
CHECKED	RDF	APPROVED	RDF
COMM. NO.	21101.51	DATE	12-13-21

SHEET

M1

12/13/21

REVISION	DATE



HVAC SPECIFICATIONS:

1. SCOPE OF THE WORK: WORK SHALL INCLUDE COMPLETE HVAC SYSTEMS, PROVIDE SUPERVISION, LABOR, MATERIAL, EQUIPMENT, MACHINERY, PLANT AND ITEMS NECESSARY FOR COMPLETE SYSTEMS TESTED AND READY FOR OPERATION.
2. REGULATIONS: MATERIALS AND INSTALLATION SHALL COMPLY WITH LOCAL CODES, APPLICABLE PROVISIONS OF LATEST EDITION OF NATIONAL FIRE PROTECTION ASSOCIATION, LOCAL UTILITY REGULATIONS AND GOVERNMENTAL DEPARTMENTS HAVING JURISDICTION, AND VIRGINIA TECH DESIGN AND CONSTRUCTION STANDARDS.
3. DRAWINGS: THESE DRAWINGS ARE DIAGRAMMATIC AND INDICATE GENERAL ARRANGEMENT OF SYSTEMS AND WORK INCLUDED. WHERE VARIANCES OCCUR INCLUDE THE ITEMS OF BETTER QUALITY, GREATER QUANTITY OR HIGHER COST.
4. COORDINATION OF WORK: THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE COORDINATION AND PROPER RELATION OF HIS WORK TO THE BUILDING STRUCTURE AND TO THE WORK OF OTHER TRADES. CONTRACTOR SHALL PROVIDE DIMENSIONS AND LOCATIONS OF ALL OPENINGS AND SIMILAR ITEMS TO THE PROPER TRADES AND SHALL INSTALL WORK AS REQUIRED SO AS NOT TO DELAY THE BUILDING CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR DAMAGE CAUSED BY HIS WORK OR WORKMEN. REPAIRING OF DAMAGED WORK SHALL BE DONE BY THE CONTRACTOR AT NO ADDITIONAL COST.
5. VISITING THE SITE: EACH CONTRACTOR SHALL BE RESPONSIBLE FOR VISITING THE SITE BEFORE PRICING THE JOB TO FAMILIARIZE HIMSELF WITH ALL EXISTING CONDITIONS TO BE MET IN THE EXECUTION OF THE WORK UNDER THIS CONTRACT. NO ADDITIONAL COMPENSATION WILL BE ALLOWED RELATING TO SITE CONDITIONS.
6. INTERRUPTION OF SERVICES: INTERRUPTIONS OF SERVICE TO EXISTING SYSTEMS SHALL BE COORDINATED WITH THE OWNER AS TO TIME AND DURATION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY INTERRUPTIONS TO SERVICE AND SHALL REPAIR ANY DAMAGES TO EXISTING SYSTEMS CAUSED BY HIS OPERATIONS.
7. WORK IN OCCUPIED AREAS: WORK IN OCCUPIED AREAS SHALL BE COORDINATED WITH THE OCCUPANT AND OWNER AS TO TIME AND DURATION. THE CONTRACTOR SHALL PROTECT THE OCCUPIED AREA AND SHALL BE RESPONSIBLE FOR CLEANING AND REPAIRING ANY DAMAGES CAUSED BY HIS WORK. SAFETY OF BUILDING OCCUPANTS SHALL BE ASSURED AT ALL TIMES. TOOLS, MATERIAL, DIRT AND DEBRIS SHALL BE REMOVED FROM OCCUPIED AREAS WHENEVER WORK AREAS ARE LEFT UNATTENDED.
8. ACCESSIBILITY: LOCATE EQUIPMENT WHICH MUST BE SERVICED OR MAINTAINED IN FULLY ACCESSIBLE POSITIONS WHERE POSSIBLE. OTHERWISE, FURNISH ACCESS PANELS OF SUFFICIENT SIZE AND LOCATED SO THAT THE CONCEALED EQUIPMENT CAN BE SERVICED.
9. FOUNDATION PADS AND ROUGH-IN: PROVIDE 4-INCH HIGH CONCRETE FOUNDATION PADS FOR FLOOR-MOUNTED EQUIPMENT. ROUGH-IN OPENINGS SHALL ALIGN VERTICALLY WITH BUILDING STRUCTURE.
10. SLEEVES: LOCATE SLEEVES DURING NORMAL COURSE OF WORK. PROVIDE SLEEVES FOR PIPING PASSING THROUGH CONCRETE FLOOR SLABS AND CONCRETE, MASONRY, TILE AND GYPSUM WALL CONSTRUCTION. SLEEVES SHALL NOT BE REQUIRED FOR PIPING EMBEDDED IN CONCRETE OR SLAB ON GRADE, EXCEPT THAT COPPER PIPING SHALL REQUIRE SLEEVES THROUGH SLABS ON GRADE. SLEEVES PLACED IN EXTERIOR WALLS BELOW GRADE SHALL BE WATERTIGHT. WHERE SLEEVES ARE LOCATED THROUGH FIRE-RATED WALLS OR FLOORS, THE SLEEVE ASSEMBLIES SHALL MAINTAIN THE FIRE RATING OF THE WALL OR FLOOR. SLEEVES SHALL BE CONSTRUCTED OF 20 GAUGE GALVANIZED STEEL WITH LOCK SEAM JOINTS FOR ALL SLEEVES SET IN CONCRETE FLOOR SLABS. ALL OTHER SLEEVES SHALL BE CONSTRUCTED OF GALVANIZED STEEL PIPE.
11. CUTTING AND PATCHING: THE CONTRACTOR SHALL PROVIDE ALL CUTTING AND PATCHING NECESSARY TO INSTALL HIS WORK. PATCHING SHALL MATCH ADJACENT SURFACES. NO STRUCTURAL MEMBERS SHALL BE CUT WITHOUT THE APPROVAL OF THE ARCHITECT.
12. CLEANING: EQUIPMENT AND PIPING SHALL BE CLEANED TO REMOVE FOREIGN MATERIALS. PLUG OR CAP OPENINGS IN EQUIPMENT, PIPING AND MATERIALS UNTIL CONNECTION IS MADE TO THE SYSTEM. REMOVE FROM THE PREMISES ALL UNUSED MATERIAL AND DEBRIS RESULTING FROM THE PERFORMANCE OF HVAC WORK.
13. WIRING: CONTROL WIRING FOR MECHANICAL EQUIPMENT SHALL BE FURNISHED BY THE CONTROLS CONTRACTOR. CONTROL WIRING SHALL NOT INCLUDE ANY WIRING WHICH CARRIES MOTOR CURRENT. ALL WIRING SHALL BE IN METAL CONDUIT AND SHALL COMPLY WITH THE ELECTRICAL SPECIFICATIONS.
14. QUIET OPERATION: SYSTEMS SHALL OPERATE UNDER CONDITIONS OF LOAD WITHOUT UNUSUAL OR EXCESSIVE NOISE OR VIBRATION. UNUSUAL OR EXCESSIVE NOISE OR VIBRATION SHALL BE CORRECTED.
15. TESTING AND BALANCING: HVAC CONTRACTOR SHALL TEST ALL HVAC EQUIPMENT TO ASSURE THAT THE PROPER SEQUENCE OF CONTROL IS ESTABLISHED AND OPERATING IN A SAFE MANNER.

BALANCING VALVES & CIRCUIT SETTERS SHALL BE BALANCED FOR THE FLOW RATES INDICATED ON THE DRAWINGS. WHERE CIRCUIT SETTER FLOW RATES ARE NOT SPECIFIED, CONTRACTOR SHALL COORDINATE WITH OWNER TO DETERMINE FLOW RATE SETTING PRIOR TO FINAL BALANCING.

PROVIDE A TESTING AND BALANCING REPORT SHOWING THAT FLOW RATES ARE WITHIN +/- 10% OF DESIGN VALUES.

16. INSTRUCTIONS TO OWNER: INSTRUCT THE OWNER IN THE PROPER OPERATION AND MAINTENANCE OF THE MECHANICAL SYSTEMS UNTIL THE OWNER IS FULLY PREPARED TO OPERATE AND MAINTAIN THE SYSTEMS. HOWEVER, LENGTH OF INSTRUCTION TIME SHALL BE LIMITED TO ONE (1) DAY.
17. OPERATING AND MAINTENANCE: PROVIDE THE OWNER WITH TWO (2) BOUND SETS OF OPERATING AND MAINTENANCE INSTRUCTIONS FOR ALL HVAC EQUIPMENT AND CONTROLS.
18. GUARANTEE: EQUIPMENT, MATERIALS AND LABOR REQUIRED BY THESE CONTRACT DRAWINGS SHALL BE GUARANTEED TO BE FREE FROM DEFECTIVE MATERIALS OR WORKMANSHIP FOR ONE (1) YEAR AFTER FINAL ACCEPTANCE OF THE PROJECT UNLESS SPECIFIED FOR A LONGER PERIOD IN OTHER PORTIONS OF THE SPECIFICATIONS. DEFECTIVE MATERIALS OR WORKMANSHIP OCCURRING DURING THIS PERIOD SHALL BE CORRECTED AT NO ADDITIONAL COST.
19. PAINTING: GENERAL - PAINT MECHANICAL EQUIPMENT AND MATERIALS WHERE NOT CONCEALED. PAINTING IN CONCEALED SPACES SHALL BE LIMITED TO EQUIPMENT AND MATERIALS NOT OTHERWISE PROTECTED FROM RUSTING SUCH AS HANGERS AND SUPPORTS. PAINT SHALL BE PRODUCTS OF SHERWIN-WILLIAMS, PITTSBURGH, PRATT-LAMBERT OR EQUAL. SURFACE PREPARATION, PRIMING AND PAINT APPLICATION SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS. GALVANIZED SURFACES SHALL BE PRETREATED WITH A PHOSPHORIC ACID CLEANING SOLUTION AND PRIMED. AFTER PREPARATION EACH ITEM SHALL BE PAINTED. PAINTING IS NOT REQUIRED OF ITEMS WITH A FACTORY-FINISH COAT. PATCH PAINTING IS REQUIRED OF ANY DAMAGED AREAS TO MATCH FACTORY-FINISH COAT. NAMEPLATES ON EQUIPMENT SHALL NOT BE PAINTED.
20. IDENTIFICATION OF PIPES AND EQUIPMENT: EACH MAJOR PIECE OF EQUIPMENT, VALVES, AND PIPING SHALL BE IDENTIFIED BY MARKING THAT WILL READ THE SAME AS THE IDENTIFICATION SHOWN ON THE DRAWINGS. EQUIPMENT SHALL BE IDENTIFIED WITH LAMINATED PLASTIC STICK-ON TAGS OR PLACARD. PIPES SHALL BE IDENTIFIED USING PRE-PRINTED MARKERS SIZED APPROPRIATELY FOR THE PIPES BEING IDENTIFIED (SHOP DRAWINGS REQUIRED). MARKERS SHALL BE SETON "SETMARK" TYPE OR EQUAL. PIPE IDENTIFICATION SHALL MEET THE MOST CURRENT EDITION OF ANSI SPECIFICATION A11.1. MARKERS SHALL BE LOCATED CLOSE TO VALVES OR FLANGES AND ADJACENT TO CHANGES IN DIRECTION, BRANCHES AND WHERE PIPES PASS THROUGH WALLS OR FLOORS, AND AT INTERVALS OF 15 FEET ON STRAIGHT RUNS. PROVIDE A COLOR CODE CHART, FRAMED WITH GLASS FRONT, INDICATING PIPING SERVICE AND COLOR CODE SCHEDULE. TAG ALL VALVES AND PROVIDE VALVE CHART FOR EACH FLOOR.
21. PIPING:

A. CONDENSER WATER LINES: PIPE 5" AND SMALLER SHALL BE ASTM A53 SCHEDULE 40 STANDARD WEIGHT GALVANIZED STEEL. PIPE OVER 5" SHALL BE ASTM A53 SCHEDULE 40 STANDARD WEIGHT BLACK STEEL. ALL FITTINGS SHALL BE SUITABLE FOR 125 PSI WATER SERVICE.

B. SERVICE VALVES: UP TO AND INCLUDING 2" SHALL BE ALL BRASS, RISING STEM, SOLID WEDGE DISC GATE VALVES. VALVES SHALL BE PROVIDED WITH LOCKING HANDLES AND EXTENDED HANDLES. VALVES OVER 2" SHALL BE IRON BODY BUTTERFLY DISC TYPE, FULL LUG, RESILIENT SEATED DESIGN RATED FOR 230 PSIG SHUT-OFF, BI-DIRECTIONAL DEAD END SERVICE. BUTTERFLY VALVE BASIS OF DESIGN SHALL BE BRAY SERIES 31H-119, KEYSTONE 222/GR, OR UNIVERSITY APPROVED EQUAL VALVES 3" AND LARGER SHALL HAVE MANUAL WHEEL. WORM GEAR, BUTTERFLY VALVES LOCATED MORE THAN 7 FEET FROM THE FLOOR SHALL BE FURNISHED WITH CHAIN WHEEL, WEATHERPROOF WORM GEAR ACTUATORS WITH SECURITY CABLE DEVICE.

C. GLOBE VALVES SHALL BE ALL BRASS WITH BRASS DISC, EXCEPT GLOBE VALVES OVER 2" SIZE MAY BE BUTTERFLY TYPE.

D. CHECK VALVES SHALL BE BRASS OR IRON BODY, SWING TYPE, REGRINDING SEAT.

E. STRAINERS SHALL BE Y TYPE WITH BRONZE BASKET SUITABLE FOR 125 PSI SERVICE.

F. MANUAL AIR VENTS SHALL BE CHROMIUM-PLATED BRASS 1/8" NPT COIN-OPERATED TYPE. PROVIDE EXTENSION TUBE IF REQUIRED TO MAINTAIN ACCESS TO VENT OPERATOR.

G. AUTOMATIC AIR VENTS SHALL BE BELL & GOSSETT NO. 79 OR EQUAL, SUITABLE FOR 75 PSI SERVICE, AND SHALL PROVIDE VENTING OPERATION UNDER ALL CONDITIONS. EXHAUST PORT FROM EACH VENT SHALL BE EXTENDED WITH CONCEALED 1/4" COPPER TUBING TO FLOOR OF EQUIPMENT ROOMS, TO A DRAIN, OR TO 6" ABOVE GRADE AT BUILDING EXTERIOR. HIGH CAPACITY AIR VENTS SHALL BE BELL & GOSSETT NO. 107A OR EQUAL.

H. SAFETY RELIEF VALVES SHALL BE WATTS ASME SERIES 174A, 3/4" X 3/4" AND SHALL HAVE A SET PRESSURE OF 10 PSI OVER THE OPERATING PRESSURE AND NOT TO EXCEED THE OPERATING DESIGN PRESSURE OF THE COOLING EQUIPMENT. PIPE DISCHARGE PORTS FULL SIZE TO FLOOR DRAIN AND SUPPORT SO THAT NO STRAIN IS ON VALVE BODY.

I. PRESSURE GAUGES SHALL BE 4" DIAL ASHCROFT BOURDON TUBE TYPE SUITABLE FOR 125 PSI SERVICE.

J. FLEXIBLE PIPE JOINTS SHALL BE PIPE LINE SIZE, FLANGED, MINIMUM 125 PSI WORKING PRESSURE AT 250 DEG. F, FLEXONICS MODEL PCS.

K. CIRCUIT SETTERS SHALL BE BELL AND GOSSETT OR EQUAL BRONZE BALANCE VALVE WITH PROVISIONS FOR CONNECTING A PORTABLE DIFFERENTIAL PRESSURE METER. METER CONNECTIONS SHALL HAVE BUILT-IN CHECK VALVES. AN INTEGRAL

- POINTER SHALL REGISTER DEGREE OF VALVE OPENING. EACH BALANCE VALVE SHALL BE CONSTRUCTED FOR 125 LBS. WORKING PRESSURE AT 250 DEG. F. FURNISH ONE DIFFERENTIAL METER MODEL RO-5 COMPLETE WITH METER, CUTOFFS, PIPING, FITTING, AND HOSE. THE VALVE PRESSURE DROP AND THE SETTING SHALL DETERMINE THE ACTUAL SYSTEM FLOW RATE.
- M. THERMOMETERS SHALL BE WEKSLER INSTRUMENTS TYPE AA OR EQUAL, FED. SPEC. GG-T-321, NON-MERCURY FLUID FILLED TYPE, BLUE COLORED, CLEAR PLASTIC WINDOW, WITH 6-INCH BRASS STEM, STRAIGHT, ADJUSTABLE ANGLE AS REQUIRED FOR EACH IN READING.
- N. PIPE SUPPORTS: SUSPENDED HORIZONTAL PIPING SHALL BE SUPPORTED BY ADJUSTABLE WROUGHT STEEL CLEVIS HANGERS. ALL SUPPORTS SHALL BE ATTACHED TO THE BUILDING STRUCTURE SPACED 10'-0" ON CENTER. HANGER RODS SHALL BE 3/8" DIAMETER SIZE FOR PIPES UP THROUGH 2", 1/2" DIAMETER SIZE FOR 2-1/2" THROUGH 3", 5/8" DIAMETER FOR PIPES 4" THROUGH 5" AND 7/8" DIAMETER SIZE FOR 6" THROUGH 12". PIPE HANGER RODS SHALL BE ATTACHED TO THE TOP CHORD ONLY ON STEEL JOISTS AND BEAMS WITH CLAMPS. PIPING SHALL BE INSTALLED IN PRACTICAL ALIGNMENT WITH THE BUILDING. STRAIGHT RUNS OF PIPING WITH 40 FEET OR MORE BETWEEN ANCHOR AND EXPANSION DEVICE SHALL BE SUPPORTED ON ROLLER TYPE HANGERS OR SUPPORTS. PROTECTION SADDLE, WELDED TO PIPE, SHALL BE PROVIDED AT EACH ROLLER SUPPORT. ALL SUPPORTS SHALL BE ATTACHED TO THE BUILDING STRUCTURE AND SHALL IN NO WAY BE ATTACHED TO THE SUPPORTS OR OTHER EQUIPMENT, PIPING, OR DUCTWORK.
- O. ANCHORS FOR PIPE SHALL BE PROVIDED AS INDICATED OR AS REQUIRED AT THE JOB SITE TO LOCALIZE EXPANSION AND CONTRACTION OF PIPE.
- P. VERTICAL PIPING SHALL BE GUIDED OR SUPPORTED IN THE CENTER OF EACH RISER AND NOT OVER 15'-0" ON CENTER AND SHALL BE SUPPORTED AT THE BASE OF EACH RISER.
- Q. ALL PIPING SHALL BE INSTALLED WITH SUFFICIENT PITCH TO INSURE ADEQUATE DRAINAGE AND VENTING. ALL HIGH POINTS IN WATER LINES SHALL BE PROVIDED WITH AUTO-AIR VENTS, ALL LOW POINTS WITH DRAINS.
- R. DIELECTRIC FITTINGS SUCH AS COUPLINGS, UNIONS OR FLANGES SHALL BE INSTALLED TO ISOLATE PIPES OF NON-FERROUS METAL WHERE CONNECTION IS MADE TO FERROUS METAL.
- S. LEAK TESTING: PERFORM A HYDROSTATIC TEST AT 1.5 TIMES DESIGN PRESSURE FOR 4 HOURS. FACTORY TESTED EQUIPMENT NEED NOT BE FIELD TESTED. AVOID EXCESSIVE PRESSURE ON MECHANICAL SEALS AND SAFETY DEVICES.

22. THERMAL COVERING

- A. INSULATION SHALL BE JOHNS MANVILLE, OWENS CORNING, ARMSTRONG OR EQUAL. INSULATION SHALL NOT BE APPLIED UNTIL AFTER THE EQUIPMENT OR PIPES TO BE INSULATED HAVE PROVEN SATISFACTORY UNDER TESTS. ALL MATERIALS USED SHALL HAVE COMPOSITE FLAME-SPREAD RATING NOT EXCEEDING 25 AND A SMOKE-DEVELOPED RATING NOT EXCEEDING 50.
- B. PIPING: INSULATION SHALL BE INSTALLED IN CONFORMANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
- C. FIBERGLASS PIPE INSULATION SHALL HAVE A WHITE KRAFT BONDED TO ALUMINUM FOIL, REINFORCED WITH FIBERGLASS YARN JACKET. ELASTOMERIC INSULATION SHALL BE CONSTRUCTED OF A CLOSED CELL STRUCTURE TO EFFECTIVELY RETARD THE FLOW OF MOISTURE VAPOR AND SERVE AS A VAPOR BARRIER. INSULATION THICKNESS AND TYPE FOR VARIOUS PIPING SYSTEMS SHALL BE AS INDICATED IN THE FOLLOWING TABLE (PIPE SIZE/INSULATION THICKNESS).

PIPE SIZE/INSULATION THICKNESS(1)							
SYSTEM	TEMP RANGE (°F)	LESS THAN 1"	1" TO 1-1/4"	1-1/2" TO 3"	4" TO 6"	8" & UP	INS. TYPE (2)
CONDENSER WATER	ALL	1.0	1.0	1.0	1.0	1.0	A

NOTES:

- (1) MINIMUM THICKNESS FOR INSULATION LISTED IN PRECEDING TABLE IS BASED ON THERMAL CONDUCTIVITY, 'K' NOT EXCEEDING 0.27 BTU PER INCH-HR. X SQ. FT. X DEG. F. BASED ON MEAN TEMPERATURE OF 75 DEG. F. INSULATION WITH GREATER THERMAL CONDUCTIVITY SHALL HAVE INCREASED THICKNESS TO PROVIDE SAME PERFORMANCE CHARACTERISTICS AS SPECIFIED.
- (2) A - FIBERGLASS TYPE INSULATION

- E. FIBERGLASS PIPE INSULATION FITTINGS SHALL BE COVERED WITH PREMOULDED PVC FITTING COVERS. JACKETS ON FIBERGLASS PIPE INSULATION BELOW 90 DEG. F. SHALL BE VAPOR SEALED USING SELF-SEALING LAP LAP SEAL GUN OR ADHESIVE. ALL INSULATION JOINTS, LAPS, VOIDS, PUNCTURES AND END TAPERS SHALL BE SEALED WITH 1/32" THICKNESS OF VAPOR ADHESIVE. A 12" LONG, 1/2 SECTION OF HYDROUS CALCIUM SILICATE OR FOAMGLAS INSULATION SHALL BE USED BETWEEN HANGERS AND PIPING. ON PIPE, SIZES 1-1/2" AND BELOW, HYDROUS CALCIUM SILICATE OR FOAMGLAS WILL NOT BE REQUIRED. ALL PIPING SHALL HAVE LOAD-DISTRIBUTING GALVANIZED 16 GAUGE METAL SHIELDS INSTALLED AROUND THE LOWER HALF OF THE INSULATION.

- F. COOLING TOWER WATER PUMPS: COOLING TOWER WATER PUMPS SHALL BE INSULATED WITH REMOVABLE AND REPLACEABLE COVER OF 20 GAGE GALVANIZED SHEET METAL, JACKET LINED WITH FIBERGLASS INSULATION HAVING AN 'R' VALUE OF 4.0 PER INCH OF THICKNESS AT A MEAN TEMPERATURE OF 75 DEG. F. ALL VOIDS BETWEEN METAL COVER AND PUMP HOUSING SHALL BE FILLED WITH INSULATION. METAL COVER SHALL BE VAPOR SEALED WITH BENJAMIN-FOSTER 30-35 AFTER THE COVERS ARE IN PLACE.

23. CONDENSER WATER PUMPS (CDP-1 & CDP-2): END SUCCTION WATER PUMP SHALL BE BELL & GOSSETT BASE MOUNTED PUMP SERIES 1510, OR EQUAL BY ARMSTRONG, TACO OR GRUNDFOS WITH CLASS 30 CAST IRON VOLUTE WITH INTEGRALLY-CAST SUPPORT, CAST BRONZE IMPELLER, ENCLOSED TYPE, DYNAMICALLY BALANCED, MECHANICAL SHAFT SEALS WITH CARBON SEAL RING FOR CONTINUOUS OPERATION @ 225.0 DEG. F. MINIMUM WORKING PRESSURE OF 175 PSI. CASINGS SHALL HAVE GAUGE PORTS AT NOZZLES AND VENT AND DRAIN PORTS AT TOP AND BOTTOM OF CASING. HOUSING ASSEMBLY SHALL HAVE REPLACEABLE HEAVY DUTY REGREASABLE BALL BEARINGS. PUMP AND MOTOR SHALL BE MOUNTED ON A COMMON BASE. BASE ENDS, WITH SECURELY WELDED CROSS MEMBERS AND FULLY OPEN GROUTING AREA. A FLEXIBLE TYPE COUPLER SHALL CONNECT THE PUMP AND U-1 LISTED MOTOR. THE COUPLER SHALL BE COMPLETE WITH SAFETY GUARD MEETING COMPLIANCE WITH ANSI B15.1, SECTION 8 AND OSHA 1910.219. CONTRACTOR TO LEVEL AND GROUT EACH UNIT ACCORDING TO MANUFACTURER'S INSTRUCTIONS. THE MOTOR SHALL MEET NEMA SPECIFICATIONS AND SHALL BE THE SIZE AND VOLTAGE CALLED FOR ON THE PLANS. PUMP AND MOTOR SHALL BE FACTORY ALIGNED, AND SHALL BE REALIGNED BY CONTRACTOR AFTER INSTALLATION. EACH PUMP SHALL BE FACTORY TESTED, CLEANED, AND PAINTED WITH HIGH GRADE MACHINERY ENAMEL. UNIT SHALL BE CHECKED BY THE CONTRACTOR AND REGULATED FOR PROPER DIFFERENTIAL PRESSURE, VOLTAGE, AND AMPERAGE DRAW. DATA SHALL BE NOTED ON A PERMANENT TAG AND FASTENED TO THE PUMP. SUBMIT THE MANUFACTURER'S CERTIFIED CHARACTERISTICS PERFORMANCE CURVE FOR THE IMPELLER SIZE TO BE FURNISHED. THE PUMP MOTOR SHALL BE NON-OVERLOADING AT ANY POINT ON THE HEAD-CAPACITY CURVE.

24. VARIABLE FREQUENCY DRIVES (VFD'S): FURNISH AND INSTALL WHERE SHOWN ON DRAWINGS. VARIABLE SPEED DRIVE SHALL BE PULSE WIDTH MODULATION (PWM) TYPE, MICROPROCESSOR CONTROLLED DESIGN. MANUFACTURER SHALL BE SQUARE D OR ABB ONLY UNLESS SPECIFICALLY ALLOWED OTHERWISE BY VIRGINIA TECH. VARIABLE SPEED DRIVE SHALL BE UL APPROVED. ENCLOSURE SHALL BE NEMA 1, DRIVE SHALL BE EQUIPPED WITH INPUT DISCONNECT SWITCH AND FUSES, HAND-OFF-AUTO SWITCH AND SPEED POTENTIOMETER, PHASE LOSS PROTECTION, AND BYPASS. BYPASS SHALL BE MANUAL TYPE CONSTANT SPEED CIRCUIT AND CONSIST OF MAIN POWER DISCONNECT, INTERLOCKED CONTACTORS AND MOTOR OVERLOAD RELAY. A DRIVE-OFF-BYPASS SWITCH SHALL BE PROVIDED ON THE FRONT OF THE DRIVE ENCLOSURE. PROVIDE ISOLATION TRANSFORMERS IN A SEPARATE ENCLOSURE. VFDs SHALL BE PROVIDED WITH AN INPUT LINE REACTOR; TOTAL IMPEDANCE AT THE INPUT TERMINALS SHALL BE NO LESS THAN 5% ELECTRICAL OUTPUT FOR VFDs SHALL NOT EXCEED 10% TOTAL HARMONIC DISTORTION. VFD POWER SUPPLIES SHALL NOT BE USED FOR ANY EXTERNAL USE. IF 24VDC IS NEEDED, AN EXTERNAL POWER SUPPLY SHALL BE ADDED. VFDs SHALL HAVE BACNET COMMUNICATIONS PROTOCOL AVAILABLE. VFDs SHALL HAVE AN EFFICIENCY RATING OF 98% OR HIGHER AT FULL LOAD. MAXIMUM SPEED FOR MOTORS ON VFD SHALL BE 60 HZ. VFDs SHALL BE CLEARLY LABELED WITH PANEL, CIRCUIT, AND EQUIPMENT DESIGNATIONS. DRIVE SHALL BE COMPATIBLE AND COORDINATED TO OPERATE AS DESCRIBED IN THE SEQUENCE OF CONTROL. VFDs SHALL BE STARTED-UP AND PROGRAMMED BY A FACTORY CERTIFIED TECHNICIAN FROM THE MANUFACTURER.

25. COOLING TOWER:

- A. GENERAL - COOLING TOWER SHALL BE EVAPCO, BALTIMORE AIRCOIL OR MARLEY, INDUCED-DRAFT, CROSSFLOW, FACTORY-ASSEMBLED COOLING TOWER.
- B. BASIN: THE ENTIRE BASIN AREA SHALL BE CONSTRUCTED OF TYPE 304 STAINLESS STEEL FOR LONG LIFE AND DURABILITY. THE BASIN AREA SHALL INCLUDE ALL STEEL COMPONENTS FROM THE BASE OF THE UNIT TO THE TOP OF THE AIR INLET LOUVER SCREENS. STANDARD BASIN ACCESSORIES SHALL INCLUDE OVERFLOW, DRAIN, ANTI-VORTEXING HOOD, TYPE 304 STAINLESS STEEL STRAINERS. THE ENTIRE BASIN AREA SHALL INCORPORATE A STEPPED CONFIGURATION FOR REDUCED WATER VOLUME, LOWER OPERATING WEIGHT AND EASIER BASIN MAINTENANCE. THE UPPER AND LOWER PAN BOTTOMS SHALL BE SLOPED TO PROVIDE POSITIVE DRAINAGE OF THE COMPLETE BASIN SECTION. DEPRESSIONED SIDE OUTLET SUMPS WHICH ARE NOT AN INTEGRAL PART OF THE BASIN WILL NOT BE ACCEPTABLE. TOWERS OF MORE THAN ONE CELL SHALL INCLUDE A METHOD FOR FLOW AND EQUALIZATION BETWEEN CELLS.
- C. CASING: THE CASING SHALL BE CONSTRUCTED OF G-235 HOT-DIP GALVANIZED STEEL. THE CASING PANELS SHALL TOTALLY ENCASE THE SIDES OF THE FILL SECTION TO PROTECT THE SURFACE FROM DIRECT ATMOSPHERIC CONTACT. THE CASING SHALL NOT BE CONSTRUCTED OF FLAMMABLE MATERIALS SUCH AS FIBERGLASS.
- D. FAN MOTORS: TWO (2) 7.5 HP TOTALLY ENCLOSED AIR OVER (E.A.O.) BALL BEARING INVERTER DUTY FAN MOTORS WITH A 1.15 SERVICE FACTOR SHALL BE FURNISHED SUITABLE FOR COOLING TOWER SERVICE ON 480 VOLTS, 60 HERTZ, AND 3 PHASE. MOTORS SHALL BE MOUNTED ON AN ADJUSTABLE BASE THAT ALLOWS THE MOTOR TO SWING TO THE OUTSIDE OF THE UNIT FOR SERVICING. A HINGED PROTECTIVE COVER SHALL SHIELD THE MOTOR FROM THE WEATHER. VARIABLE SPEED DRIVE (VFD) SHALL BE PROVIDED FOR EACH FAN MOTOR.

- E. DRIVES: THE FAN DRIVES SHALL BE A MULTI-GROOVE, SOLID BACK V-BELT WITH TAPER LOCK SHEAVES, DESIGNED FOR 1.5 SERVICE FACTOR OF THE MOTOR NAMEPLATE HORSEPOWER. THE BELT MATERIAL SHALL BE NEOPRENE REINFORCED WITH POLYESTER CORD AND SPECIFICALLY DESIGNED FOR COOLING TOWER SERVICE. FAN AND MOTOR SHEAVES SHALL BE ALUMINUM ALLOY CONSTRUCTION. BELT ADJUSTMENT SHALL BE ACCOMPLISHED FROM THE EXTERIOR OF THE UNIT. BEARING LUBE LINES SHALL BE EXTENDED TO THE EXTERIOR OF THE UNIT FOR EASY MAINTENANCE. ALL SHEAVES LOCATED IN THE AIRSTREAM SHALL BE CONSTRUCTED OF ALUMINUM ALLOY. VENTED GUARDS WILL NOT BE ACCEPTABLE. IF INTERNAL BELT ADJUSTMENT IS NECESSARY, AN INTERNAL WORKING PLATFORM AND LADDER IS REQUIRED TO ACCESS THE DRIVE SYSTEM.

- F. FAN SHAFT BEARINGS: FAN SHAFT BEARINGS SHALL BE HEAVY DUTY SELF-ALIGNING BALL TYPE WITH SELF LOCKING COLLARS AND GREASE FITTINGS EXTENDED TO THE OUTSIDE OF THE UNIT. BEARINGS SHALL BE DESIGNED FOR A MINIMUM L-10 LIFE OF 75,000 HOURS.

- G. FILL, LOUVERS, AND DRIFT ELIMINATORS: FILL SHALL BE FILM TYPE, THERMOFORMED OF PVC, WITH LOUVERS AND ELIMINATORS FORMED AS PART OF EACH FILL SHEET. FILL SHALL BE SUSPENDED FROM HOT DIP GALVANIZED STRUCTURAL TUBING SUPPORTED FROM THE TOWER STRUCTURE, AND SHALL BE ELEVATED ABOVE THE FLOOR OF THE COLD-WATER BASIN TO FACILITATE CLEANING. AIR INLET FACES OF THE TOWER SHALL BE FREE OF WATER SPLASH OUT.

- H. AN OPEN 30"X1 STAINLESS STEEL BASIN ABOVE THE BANK OF FILL SHALL RECEIVE HOT WATER PIPED TO EACH CELL OF THE TOWER. THE DISTRIBUTION BASIN SHALL BE INSTALLED AND SEALED AT THE FACTORY WITH BOLTED CONNECTIONS. TAP SCREWS SHALL NOT BE ALLOWED. THE BASIN SHALL BE EQUIPPED WITH REMOVABLE, STAINLESS STEEL COVERS TO KEEP OUT LEAVES AND DEBRIS, AND TO RETARD THE GROWTH OF ALGAE. THE WATER DISTRIBUTION SYSTEM SHALL BE ACCESSIBLE AND MAINTAINABLE DURING TOWER FAN AND WATER OPERATION.

- Each basin shall include an inlet hole and bolt circle to accept a 125# flange connection per ANSI B16.1. REMOVABLE, INTERCHANGEABLE POLYPROPYLENE NOZZLES INSTALLED IN THE FLOOR OF THESE BASINS SHALL PROVIDE FULL COVERAGE OF THE FILL BY GRAVITY FLOW.

- HEAVY-DUTY FLOW-REGULATOR VALVES SHALL BE PROVIDED AT THE HOT-WATER INLET CONNECTIONS. THESE VALVES SHALL BE DISC-TYPE, WITH CAST IRON BODIES AND STAINLESS STEEL OPERATING STEMS. THERE SHALL BE A LOOKING HANDLE TO MAINTAIN THE VALVE SETTING IN ANY POSITION. VALVES SHALL BE RIGHT-ANGLE CONFIGURATION, PRECLUDING THE NEED FOR INLET ELBOWS.

- I. FINISH: THE BASIN MATERIAL SHALL BE CONSTRUCTED OF TYPE 304 STAINLESS STEEL FOR MAXIMUM PROTECTION AGAINST CORROSION. THE CASING MATERIAL SHALL BE CONSTRUCTED OF G-235 HEAVY GAUGE MIL HOT-DIP GALVANIZED STEEL FOR PROTECTION AGAINST CORROSION. G-235 HOT-DIP GALVANIZED STEEL DESIGNATES AN AVERAGE COATING THICKNESS OF 2.35 OUNCES OF ZINC PER SQUARE FOOT ON THE STEEL. DURING FABRICATION, ALL PANEL EDGES SHALL BE COATED WITH A 95% PURE ZINC-RICH COMPOUND.

- J. WORKING PLATFORM AND LADDER WITH DAVIT: EXTERNAL SERVICE PLATFORM WITH VERTICAL LADDER SHALL ALLOW EASY SERVICING OF THE FAN MOTOR AND WATER DISTRIBUTION SYSTEM. LADDER EXTENSIONS SHALL BE PROVIDED AS NEEDED. TO PROVIDE A CONVENIENT PLATFORM TO PERFORM WORK, THE HEAVY DUTY GALVANIZED STEEL PLATFORM WITH STAINLESS STEEL MOUNTING HARDWARE SHALL BE SELF-SUPPORTING TO ELIMINATE THE NEED FOR ANY EXTERNAL SUPPORT. THE WORKING PLATFORM SHALL USE A VERTICAL LADDER AND SHIP IN SECTIONS FOR EASY INSTALLATION. THE DAVIT SHALL FACILITATE THE REMOVAL OF MOTORS AND GEAR DRIVES. THE DAVIT SHALL BE CONSTRUCTED OF HEAVY-DUTY GALVANIZED STEEL AND SHALL BE MOUNTED ON THE SIDE OF THE UNIT IN A STAINLESS STEEL BRACKET. THE FAN MOTOR AND GEAR DAVIT SHALL SHIP LOOSE AND SHALL BE INSTALLED IN THE FIELD. THE WORKING PLATFORM AND LADDER SHALL MEET ALL APPLICABLE OSHA REQUIREMENTS.

- M. ELECTRIC HEATERS: ELECTRIC IMMERSSION HEATERS SHALL BE LOCATED IN THE BASIN OF THE TOWER. THEY SHALL BE SIZED TO MAINTAIN A +40 DEG. F. PAN WATER TEMPERATURE AT 0 DEG. F. AMBIENT WITH THE FANS OFF. THEY SHALL BE FURNISHED WITH A COMBINATION THERMOSTAT/LOW WATER PROTECTION DEVICE TO CYCLE THE HEATERS ON WHEN REQUIRED AND TO PREVENT THE HEATER ELEMENTS FROM ENERGIZING UNLESS THEY ARE COMPLETELY SUBMERGED. ALL COMPONENTS SHALL BE ENCLOSED IN RUGGED, WEATHER PROOF ENCLOSURES FOR OUTDOOR USE. HEATER CONTROL PACKAGES SHALL INCLUDE CONTACTORS, TRANSFORMERS AND DISCONNECT SWITCHES.

- N. FAN VIBRATION CUTOFF SWITCHES SHALL BE PROVIDED TO CUT OFF THE FAN MOTORS IF THE FAN SUPPORT STRUCTURE STARTS TO VIBRATE EXTENSIVELY. ALARM SIGNAL SHALL COMMUNICATE WITH THE BAS CONTROL SYSTEM.

- O. STRUCTURAL SUPPORTS AND MOUNTING SHALL BE PROVIDED AS NECESSARY TO SUPPORT AND SECURE THE TOWER IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE MANUFACTURER OF THE TOWER FOR THIS PROJECT.

- P. 5-YEAR WARRANTY: THE UNIT SHALL BE WARRANTED AGAINST FAILURE CAUSED BY DEFECTS IN MATERIALS AND WORKMANSHIP FOR FIVE (5) YEARS FROM THE DATE OF SHIPMENT. ALL COOLING TOWER AND DRIVE SYSTEM COMPONENTS SHALL BE INCLUDED.

26. WATER TREATMENT SYSTEM FOR THE COOLING TOWER:

- A. GENERAL - WHEN THE CONDENSER WATER SYSTEM IS INITIALLY PLACED IN OPERATION AND FOR ONE CALENDAR YEAR AFTER OWNER'S ACCEPTANCE OF INSTALLATION, THE CONTRACTOR SHALL FURNISH A COMPLETE WATER TREATMENT SERVICE FOR CONTROL OF CORROSION, CARBONATE SCALE, AND BACTERIAL GROWTH.

- B. PERFORMANCE OF WORK - THIS SYSTEM SHALL BE PROVIDED BY A LOCAL ESTABLISHED COMPANY MAINTAINING 24-HOUR SERVICE IN THE AREA AND SHALL INCLUDE ALL NECESSARY SERVICE VISITS TO THE SYSTEM TO DELIVER AND APPLY ALL CHEMICALS REQUIRED TO CONTINUOUSLY MAINTAIN NORMAL OPERATING CONDITIONS, APPROVED CHEMICAL CONCENTRATIONS IN THE SYSTEM. BUILDING EMPLOYEES SHALL NOT BE REQUIRED TO HANDLE, STORE, OR APPLY ANY CHEMICALS. THE CONTRACTOR SHALL FURNISH AND APPLY ALL CHEMICALS, ADJUST THE CHEMICAL FEED DEVICES AS REQUIRED TO MAINTAIN THE APPROVED TREATMENT STANDARDS, AND MAINTAIN COMPLETE RECORDS CONCERNING THE TREATMENT APPLICATIONS, CONTROL ADJUSTMENTS, AND THE PERIODIC LABORATORY ANALYSES OF THE TREATED WATER IN THE SYSTEM.

- C. CHEMICAL FEED DEVICES - THE CONTRACTOR SHALL FURNISH ALL PUMPS, LABOR, STANDARD PIPE, VALVES, FITTINGS, AND INSULATION REQUIRED TO COMPLETELY INSTALL THE CHEMICAL FEED DEVICES IN ACCORDANCE WITH APPROVED SHOP DRAWINGS. THE CHEMICAL FEED DEVICES SHALL BE FURNISHED BY THE CONTRACTOR, AND TITLE TO THESE DEVICES SHALL BE ASSUMED BY THE OWNER UPON TERMINATION OF THE ORIGINAL SERVICES CONTRACT WITH CONTRACTOR.

- D. BLEED - CONTRACTOR SHALL SET AND LOCK THE BLEED VALVE TO THE BLEED-OFF RATE RECOMMENDED BY THE COOLING TOWER MANUFACTURER.

- E. PIPING OF BLEED - THE BLEED SHALL BE PIPED TO THE NEAREST DRAIN.

- F. CONDENSER CHECK - THE CONDENSER SHALL BE CHECKED FOR SCALING AFTER THE FIRST FULL COOLING SEASON AND SHALL BE CHEMICAL FEED ADJUSTED ACCORDINGLY.

- G. CLEAN-OUT - THE TOWER AND TOWER BASIN SHALL BE CLEANED OUT, AND NO WATER FILL SHALL BE ALLOWED UNTIL TOWER IS COMPLETELY CLEAN.

27. HEAT EXCHANGER (HX-1): HEAT EXCHANGER SHALL BE MUELLER MODEL ACCUTHERM 80M HV OR EQUAL, GASKETED PLATE AND FRAME HEAT EXCHANGER. ALL CONNECTIONS SHOULD BE LOCATED ON THE FIXED HEAD, FRAME PLATE, ALLOWING THE MOVABLE HEAD, PRESSURE PLATE TO SLIDE BACK AND PLATES ADDED, REMOVED, OR REPLACED WITHOUT DISTURBING THE CONNECTIONS OR PIPING. THE DESIGN SHOULD ALLOW FOR THE REMOVAL OF ANY PLATE IN THE PLATE PACK WITHOUT REQUIRING THE REMOVAL OF ANY OTHER PLATES. THE UNIT SHALL BE PROVIDED WITH AN ALUMINUM SPLASH SHIELD COVERING THE SIDES AND TOP OF THE PLATE PACK. THE BOTTOM SHOULD BE LEFT OPEN FOR LEAK DETECTION. THE UNIT SHALL BE DESIGNED, HYDRO-TESTED, AND U-1 STAMPED IN ACCORDANCE WITH ASME SECTION VIII DIVISION 1.

- THE FRAME AND PRESSURE PLATE SHALL BE CARBON STEEL OF SUFFICIENT THICKNESS TO MEET ASME DESIGN PRESSURE. STIFFENERS OR SUPPORT BRACKETS ARE NOT ALLOWED. CONNECTIONS SHALL BE UNLINED OR ALLOY UNLINED STUDDED PORTS TO MATE WITH RAISED FACE OR FLAT-FACED ANSI FLANGES. TIGHTENING BOLTS SHALL BE ZINC PLATED CARBON STEEL AND INCLUDE CAPTIVE WORKING NUTS AT THE PRESSURE PLATE, REAR HEAD, SUCH THAT THE UNIT CAN BE OPENED AND CLOSED WITH ONE WRENCH FROM THE FRONT OF THE UNIT.

- PLATES SHALL BE PRESSED IN A ONE STEP STAMPING PROCESS AND USE AN INTEGRAL ROLLED EDGE HANGING SYSTEM TO PROVIDE A RIDG HANGER DEVICE BETWEEN THE PLATE AND CARRY BAR AND GUIDE BAR. THE PLATE PACK SHALL USE A POSITIVE PLATE TO PLATE ALIGNMENT SYSTEM TO ENSURE PROPER PLATE TO GASKET SEALS THROUGHOUT THE PLATE PACK. PLATE DESIGNS, WHICH ONLY OFFER ALIGNMENT THROUGH CONTACT WITH THE CARRY AND GUIDE BAR ARE UNACCEPTABLE. GASKETS SHALL BE A ONE-PIECE CONSTRUCTION WITH A DOUBLE GASKET BARRIER AT THE PORT REGION. THE AREA ISOLATED BY THE DOUBLE GASKET SHALL BE VENTED TO THE ATMOSPHERE, SO THAT A GASKET FAILURE IS DETECTED BY LEAKAGE TO THE EXTERIOR PRIOR TO ANY POSSIBLE CROSS CONTAMINATION.

- THE MANUFACTURER SHALL BE CERTIFIED WITH THE AIR-CONDITIONING AND REFRIGERATION INSTITUTE'S LIQUID TO LIQUID HEAT EXCHANGER CERTIFICATION PROGRAM AIR STANDARD 400 FOR THE MODEL BEING SUPPLIED. SHOULD THE HEAT EXCHANGER NOT PERFORM TO THE SPECIFIED CONDITIONS AS DEFINED IN THE AIR STANDARD 400, THE MANUFACTURER IS RESPONSIBLE TO REPLACE OR REPAIR THE EXCHANGER TO ACHIEVE THE STATED PERFORMANCE.

28. FLUSHING AND CLEANING PIPING SYSTEMS: REMOVE LOOSE DIRT, MILL SCALE, METAL CHIPS, WELD BEADS, RUST, AND LIKE DELETERIOUS SUBSTANCES WITHOUT DAMAGE TO ANY SYSTEM COMPONENT. BYPASS FACTORY CLEANED EQUIPMENT UNLESS ACCEPTABLE MEANS OF PROTECTION ARE PROVIDED AND SUBSEQUENT INSPECTION OF HIDE-OUT AREAS TAKES PLACE. ISOLATE OR PROTECT CLEAN SYSTEM COMPONENTS, INCLUDING PUMPS AND PRESSURE VESSELS, AND REMOVE ANY COMPONENT WHICH MAY BE DAMAGED. OPEN KEYS ALL VALVES, DRAINERS AND STRAINERS AT ALL SYSTEM LEVELS. REMOVE PLUGS, CAPS, SPOOL PIECES, AND COMPONENTS TO FACILITATE EARLY DEBRIS DISCHARGE FROM SYSTEM. SECTIONALIZE SYSTEM TO OBTAIN DEBRIS CARRYING VELOCITY OF 6 FEET PER SECOND, IF POSSIBLE. CONNECT DEADEND SUPPLY AND RETURN HEADS AS NECESSARY. FLUSH BOTTOMS OF RISERS. INSTALL TEMPORARY STRAINERS WHERE NECESSARY TO PROTECT DOWN-STREAM EQUIPMENT. SUPPLY AND REMOVE FLUSHING WATER AND DRAINAGE BY VARIOUS TYPE HOSE, TEMPORARY OR PERMANENT PIPING AND

- CONTRACTOR'S BOOSTER PUMPS. FLUSH UNTIL CLEAN.

29. TEMPERATURE CONTROL SYSTEM:

- A. GENERAL - CONTROLS SHALL BE PROVIDED AND INTEGRATED WITH THE EXISTING BUILDING AUTOMATION SYSTEM AS REQUIRED TO ACHIEVE THE SEQUENCE OF CONTROL. COMPONENT PARTS OF THE SYSTEM SHALL BE MANUFACTURED BY ONE CONTROL MANUFACTURER AND/OR BY THE PARTICULAR HVAC EQUIPMENT MANUFACTURER. IN EITHER CASE, THE CONTROLS CONTRACTOR SHALL BE RESPONSIBLE FOR ACHIEVING THE SEQUENCE OF CONTROL. THE SYSTEM SHALL BE INSTALLED BY COMPETENT, TRAINED MECHANICS. PROVIDE ALL EQUIPMENT AND MATERIALS AS REQUIRED TO ACCOMPLISH THE SEQUENCE OF CONTROL.

- B. MATERIALS

1. CONTROL VALVES 2" AND SMALLER SHALL BE BRONZE, SCREWED TYPE AND SHALL BE RATED AT 250 PSIG. VALVE BODIES 2-1/2" AND LARGER SHALL BE IRON, FLANGED AND RATED AT 125 PSIG. VALVES SHALL BE SIZED BY THE CONTROLS MANUFACTURER AND THE MAXIMUM ALLOWABLE PRESSURE DROP SHALL BE 5 FEET WATER COLUMN. VALVE ACTUATORS SHALL BE OF THE PNEUMATIC TYPE AND SHALL BE INTEGRATED WITH THE EXISTING BUILDING PNEUMATIC CONTROLS SYSTEM. VALVE ACTUATORS SHALL BE PROPERLY SELECTED FOR VALVE BODY AND SERVICE.
2. HYDRONIC TEMPERATURE SENSORS SHALL BE SIEMENS, CAPABLE OF COMMUNICATION WITH EXISTING BAS.

- C. SERVICE AND GUARANTEE - THE ENTIRE CONTROL SYSTEM SHALL BE SERVICED AND MAINTAINED IN FIRST-CLASS CONDITION BY THE CONTROL MANUFACTURER FOR A PERIOD OF ONE YEAR AFTER ACCEPTANCE AT NO EXTRA COST TO THE OWNER.

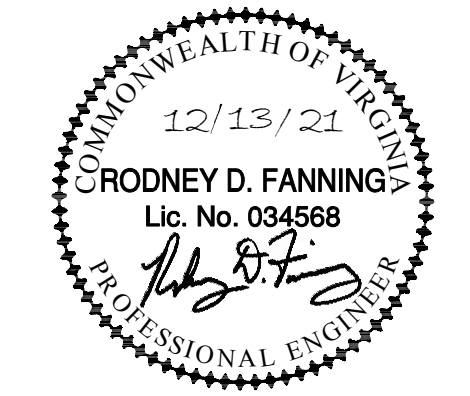
- D. SEQUENCE OF CONTROL:

1. COOLING TOWER:

SUMMER OPERATION: BAS CONTROLLER SHALL CONTROL THE COOLING TOWER TO ENERGIZE THE SUPPLY WATER PUMP AND VARY THE SPEED OF THE FAN MOTOR THRU A VFD TO MAINTAIN A MAXIMUM 90 DEG. F. HEAT PUMP LOOP SUPPLY WATER TEMPERATURE. COOLING TOWER SUMP HEATERS SHALL ENERGIZE TO MAINTAIN SUMP WATER TEMPERATURE ABOVE FREEZING. THE OPERATION OF THE COOLING TOWER PUMP SHALL BE THE FIRST STAGE OF COOLING AND ENERGIZING THE FANS SHALL BE THE SECOND STAGE OF COOLING (ONLY ONE PUMP SHALL OPERATE AT A TIME). THE EXISTING 2-WAY CONTROL VALVES SHALL ALLOW THE BAS TO BYPASS THE COOLING TOWER HEAT EXCHANGER WHEN COOLING IS NOT REQUIRED IN THE SYSTEM.

WINTER OPERATION: THE TOWER IS TO BE OFF-LINE AND DRAINED DURING THE HEATING SEASON. THE EXISTING 2-WAY CONTROL VALVES SHALL ALLOW THE BAS TO BYPASS THE COOLING TOWER HEAT EXCHANGER.

2. HEAT EXCHANGER (HX-1): THE BAS SHALL MONITOR ENTERING AND LEAVING WATER TEMPERATURE.



REVISION	DATE

DESIGNED	DRAWN
RWR	RWR
CHECKED	APPROVED
RDF	RDF

COMM. NO.	DATE
21101.51	12-13-21



ELECTRICAL SPECIFICATIONS:

1. SCOPE OF WORK: PROVIDE SUPERVISION, LABOR, MATERIAL, EQUIPMENT, MACHINERY, PLANT AND OTHER ITEMS NECESSARY FOR A COMPLETE AND OPERABLE ELECTRICAL SYSTEM.
- WHERE VARIANCES OCCUR BETWEEN DRAWINGS AND SPECIFICATIONS OR WITHIN EITHER DOCUMENT ITSELF, INCLUDE IN THE CONTRACT PRICE THE ITEM OR ARRANGEMENT OF BETTER QUALITY, GREATER QUANTITY, OR HIGHER COST.
2. STANDARDS AND CODES: THE MATERIALS AND EQUIPMENT SHALL BE NEW AND LISTED BY UNDERWRITERS LABORATORIES, INC. THE INSTALLATION SHALL BE IN ACCORDANCE WITH THE 2018 VIRGINIA UNIFORM STATEWIDE BUILDING CODE (USBC); THE 2018 INTERNATIONAL BUILDING CODE (IBC) AS ADOPTED AND MODIFIED BY THE 2018 VIRGINIA CONSTRUCTION CODE (VCC); THE 2017 NFPA 70 NATIONAL ELECTRICAL CODE, OR NEC; THE 2016 NFPA 72 (NATIONAL FIRE ALARM AND SIGNALING CODE); AND OTHER RELATED CODES AND STANDARDS. THE COMPLETED INSTALLATION SHALL COMPLY WITH THE ADAAG "AMERICAN WITH DISABILITIES ACT GUIDELINES FOR BUILDINGS AND FACILITIES". WORKMANSHIP SHALL MEET THE "STANDARDS OF INSTALLATION" AS PUBLISHED BY THE NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION (NECA).
3. PERMITS AND FEES: OBTAIN PERMITS, BONDS, LICENSES AND INSPECTION CERTIFICATES. PAY INSPECTION FEES AND TAXES. FILE PLANS AND PREPARE DOCUMENTS REQUIRED TO OBTAIN APPROVALS OF GOVERNMENTAL DEPARTMENT'S HAVING JURISDICTION.
4. CONDUIT: PROVIDE RIGID GALVANIZED STEEL CONDUIT (RGS) OR INTERMEDIATE METAL CONDUIT (IMC) WHERE EXTERIOR ABOVE-GRADE. WHERE NOT EXTERIOR, PROVIDE ELECTRICAL METALLIC TUBING (EMT) FOR EMPTY CONDUITS RUNS AND STUB-UPS, BRANCH CIRCUITS AND PANEL FEEDERS; ALL CONDUIT STUBS SHALL HAVE CUSHIONS. PROVIDE GALVANIZED SINGLE STRIP FLEXIBLE CONDUIT, MINIMUM 18" LONG, FOR MOTOR CONNECTIONS. USE PVC JACKETED FLEXIBLE LIQUID-TIGHT CONDUIT TYPE UA FOR MOTOR CONNECTIONS IN WET LOCATIONS. CONDUIT SHALL BE MINIMUM 3/4", SUPPORT CONDUIT AS REQUIRED BY THE NEC. FOR ROOF DECKING APPLICATIONS, FOLLOW REQUIREMENTS OF NEC 300.4(E). EXPANSION/DEFLECTION FITTINGS SHALL BE PROVIDED WHERE REQUIRED PER NEC 300.4(H). FOR UNDERGROUND CONDUIT, PROVIDE SEALS WHERE REQUIRED PER NEC 225.27 AND 300.5(G). FITTINGS SHALL NOT BE CAST POT METAL.
- ALL CONDUITS PASSING THROUGH RATED WALLS OR CEILINGS SHALL BE SLEEVED AND PACKED WITH U.L. LISTED SEALANT TO MAINTAIN RATING.
- TYPE AC, MC AND NMC CABLE ARE NOT ALLOWED.
5. JUNCTION, OUTLET AND PULL BOXES: PROVIDE JUNCTION, OUTLET AND PULL BOXES FOR WIRING DEVICES, FIXTURES, CONNECTIONS TO EQUIPMENT AND AS REQUIRED BY THE NEC. BOXES SHALL BE STEEL UNLESS REQUIRED OTHERWISE BY ENVIRONMENT.
6. HANGERS AND SUPPORTS: PROVIDE ALL HANGERS, SUPPORTS, ANCHORS, SLEEVES AND SEALS AS REQUIRED BY THE NEC.
7. WIRING: PROVIDE COPPER CONDUCTORS, XHHW OR XHHW-2 OR THHN OR THWN-2, 600 VOLT, 90 DEGREE C RATED. WIRING SHALL BE COLOR-CODED TO IDENTIFY PHASES, NEUTRAL AND GROUND, MATCH EXISTING BUILDING WIRING COLOR-CODING. NUMBER 12 AWG SHALL BE THE SMALLEST SIZE WIRE USED FOR POWER AND LIGHTING. FOR 120-VOLT 15 AMP AND 20 AMP BRANCH CIRCUITS, USE MINIMUM 12 AWG UP TO 60 FEET, 10 AWG FOR 61-95 FEET, 8 AWG FOR 96-155 FEET AND 6 AWG FOR BRANCH CIRCUITS LONGER THAN 155 FEET; CONDUCTORS SHALL BE SAME SIZE FOR ENTIRE LENGTH OF RUN, EXCEPT IF ALL OUTLETS ARE IN THE SAME ROOM (1200 SQUARE FEET OR LESS) THE OVERSIZED CONDUCTORS MAY BE RUN ONLY TO THE FIRST OUTLET. FOR 277-VOLT 15 AMP AND 20 AMP BRANCH CIRCUITS, USE MINIMUM 12 AWG UP TO 140 FEET, 10 AWG FOR 141-220 FEET AND 8 AWG FOR BRANCH CIRCUITS LONGER THAN 220 FEET; CONDUCTORS SHALL BE SAME SIZE FOR ENTIRE LENGTH OF RUN. CONDUCTORS 8 AWG AND LARGER SHALL BE STRANDED, CONDUCTORS 10 AWG AND SMALLER SHALL BE SOLID. WIRING SHALL BE RUN CONCEALED, EXCEPT WHERE INDICATED OTHERWISE ON THE DRAWINGS. DO NOT INSTALL A SHARED NEUTRAL ON ANY CIRCUIT. ALL TERMINATIONS SHALL BE 75 DEGREES C.
8. GROUNDING AND BONDING: PROVIDE AN EQUIPMENT GROUNDING SYSTEM INSTALLED TO METALLIC STRUCTURES, ENCLOSURES, RACEWAYS, JUNCTION BOXES, OUTLET BOXES, PULL BOXES, CABINETS, MACHINE FRAMES, PORTABLE EQUIPMENT AND OTHER CONDUCTIVE ITEMS IN CLOSE PROXIMITY TO ELECTRICAL CIRCUITS. ALL BRANCH AND FEEDER CIRCUITS SHALL INCLUDE A GREEN GROUNDING CONDUCTOR. PROVIDE GROUND BUS IN ALL NEW PANELBOARDS. PARTICULAR ATTENTION IS CALLED TO BONDING REQUIREMENTS IN NEC 250.97, 250.98 AND 250.104.
9. IDENTIFICATION: IDENTIFY CABLES/CONDUCTORS, INCLUDING VOLTAGE, PHASE AND FEEDER OR CIRCUIT NUMBER, ON EACH CABLE/CONDUCTOR IN EACH BOX/ENCLOSURE/CABINET WHERE WIRES OF MORE THAN ONE CIRCUIT OR COMMUNICATION/SIGNAL SYSTEM ARE PRESENT. WHEREVER REASONABLY REQUIRED FOR SAFETY, MAINTENANCE AND/OR OPERATIONAL PURPOSES, PROVIDE SELF-ADHESIVE PLASTIC SIGNS FOR IDENTIFICATION, INSTRUCTION OR WARNING ON SWITCHES AND OUTLETS, AS WELL AS OTHER CONTROLS, DEVICES AND ENCLOSURE COVERS. PROVIDE A DANGER SIGN WHEREVER IT IS POSSIBLE FOR PERSONS TO COME INTO CONTACT WITH A VOLTAGE HIGHER THAN 120 VOLTS, AS WELL AS ON CRITICAL SWITCHES AND CONTROLS WHERE UNTIMELY OPERATION COULD BE A SAFETY HAZARD. PROVIDE AN ENGRAVED PLASTIC-LAMINATE LABEL ON EACH MAJOR UNIT OF ELECTRICAL EQUIPMENT, INCLUDING BUT NOT LIMITED TO: PANELBOARDS, CONTROL PANELS, CABINETS, ENCLOSURES, CONTACTORS, VFD'S, STARTERS, DISCONNECT SWITCHES AND ENCLOSED CIRCUIT BREAKERS. EQUIPMENT LABELS SHALL INCLUDE WHAT IS REQUIRED IN NEC 408.4(B). ENCLOSURE TYPES SHALL BE MARKED PER NEC 110.28. WIRING COLOR-CODE KEY SHALL BE READILY AVAILABLE OR PERMANENTLY POSTED PER NEC 200.6(D) AND 210.5.
10. CONNECTIONS TO EQUIPMENT: MAKE FINAL ELECTRICAL POWER CONNECTIONS TO MECHANICAL EQUIPMENT. PROVIDE CONDUITS, OUTLET BOXES AND POWER WIRING FROM THE POWER SOURCE TO THE MOTOR OR EQUIPMENT JUNCTION BOX, INCLUDING WIRING THROUGH STARTERS OR SAFETY SWITCHES, IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.
11. FUSES (SHOP DRAWINGS REQUIRED): FUSES SHALL BE CLASS RK1 DUAL ELEMENT TIME DELAY, WITH APPROPRIATE VOLTAGE. FURNISH 3 SPARE OF EACH TYPE. MANUFACTURER SHALL BE COOPER BUSSMANN, MERSEN OR LITTELFUSE.
12. SAFETY SWITCHES (SHOP DRAWINGS REQUIRED): PROVIDE SURFACE-MOUNTED, HEAVY-DUTY, HORSEPOWER-RATED, FUSIBLE OR NON-FUSIBLE AS INDICATED. SAFETY SWITCHES WITH LUGS SUITABLE FOR COPPER OR ALUMINUM CONDUCTORS AND ELECTRO-SILVER PLATED CURRENT CARRYING PARTS, AND WITH EQUIPMENT GROUND BUS WITH APPROPRIATE LUGS. FUSIBLE SWITCHES SHALL BE PROVIDED WITH SPRING-REINFORCED FUSE CLIPS TO REJECT ALL FUSES EXCEPT CLASS R CURRENT LIMITING TYPE; FUSE EACH PHASE. SWITCHES SHALL HAVE HINGED DOOR WITH DEFEATABLE INTERLOCK TO PREVENT DOOR FROM BEING OPENED IN "ON" POSITION, OPERATING LEVER ARRANGED FOR PADLOCKING IN THE "OFF" POSITION; ARC QUENCHERS, CAPACITY AND CHARACTERISTICS AS REQUIRED; NON-TEASABLE QUICK-MAKE AND QUICK-BREAK MECHANISM, DEAD FRONT; LINE SIDE SWITCH. PROVIDE A SET OF AUXILIARY CONTACTS FOR DISCONNECTS SERVING VFD'S, TO SEND A "DISABLE" SIGNAL TO THE VFD WHEN THE DISCONNECT IS OPENED.
- MANUFACTURER SHALL BE SQUARE D, GENERAL ELECTRIC, EATON OR SIEMENS.
13. MAGNETIC MOTOR STARTERS (SHOP DRAWINGS REQUIRED): PROVIDE FULL VOLTAGE SINGLE-SPEED ACROSS-THE-LINE TYPE, UNLESS OTHERWISE INDICATED. PROVIDE COMBINATION STARTERS WHERE INDICATED, WHICH HAVE INTEGRAL, NON-FUSIBLE DISCONNECT SWITCHES (GENERAL DUTY OR HEAVY DUTY AS APPLICABLE), INTEGRAL FUSIBLE DISCONNECT SWITCHES (GENERAL DUTY OR HEAVY DUTY AS APPLICABLE) WITH REJECTION TYPE CLASS R FUSE CLIPS, OR INTEGRAL CIRCUIT BREAKERS AS INDICATED, WITH HINGED DOOR WITH DEFEATABLE INTERLOCK TO PREVENT DOOR FROM BEING OPENED IN ON POSITION, AND WITH HANDLES CAPABLE OF BEING PADLOCKED OFF. PROVIDE INDIVIDUAL 120 VOLT SECONDARY CONTROL TRANSFORMERS OF SUFFICIENT CAPACITY TO OPERATE CONNECTED PILOTS, INDICATING AND CONTROL DEVICES, PLUS 100 PERCENT SPARE CAPACITY, LOCATED WITHIN THE STARTER CASE. PRIMARY VOLTAGE OF CONTROL TRANSFORMER SHALL MATCH THE MOTOR POWER CIRCUIT VOLTAGE AND SHALL BE CONNECTED ON THE SAME CIRCUIT AS THE MOTOR WITH FUSE PROTECTION FOR THE TRANSFORMER. PROVIDE OVERLOAD RELAY WITH COMMON TRIP AND RESET DEVICE. PROVIDE MELTING ALLOY THERMAL OVERLOAD DEVICES IN EACH UNGROUNDED LINE. PROVIDE PHASE LOSS AND PHASE REVERSAL PROTECTION WITH CONTACTS TO DE-ENERGIZE THE STARTER UPON THE LOSS OF ANY PHASE OR REVERSAL OF ANY PHASES. MAKE PROVISIONS FOR FIELD INSTALLATION OF UP TO 3 NO AND 1 NC CONTACTS IN ADDITION TO THE HOLDING INTERLOCK. PROVIDE AUXILIARY CONTACTS, RELAYS, PILOT LIGHTS, SWITCHES AND OTHER CONTROL DEVICES, ETC. AS REQUIRED BY THE SEQUENCE OF CONTROL. COORDINATE COIL VOLTAGE WITH SEQUENCE OF CONTROL. PROVIDE HOA SWITCH AND PILOT LIGHTS. PROVIDE EQUIPMENT GROUND BUS WITH APPROPRIATE LUGS.
- MANUFACTURER SHALL BE SQUARE D, GENERAL ELECTRIC, EATON OR SIEMENS.
14. PANELBOARDS (SHOP DRAWINGS REQUIRED): PANELBOARDS SHALL BE DEAD-FRONT, COPPER BUS, WITH THERMAL MAGNETIC MOLDED CASE CIRCUIT BREAKERS IN ACCORDANCE WITH SCHEDULES SHOWN ON THE DRAWINGS. BREAKERS FOR APPLIANCE PANELBOARDS SHALL BE BOLT-ON. BREAKERS FOR DISTRIBUTION PANELBOARDS SHALL BE GROUP MOUNTED PLUG-ON WITH MECHANICAL RESTRAINT ON A COMMON PAN OR RAIL ASSEMBLY, AND WITH LINE-SIDE JAW TYPE CONNECTIONS. SERIES RATING IS NOT ACCEPTABLE. WHERE NON-INSTANTANEOUS TRIP BREAKERS ARE USED, FOLLOW NEC 240.87. PANELBOARDS SHALL HAVE TYPED, FRAMED CIRCUIT DIRECTORIES. THE CIRCUIT DIRECTORIES SHALL INDICATE THE LOAD TYPE AND THE OWNERS' ROOM NAMES/NUMBERS (NOT THE CONSTRUCTION DOCUMENT ROOM NAMES/NUMBERS). DOORS SHALL HAVE LOCKS AND BE KEYPED ALIKE. EMPTY SPACES SHALL BE FULLY BUSSED WITH HARDWARE FOR FUTURE BREAKERS.
- MANUFACTURER SHALL BE SQUARE D, GENERAL ELECTRIC, EATON OR SIEMENS.
15. SURGE PROTECTIVE DEVICES (SPD) (SHOP DRAWINGS REQUIRED):
- A. SPD EQUIPMENT (INCLUDING TRANSIENT VOLTAGE SURGE SUPPRESSORS [TVSS]) SHALL BE LISTED AND LABELED PER ANSI/UL 1449 3RD EDITION, AND SHALL BE TESTED AND DEMONSTRATE SUITABILITY FOR APPLICATION WITHIN ANSI/IEEE C82.41 CATEGORY C, B AND A ENVIRONMENTS.

- B. SPD SHALL BE MANUFACTURED BY THE SAME MANUFACTURER AS THE PANELBOARDS.
- C. THE SPD MANUFACTURER SHALL PROVIDE UNLIMITED FREE REPLACEMENT OF THE ENTIRE SPD FOR ALL INOPERABLE SPD UNITS DURING THE WARRANTY PERIOD.
- D. SPD SHALL BE GUARANTEED BY THE INSTALLING CONTRACTOR AND SURGE SUPPRESSION MANUFACTURER TO BE FREE OF DEFECTS IN MATERIALS AND WORKMANSHIP FOR A PERIOD OF NOT LESS THAN 5 YEARS FROM THE DATE OF SUBSTANTIAL COMPLETION OF THE SYSTEM FOR WHICH THE SUPPRESSOR IS INSTALLED. THE WARRANTY SHALL PROVIDE FOR A COMPLETE REPLACEMENT OF SPD IN ORDER TO EXPEDITE SERVICE.
- E. SPD UNIT SHALL INCORPORATE THERMALLY PROTECTED METAL-OXIDE VARISTORS (MOV) AS THE CORE SURGE SUPPRESSION COMPONENT FOR THE SERVICE ENTRANCE AND ALL OTHER DISTRIBUTION LEVELS. THE SYSTEM SHALL NOT UTILIZE SILICON AVALANCHE DIODES, SELENIUM CELLS, AIR GAPS, OR OTHER COMPONENTS THAT MAY CROWBAR THE SYSTEM VOLTAGE LEADING TO SYSTEM UPSET OR CREATE ANY ENVIRONMENTAL HAZARDS.
- F. SPD UNIT MUST PROTECT ALL MODES (L-N, L-G, L-L, N-G) OF THE ELECTRICAL SYSTEM BEING UTILIZED.
- G. SPD UNIT SHALL HAVE A 20KA NOMINAL DISCHARGE CURRENT.
- H. SPD UNIT SHALL BE INSTALLED INTEGRALLY IN THE PANELBOARDS INDICATED ON THE DRAWINGS. THE COMPLETE PANELBOARD, INCLUDING THE SPD, SHALL BE UL LISTED.
- I. WHERE SPD'S ARE INDICATED ON THE DRAWINGS AS BEING INTEGRAL TO A PIECE OF ELECTRICAL GEAR, IT SHALL BE THE CONTRACTOR'S OPTION TO PROVIDE AN EXTERNAL SPD INSTEAD, LOCATED AS CLOSELY AS POSSIBLE TO THE GEAR BEING PROTECTED AND IN A NEMA ENCLOSURE APPROPRIATE FOR THE INSTALLATION ENVIRONMENT. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE TO ENSURE THAT THERE IS SUFFICIENT WALL SPACE FOR THE EXTERNAL SPD, AS THE EXTERNAL SPD IS HIS OPTION - CHANGE ORDERS WILL NOT BE APPROVED DUE TO THE CONTRACTOR NOT COORDINATING THIS.
- J. SPD UNITS (EXCEPT THOSE IN SWITCHBOARDS) SHALL BE SERVED WITH A DEDICATED 3-POLE 60-AMP CIRCUIT BREAKER IN THE GEAR BEING SERVED AND (5) #6 AWG MINIMUM STRANDED LOW IMPEDANCE CONNECTION CABLE TO THE BREAKER, UNLESS THE MANUFACTURER RECOMMENDS DIFFERENTLY. THE CONDUCTORS SERVING SPD UNITS SHALL BE TWISTED TOGETHER TO REDUCE THE SPD SYSTEM INPUT IMPEDANCE, AND SHALL BE KEPT AT THE MINIMUM LENGTH. SPD UNITS SHALL BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDED PRACTICES AND IN COMPLIANCE WITH NEC REQUIREMENTS. MEASURED IMPEDANCE SHALL NOT BE HIGHER THAN 5 OHMS ON THE GROUND FOR THE SERVICE ENTRANCE SPD DEVICE. WHERE EXTERNAL, CLOSE NIPPLE THE SPD TO THE RESPECTIVE GEAR BEING PROTECTED.
- K. SPD UNIT SHALL MEET ANSI/UL VOLTAGE PROTECTION RATING (VPR) OF (MAXIMUM): 900V (L-N, L-G, N-G) AND 1200V (L-L) FOR 120/208V; 1200V (L-G AND N-G), 1500V (L-N) AND 2000V (L-L) FOR 277/480V. MAXIMUM SURGE CURRENT RATINGS SHALL BE 300KA PER PHASE/150KA PER MODE FOR SERVICE ENTRANCE, 160KA PER PHASE/80KA PER MODE FOR DISTRIBUTION PANELS, AND 120KA PER PHASE/60KA PER MODE FOR BRANCH PANELS. MAXIMUM CONTINUOUS OPERATING VOLTAGE (MCOV) SHALL BE 125% MINIMUM OF NOMINAL VOLTAGE FOR 120/208V, AND 115% MINIMUM OF NOMINAL VOLTAGE FOR 277/480V; MCOV SHALL BE A TESTED VALUE.
- L. SPD UNIT SHALL HAVE POSITIVE STATUS MONITORS FOR EACH PHASE.

16. LIGHTING (SHOP DRAWINGS REQUIRED): PROVIDE FIXTURES AS INDICATED ON THE DRAWINGS. MANUFACTURERS SHALL BE AS INDICATED ON THE DRAWINGS OR EQUAL. FIXTURES SHALL BE COMPLETE WITH REQUIRED SOCKETS, WIRING, GLASSWARE, REFLECTORS, HANGERS, FITTINGS AND MOUNTING TRIM. FIXTURES SHALL BE CLEANED AND COMPLETELY LAMPED. PROVIDE PROPER TRIM, FRAMES, MOUNTING DEVICES, CONFIGURATION AND ACCESSORIES REQUIRED TO PROPERLY INSTALL FIXTURES IN THE BUILDING CONSTRUCTION.

CATALOG NUMBERS OF FIXTURES SCHEDULED ARE TO ESTABLISH A TYPE OF FIXTURE, NOT TO DETERMINE A METHOD OF MOUNTING. VERIFY CEILING CONSTRUCTION BEFORE ORDERING FIXTURES, AND PROVIDE MOUNTING TRIM SUITABLE FOR THE CEILING FINISH IN WHICH FIXTURE IS INSTALLED. LENS TYPE RECESSED 1X4, 2X2 AND 2X4 FIXTURES SHALL HAVE A MINIMUM 0.125" THICK ACRYLIC LENS WITH 7.8 OZ./SQ. FT. MINIMUM WEIGHT.

ADDITIONAL REQUIREMENTS FOR LED LUMINAIRES:

- A. COLOR TEMPERATURE SHALL BE 4000K WITH MINIMUM CRI OF 80, UNLESS INDICATED OTHERWISE.
- B. LED'S SHALL BE BINNED WITHIN A MAXIMUM THREE-STEP MACADAM ELLIPSE TO ENSURE COLOR CONSISTENCY AMONGST LUMINAIRES OF THE SAME TYPE.
- C. MERCURY-FREE, LEAD-FREE, ROHS COMPLIANT.
- D. COMPLIANT WITH FCC 47 CFR PART 15 NON-CONSUMER RF/EMI STANDARDS.
- E. LIGHT OUTPUT SHALL BE MEASURED USING THE ABSOLUTE PHOTOMETRY METHOD FOLLOWING IES LM-79 AND LM-80 REQUIREMENTS AND GUIDELINES.
- F. LUMINAIRES SHALL MAINTAIN AT LEAST 70% LUMEN OUTPUT (L70) FOR A MINIMUM OF 50,000 HOURS.
- G. LUMEN OUTPUT SHALL NOT DEPRECIATE MORE THAN 20% AFTER 20,000 HOURS OF USE.
- H. THERMALLY DESIGNED TO NOT EXCEED THE MAXIMUM JUNCTION TEMPERATURE OF THE LED FOR THE AMBIENT TEMPERATURE OF THE LOCATION IN WHICH THE LUMINAIRE IS TO BE INSTALLED. RATED CASE TEMPERATURE SHALL BE SUITABLE FOR OPERATION IN THE AMBIENT TEMPERATURES TYPICALLY FOUND IN THE INTENDED INSTALLATION. EXTERIOR LUMINAIRES SHALL BE CAPABLE OF OPERATING IN AMBIENT TEMPERATURES OF: -20 DEG. F TO 122 DEG. F (-29 DEG. C TO 50 DEG. C).
- I. LUMINAIRES SHALL OPERATE NORMALLY FOR INPUT VOLTAGE FLUCTUATIONS OF PLUS OR MINUS 10%.
- J. MAXIMUM TOTAL HARMONIC DISTORTION (THD) OF 15% AT FULL INPUT POWER AND ACROSS SPECIFIED VOLTAGE RANGE.
- K. ALL CONNECTIONS TO LUMINAIRES SHALL BE REVERSE-POLARITY PROTECTED AND PROVIDE HIGH VOLTAGE PROTECTION IN THE EVENT THAT CONNECTIONS ARE REVERSED OR SHORTED DURING INSTALLATION.
- L. THE FAILURE OF ONE INDIVIDUAL LED SHALL NOT AFFECT THE OPERATION OF THE REMAINING LED'S IN THE LUMINAIRE.

ALL DRIVERS SHALL COMPLY WITH NEMA 410 FOR INRUSH CURRENT.

REQUIREMENTS FOR LED DRIVERS:

- A. UNLESS SPECIFICALLY INDICATED OTHERWISE, SHALL BE OF THE 0-10V DIMMING TYPE DOWN TO 10% LIGHT LEVEL. THE PERFORMANCE CURRENT FOR THE 0-10V CONTROL AND THE 0-10V DRIVERS SHALL NOT BOTH BE LOGARITHMIC. DIMMING SHALL OCCUR DOWN TO THE MINIMUM LEVEL WITH NO VISIBLE FLICKER OR "POPCORN EFFECT". "POPCORN EFFECT" IS WHEN THE LUMINAIRE IS ON A PRESET DIMMED LEVEL, AND THE LED'S GO TO 100% PRIOR TO RETURNING TO THE PRESET LEVEL WHEN POWER IS RETURNED TO THE FIXTURE.
- B. SHALL HAVE RATED LIFE OF MINIMUM 50,000 HOURS.
- C. SHALL HAVE MINIMUM POWER FACTOR OF 0.9 AND MAXIMUM CREST FACTOR OF 1.5 AT FULL INPUT POWER AND ACROSS SPECIFIED VOLTAGE RANGE.
- D. SHALL OPERATE NORMALLY FOR INPUT VOLTAGE FLUCTUATIONS OF PLUS OR MINUS 10%.
- E. SHALL HAVE MAXIMUM TOTAL HARMONIC DISTORTION (THD) OF 15% AT FULL INPUT POWER AND ACROSS SPECIFIED VOLTAGE RANGE.
- F. SHALL HAVE POLARIZED QUICK-DISCONNECTS FOR WIRING CONNECTIONS FOR FIELD MAINTENANCE.
- G. SHALL HAVE BUILT-IN FUSE PROTECTION WITH ALL POWER SUPPLY OUTPUTS EITHER FUSE PROTECTED OR POLYMERIC POSITIVE TEMPERATURE COEFFICIENT (PTC)-PROTECTED PER CLASS 2 UL LISTING.
- H. SHALL DEMONSTRATE NO VISIBLE CHANGE IN LIGHT OUTPUT WITH A VARIATION OF PLUS OR MINUS 10% CHANGE IN LINE-VOLTAGE INPUT.
- I. ALL DIMMABLE LED DRIVERS OF THE SAME MANUFACTURER FAMILY/SERIES SHALL TRACK EVENLY ACROSS MULTIPLE LIGHT FIXTURES AT ALL LIGHT LEVELS.

17. EMERGENCY LAMP POWER SUPPLY (SHOP DRAWINGS REQUIRED): EMERGENCY LIGHTING SHALL BE PROVIDED BY USING A STANDARD LUMINAIRE EQUIPPED WITH A UL LISTED, SELF-CONTAINED, MODULAR, BATTERY INVERTER UNIT COMPLYING WITH UL 924. THE UNIT SHALL BE MOUNTED WITHIN THE LIGHTING FIXTURE BODY OR LISTED FOR INSTALLATION ON TOP OF OR REMOTE FROM THE FIXTURE. THE BATTERY INVERTER UNIT SHALL CONSIST OF A HIGH-TEMPERATURE, MAINTENANCE-FREE, NICKEL CADMIUM BATTERY, CHARGER AND ELECTRONIC CIRCUITRY. THE AC DRIVER OPERATION SHALL BE DELAYED FOR APPROXIMATELY 3 SECONDS BY THE CIRCUITRY TO PREVENT FALSE TRIPPING OF AN OVERCURRENT DEVICE. A SOLID-STATE CHARGING LED INDICATOR LIGHT TO MONITOR THE CHARGER AND BATTERY AND A SINGLE-POLE TEST SWITCH SHALL BE PROVIDED AND MOUNTED SUCH THAT THE LIGHT AND SWITCH ARE VISIBLE AND ACCESSIBLE WITHIN THE FIXTURE WITHOUT ENTERING THE CEILING SPACE. WHERE UNITS ARE MOUNTED OUTSIDE THE BUILDING ENVELOPE, PROVIDE COLD-WEATHER RATED UNITS. UNITS SHALL BE BY PHILIPS BODINE, LITHONIA, IOTA OR APPROVED EQUAL.

EMERGENCY LED DRIVERS SHALL HAVE LUMEN OR WATTAGE OUTPUTS AS INDICATED IN THE LIGHTING FIXTURE SCHEDULE.

18. WIRING DEVICES (SHOP DRAWINGS REQUIRED): WIRING DEVICES SHALL BE BLACK AND SHALL BE COMMERCIAL SPECIFICATION GRADE. BACK WIRING IS NOT ALLOWED. RECEPTACLES SHALL BE NEMA 5-20R, GROUNDED. GFCI TYPE DUPLEX RECEPTACLES SHALL BE RATED 5 MILLIAMPS, AND SHALL BE READILY ACCESSIBLE WHERE REQUIRED BY NEC 210.8. EXTERIOR RECEPTACLES SHALL BE PROVIDED WITH WEATHERPROOF IN-USE COVERS. WEATHERPROOF COVERS SHALL HINGE FROM TOP. SHALL BE LISTED AS WEATHERPROOF WHEN IN USE AND SHALL BE "EXTRA DUTY" (WHERE REQUIRED BY NEC 408.9(B)(1)), AND RECEPTACLES IN THESE COVERS SHALL BE LISTED AS WEATHER-RESISTANT TYPE.

WIRING DEVICE MANUFACTURER SHALL BE BRYANT, EATON ARROWHART, HUBBELL, LEVITON OR PASS & SEYMOUR.

ELECTRICAL ABBREVIATIONS

A OR AMP	AMPERE	INC	INCANDESCENT
ABD	ABANDONED	INIT	INITIAL
ABV	ABOVE	JB	JUNCTION BOX
AC	ALTERNATING CURRENT	KCMIL	THOUSAND CIRCULAR MILS
ACB	ABOVE COUNTER BACKSPLASH	KO	KNOCKOUT
AF OR AFI	ARC FAULT INTERRUPTER	KV	KILOVOLT
AFD	ADJUSTABLE FREQUENCY DRIVE	KVA	KILOVOLT-AMPERE
AFF	ABOVE FINISHED FLOOR	KVAR	KILOVOLT-AMPERE REACTIVE
AIC	AMPERES INTERRUPTING CAPACITY	KW	KILOWATT
AIP	ABANDONED IN PLACE	KWH	KILOWATT-HOUR
AL	ALUMINUM	LA	LIGHTNING ARRESTER
AM	AMMETER	LED	LIGHT EMITTING DIODE
AMPL	AMPLIFIER	LPS	LOW PRESSURE SODIUM
ASYM	ASYMMETRICAL	LRP	LIGHTING RELAY PANEL
ATS	AUTOMATIC TRANSFER SWITCH	LTG	LIGHTING
AWG	AMERICAN WIRE GAGE	LUM	LUMENS OR LUMINAIRE
BAS	BUILDING AUTOMATION SYSTEM	MAG	MAGNETIC
BEL	BELOW	MAN	MANUAL
BD	BUS DUCT	MATV	MASTER ANTENNA TELEVISION
BOT	BOTTOM	MCA	MINIMUM CIRCUIT AMPACITY
BRKR	BREAKER	MCB	MAIN CIRCUIT BREAKER
C	COUNTERTOP	MCC	MOTOR CONTROL CENTER
CA	CABLE	MCM	THOUSAND CIRCULAR MILS
CAB	CABINET	MDF	MAIN DISTRIBUTION FRAME
CATV	CABLE TV	MIG	MOTOR/GENERATOR
CB	CIRCUIT BREAKER	MH	METAL HALIDE OR MOUNTING HEIGHT
CCTV	CLOSED CIRCUIT TELEVISION	MIN	MINIMUM
CF	COMPACT FLUORESCENT	MLO	MAIN LUGS ONLY
CKT	CIRCUIT	MMS	MANUAL MOTOR STARTER
CLG	CEILING	MNS	MASS NOTIFICATION SYSTEM
CND	CONDUIT	MOPP	MAXIMUM OVER CURRENT PROTECTION
CNTR	CENTER	MOD	MOTOR OPERATED DAMPER
COMB	COMBINATION	MOT	MOTOR
COND	CONDUCTOR	MS	MAGNETIC STARTER
CONN	CONNECTION	MTG	MOUNTED OR MOUNTING
CONT	CONTACTOR	MTR	METER
CR	CORROSION RESISTANT	MV	MERCURY VAPOR
CT	CURRENT TRANSFORMER	N OR NORM	NORMAL
CTRL	CONTROL	NEC	NATIONAL ELECTRICAL CODE
CW	COPPER	NEUT	NEUTRAL
CU	COLD WATER	NFSS	NON-FUSIBLE SAFETY SWITCH
DB	DOOR BELL	N	NIGHT LIGHT
DC	DIRECT CURRENT	NO	NUMBER
DIM	DIMENSION	OH	OVERHEAD
DISC	DISCONNECT	P	POLE
DR	DOOR RELEASE SERVICE	PB	PULL BOX OR PUSHBUTTON
DS	DOOR SWITCH	PBS	PUSHBUTTON STATION
DWG	DRAWING	PH	PANEL
E OR EMER	EMERGENCY	PNLBRD	PANELBOARD
EI	EMPTY CONDUIT	PT	POTENTIAL TRANSFORMER
ECNC	EXIST CND AND NEW COND'S	PVC	POLYVINYL CHLORIDE
EGC	EQUIPMENT GROUNDING CONDUCTOR	PWR	POWER
EL	EXIST RELOCATED TO THIS LOCATION	QTY	QUANTITY
ELEC	ELECTRIC OR ELECTRICAL	RB	RELAY BASE
ELEV	ELEVATOR	REC	RECEPTACLE
EM	EXIST REMOVED	REFRIG	REFRIGERATOR
EML	EXIST REMOVED AND RELOCATED	RGS	RIGID GALVANIZED STEEL CONDUIT
EMN	EXIST REMOVED AND NEW INSTALLED	SIO	SPACE ONLY
EMT	ELECTRICAL METALLIC TUBING	SB	SOUNDER BASE
ENCL	ENCLOSURE	SCCR	SHORT CIRCUIT CURRENT RATING
ENG	ENGINE	SEC	SECONDARY
EP	EXPLOSIONPROOF	SL	SINGLE STATION
EQUIP	EQUIPMENT	SMR	MOTOR OPERATED SMOKE DAMPER
ER	LIGHT TO REMAIN	SN	SOLID NEUTRAL
ERC	ELEVATOR RECALL	SP	SPECIAL PURPOSE
EW	ELECTRIC WATER COOLER	SPKR	SURGE PROTECTIVE DEVICE
EXIST	EXISTING	SR	SURFACE RACEWAY
EXT	EXTERIOR	SS	SURGE SUPPRESSOR
FA	FIRE ALARM	STR	STARTER
FACP	FIRE ALARM CONTROL PANEL	SW	SWITCH
FACU	FIRE ALARM CONTROL UNIT	SWBD	SWITCHBOARD
FDR	FEEDER	SWGR	SYMMETRICAL
FC	FOOTCANDLE	SYM	TAMPER RESISTANT
FLUOR	FLUORESCENT	T	TIME CLOCK
FSD	FIRE/SMOKE DAMPER	TEL	TELEPHONE
FSS	FUSIBLE SAFETY SWITCH	TEV	TELEVISION
FXTR	FIXTURE	TY	TYPICAL
GD	RECEPTACLE GUARD	U	USB CHARGER
GEC	GARAGE DOOR	UC	UNDERCOUNTER
GEN	GENERATOR	UF	UNDERFLOOR
GFP	GROUND FAULT CIRCUIT INTERRUPTER	UG	UNDERGROUND
GFF	GROUND FAULT PROTECTION/PROTECTED	UN	UNDERWRITERS' LABORATORIES
GND	GROUND	UNO	UNLESS NOTED OTHERWISE
GTD	GENERATOR TRANSFER DEVICE	V	VOLT
H OR HOR	HORIZONTAL	VA	VOLT-AMPERE
HG	HOSPITAL GRADE	VAR	VOLT-AMPERE REACTIVE
HGT	HEIGHT	VERT	VERTICAL
HID	HIGH INTENSITY DISCHARGE	VFD	VARIABLE FREQUENCY DRIVE
HOA	HAND-OFF-AUTOMATIC	VM	VOLTMETER
HP	HORSEPOWER OR HEAT PUMP	W	WATT OR WIRE
HPF	HIGH POWER FACTOR	WG	WIRE GUARD
HPS	HIGH PRESSURE SODIUM	WP	WEATHERPROOF
HTR	HEATER	XFER	TRANSFER
HW	HOT WATER	XFMR	TRANSFORMER
HZ	HERTZ		
IC	INTERCOM OR INTERRUPTING CAPACITY		
ID	INTERMEDIATE DISTRIBUTION FRAME		
IG	ISOLATED GROUND		
IMC	INTERMEDIATE METAL CONDUIT		

NOTE (ELECTRICAL ABBREVIATIONS):

1. ALL ABBREVIATIONS LISTED MAY NOT APPLY TO THIS PROJECT. REFER TO OTHER ABBREVIATION LISTS ELSEWHERE IN THESE DOCUMENTS FOR ABBREVIATIONS NOT LISTED HERE.

LIGHTING FIXTURE SCHEDULE

FXTR TYPE	MOUNTING	LAMP (NO.) TYPE	MANUFACTURER AND CATALOG NO. (BASIS OF DESIGN)	REMARKS
A1	CEILING/ SURFACE	LED	LITHONIA LIGHTING: ZL1F-L48-SMR-6000LM-MDD-MVOLT-40K-80CR-WH-E10W.LCP-ZLRL48-SYM-WH	NOTE 1

NOTES (LIGHTING FIXTURE SCHEDULE):

1. PROVIDE INTEGRAL 10W BATTERY DRIVER.

ELECTRICAL LEGEND

MTG. HGT.	SYMBOL	DESCRIPTION
		PLAN NOTE DESIGNATION.
		LIGHTING FIXTURE TYPE DESIGNATION.
		REVISION DESIGNATION.
		NEW CONNECTED TO EXISTING AT THIS POINT.
		EXISTING REMOVED FROM THIS POINT.
		LIGHTING FIXTURE, LED, CEILING MOUNTED WITH INTEGRAL EMERGENCY LED DRIVER. (TYPICAL FOR ALL LIGHTING FIXTURES)
		LIGHTING FIXTURE, LED, INCANDESCENT, FLUORESCENT OR HID, CEILING MOUNTED.
		ELECTRIC MOTOR CONNECTION.
1'-4" TO BOT		RECEPTACLE, DUPLEX GFCI, WALL, WP = RECEPTACLE IN WEATHERPROOF IN-USE COVER.
6'-0"		208/120 VOLT PANELBOARD.
6'-0"		480/277 VOLT PANELBOARD.
5'-0"		FUSIBLE SAFETY SWITCH, WALL OR EQUIPMENT MOUNTED. NUMBER INDICATES FUSED/3-POLE/60 AMP RATING/45 AMP FUSES.
5'-0"		COMBINATION MAGNETIC MOTOR STARTER AND FUSIBLE SAFETY SWITCH, WALL OR EQUIPMENT MOUNTED. NUMBER INDICATES 3-POLE/30 AMP RATING/15 AMP FUSES/ NEMA SIZE 0 STARTER.
	HCT-13	CIRCUIT DESIGNATION. DESIGNATION SHOWN INDICATES PANEL HCT AND CIRCUIT NUMBER 13.
	---	CONDUIT EXPOSED.
	— ER —	EXISTING CONDUIT TO REMAIN.
	-----	EXISTING CONDUIT TO BE REMOVED.
		CONDUIT TURNED UP.

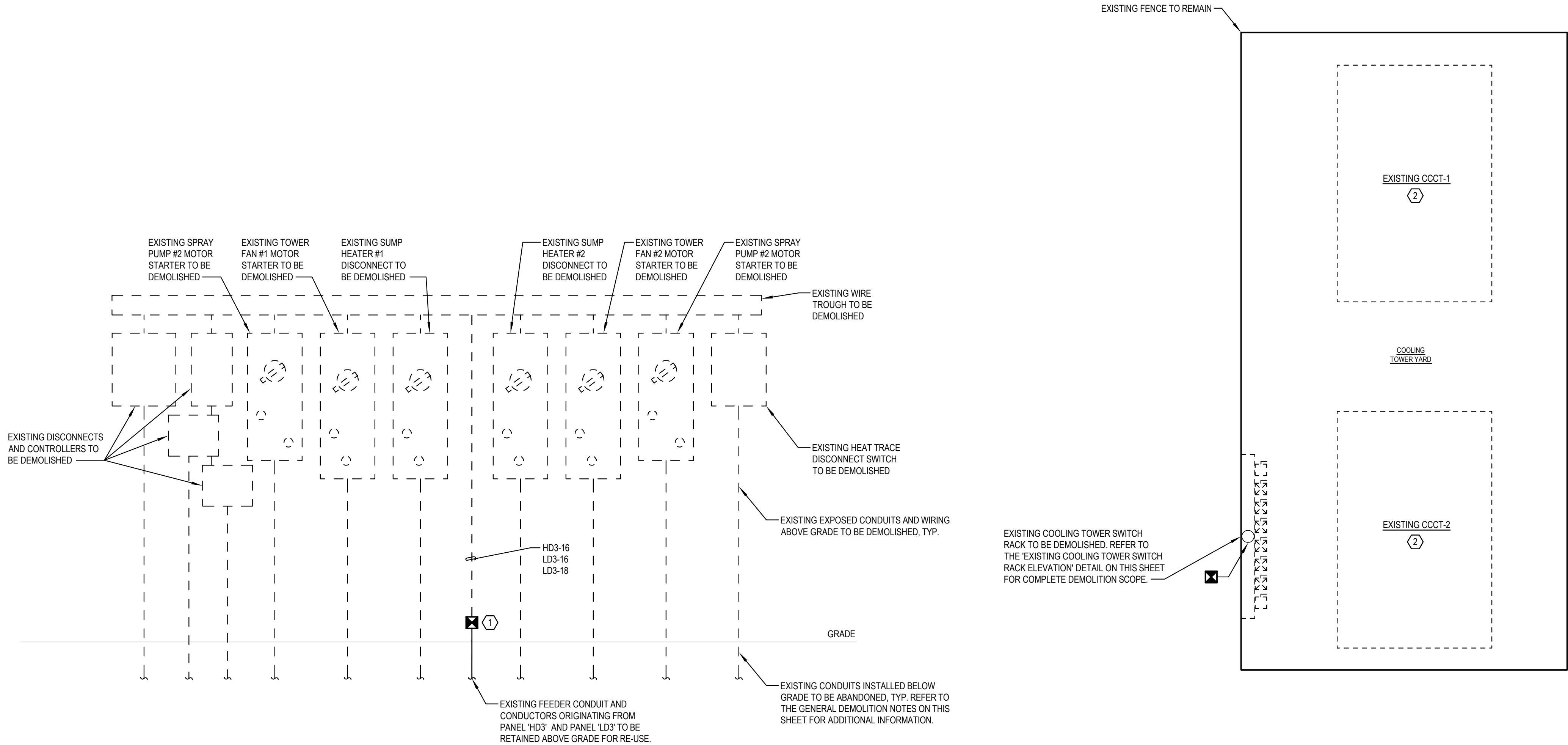
NOTES (ELECTRICAL LEGEND):

1. THESE ARE STANDARD ELECTRICAL SYMBOLS AND MAY NOT APPEAR ON THE PROJECT DRAWINGS. HOWEVER, WHEREVER AN ELECTRICAL SYMBOL APPEARS ON THE PROJECT DRAWINGS, THE ITEM SHALL BE FURNISHED AND INSTALLED.
2. MOUNTING HEIGHTS ARE FROM FINISHED FLOOR TO TOP OF OUTLET OR EQUIPMENT, UNO, WHERE THE MOUNTING HEIGHT INDICATED ON THE DRAWINGS IS DIFFERENT FROM THE LEGEND, THE DRAWING TAKES PRECEDENT. SEE DRAWINGS FOR MOUNTING HEIGHTS NOT INDICATED IN THE LEGEND.
3. SEE ELECTRICAL ABBREVIATIONS FOR ALPHABETIC SUBSCRIPT WITH SYMBOL, UNO.

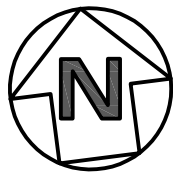
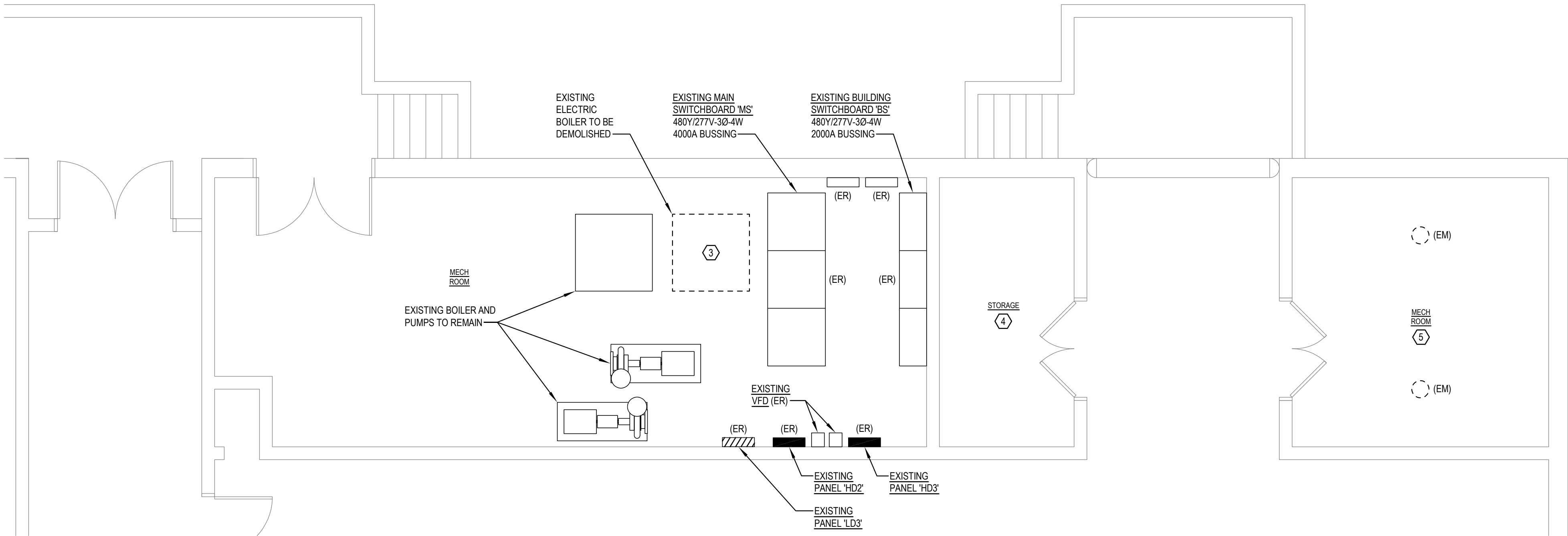
GENERAL NOTES:

1. ALL VFD'S WILL BE FURNISHED BY THE MECHANICAL CONTRACTOR. THE ELECTRICAL CONTRACTOR SHALL MOUNT THE VFD'S (UNLESS THEY ARE INTEGRAL TO THE EQUIPMENT SERVED), CONNECT THE LINE SIDE POWER WIRING AND THE LOAD SIDE POWER WIRING FROM THE VFD'S TO THE EQUIPMENT. ALL CONTROL AND INTERLOCK WIRING FOR THE VFD'S SHALL BE BY THE CONTROL SYSTEM CONTRACTOR.
2. LOAD SIDE CONDUCTOR AND CONDUIT SIZES FROM DISCONNECT SWITCHES, STARTERS AND VFD'S TO EQUIPMENT SHALL BE THE SAME AS LINE SIDE CONDUCTORS AND CONDUIT.
3. CAREFULLY COORDINATE ALL ELECTRICAL EQUIPMENT LOCATIONS WITH DUCTWORK, PIPING AND MECHANICAL EQUIPMENT. MAINTAIN ALL CLEARANCES AND SPACES REQUIRED BY THE NEC.
4. WHERE MULTIPLE CIRCUITS ARE COMBINED IN A SINGLE CONDUIT, DERATE CONDUCTORS PER THE NEC.
5. SEE SPECIFICATIONS FOR REQUIREMENTS REGARDING OVERSIZING CONDUCTORS FOR 1-POLE 15-AMP AND 20-AMP CIRCUITS TO REDUCE VOLTAGE DROP - THESE OVERSIZING REQUIREMENTS TAKE PRECEDENCE OVER THE WIRE AND CONDUIT SIZES SHOWN IN THE PANEL SCHEDULE.
6. THE VOLTAGE SENSING TERMINALS OF ALL EMERGENCY BATTERY PACKS SHALL BE CONNECTED AHEAD OF ALL SWITCHES, RELAYS, SENSORS AND POWER PACKS WITH 2#12 AND 1#12 GROUND IN 1/2" CONDUIT.
7. ALL EMERGENCY LIGHTING FIXTURES SHALL BE MARKED SO AS TO BE IDENTIFIED BY VISUAL INSPECTION FOR TESTING PURPOSES. IDENTIFICATION SHALL BE BY ONE 1/2" RED SELF-STICK DOT ON THE VERTICAL PORTION OF LOUVER OR ON THE TOP OF THE LENS.
8. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE ALL PANELBOARD FEEDER ENTRANCE LOCATIONS (TOP, BOTTOM, SIDE).
9. CAREFULLY COORDINATE LOCATIONS OF LIGHTING FIXTURES WITH SPRINKLER HEADS AND HVAC CEILING DEVICES. COORDINATE SURFACE MOUNTED LIGHTING FIXTURES ON LOW CEILINGS SUCH THAT FIXTURES WILL NOT INTERFERE WITH DOOR SWINGS.
10. WHERE RE-USE OF EXISTING CONDUIT, WIRING AND/OR OUTLET BOXES IS INDICATED, ALSO PROVIDE NEW MATERIALS IF NECESSARY. IF NEW EXPOSED MATERIALS ARE NEEDED, USE SURFACE RACEWAY (SINGLE-CHANNEL EXCEPT WHERE SPECIFICALLY INDICATED OTHERWISE), EXCEPT EXPOSED CONDUIT AND BOXES MAY BE USED IN UNFINISHED AREAS (MECHANICAL/ELECTRICAL UTILITY ROOMS, STORAGE AND HOUSEKEEPING CLOSETS, ETC.).
11. PROVIDE FIRE RATED DEVICES AND FIRE SEALANT FOR PENETRATIONS THROUGH FIRE WALLS. FIRE DEVICES AND SEALANT SHALL MATCH THE RATING OF THE WALL BEING PENETRATED.
- <





**EXISTING COOLING TOWER SWITCH RACK ELEVATION**  
SCALE: NONE



**PARTIAL FLOOR PLAN - ELECTRICAL - DEMOLITION**  
SCALE: 1/4" = 1'-0"

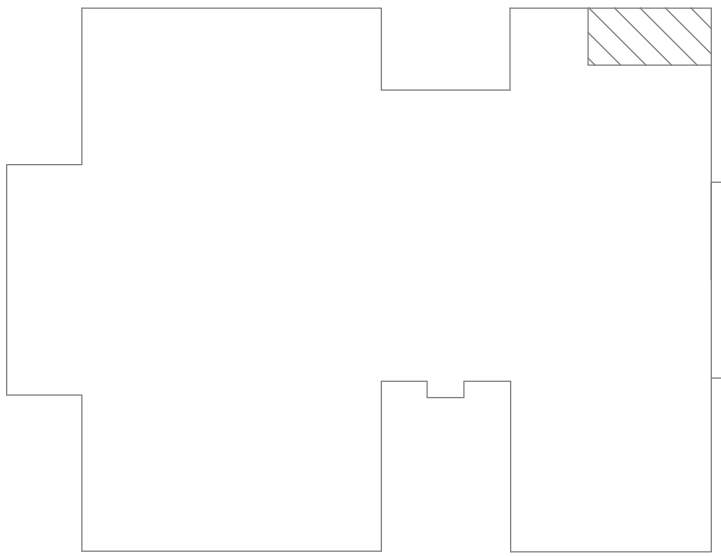
**DEMOLITION PLAN NOTES:** ○

- DISCONNECT AND RETAIN THE EXISTING FEEDER CONDUIT AND CONDUCTORS ORIGINATING FROM CIRCUIT BREAKER #16 (3-POLE, 175 AMP) IN 480V PANEL 'HD3' FOR RE-USE IN NEW WORK. REMOVE THE EXISTING POWER CONDUCTORS IN THIS CONDUIT THAT ORIGINATE FROM CIRCUIT BREAKERS #16 AND #18 (1-POLE, 20 AMP) IN 208V PANEL 'LD3'. LABEL THE CIRCUIT BREAKERS IN PANEL 'LD3' "SPARE" AND PLACE IN THE 'OFF' POSITION FOR FUTURE USE. PROVIDE ONE (1) 1/2" X 1/2" NEMA-3R SPLICE BOX ABOVE GRADE TO CAPTURE THE EXISTING PANEL-HD3 FEEDER FOR EXTENSION IN NEW WORK.
- DISCONNECT THE EXISTING CIRCUITS SERVING THE EXISTING COOLING TOWER FANS, PUMPS, AND HEATERS PRIOR TO DEMOLITION OF THE COOLING TOWERS AND ASSOCIATED EQUIPMENT. REMOVE ALL ACCESSIBLE CONDUIT AND WIRING FROM THE COOLING TOWER SWITCH RACK TO DEMOLISHED EQUIPMENT. REMOVE ALL DISCONNECT SWITCHES, STARTERS, CONTROLLERS, ETC. SERVING MECHANICAL EQUIPMENT BEING DEMOLISHED. REFER TO THE 'EXISTING COOLING TOWER SWITCH RACK ELEVATION' DETAIL ON THIS SHEET FOR ADDITIONAL INFORMATION.
- DISCONNECT THE EXISTING CIRCUIT SERVING THE EXISTING ELECTRIC BOILER PRIOR TO DEMOLITION. REMOVE ALL ACCESSIBLE CONDUIT, WIRE, PULL BOXES, ETC. ASSOCIATED WITH THIS CIRCUIT BACK TO THE POINT OF ORIGINATION. LABEL THE EXISTING FUSED SWITCH PREVIOUSLY SERVING THE DEMOLISHED ELECTRIC BOILER "SPARE" AND PLACE IN THE 'OFF' POSITION FOR FUTURE USE.
- NO ELECTRICAL DEMOLITION WORK IN THIS SPACE.
- DISCONNECT AND REMOVE THE EXISTING EXPLOSION-PROOF LIGHTING FIXTURES IN THIS SPACE. THE EXISTING LIGHTING CIRCUIT SERVING THESE FIXTURES SHALL BE DISCONNECTED AND RETAINED FOR RE-USE IN NEW WORK.

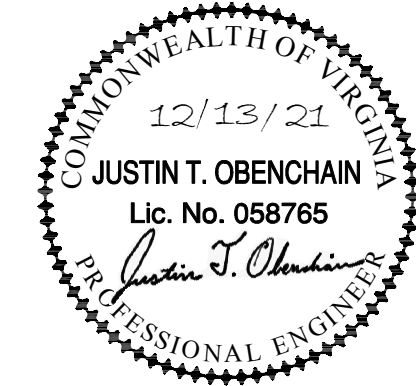
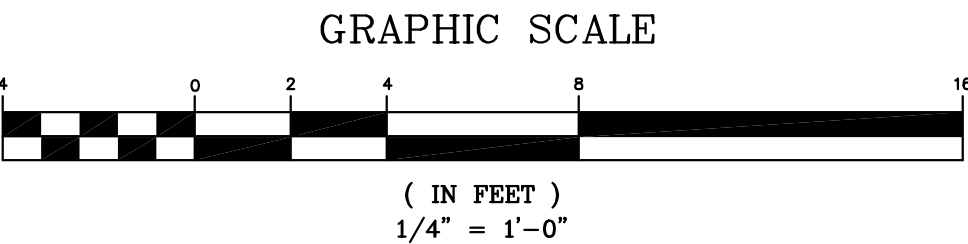
**GENERAL DEMOLITION NOTES:**

- SCOPE:** THE SCOPE OF ELECTRICAL DEMOLITION IS DEFINED IN THE FOLLOWING NOTES AND IN LIMITED FASHION ON THE DRAWINGS. THE DRAWINGS ARE ONLY INTENDED TO BE A PARTIAL REPRESENTATION OF THE ACTUAL DEMOLITION WORK REQUIRED. THESE NOTES ONLY APPLY TO THE AREAS OF RENOVATION. IN GENERAL, THE DEMOLITION SCOPE IS THE REMOVAL OF THE EXISTING ELECTRICAL SYSTEMS SUPPORTING THE EXISTING COOLING TOWERS AND ASSOCIATED EQUIPMENT BEING DEMOLISHED, EXCEPT AS NOTED OTHERWISE IN THESE NOTES AND ON THE DRAWINGS.
- MECHANICAL EQUIPMENT:** DISCONNECT EXISTING MECHANICAL EQUIPMENT THAT IS BEING REMOVED, AND REMOVE ALL ASSOCIATED STARTERS, DISCONNECTS, ETC. ABANDON CONDUITS AND CONDUCTORS CONCEALED IN EXISTING WALLS TO REMAIN. WHERE CONDUIT COMES UP FROM FLOOR, CUT CONDUIT FLUSH WITH FLOOR, FILL IT WITH GROUT, AND FINISH TO MATCH THE SURROUNDING FLOOR SURFACE. REMOVE CONDUITS AND CONDUCTORS EXPOSED, CONCEALED ABOVE CEILING, AND EXTERIOR EXPOSED. CONDUIT AND CONDUCTORS TO REMOVED MECHANICAL EQUIPMENT SHALL BE REUSED ONLY WHERE SPECIFICALLY INDICATED. REFER TO THE MECHANICAL DRAWINGS FOR ADDITIONAL INFORMATION. UNLESS SPECIFICALLY INDICATED OTHERWISE, EXISTING WIRING TO EXISTING-TO-REMAIN EQUIPMENT SHALL REMAIN.
- ELECTRICAL SERVICE:** THE EXISTING ELECTRICAL SERVICE SHALL BE RE-USED, BUT SOME ISOLATED DOWNTIME WILL LIKELY STILL BE REQUIRED FOR DEMOLITION AND NEW WORK. ALL ELECTRICAL SERVICE DOWNTIME REQUIRED SHALL BE COORDINATED WITH OWNER AND SHALL BE AT THE OWNER'S CONVENIENCE. DOWNTIME SHALL BE KEPT TO THE MINIMUM. ALL EXTENDED DOWNTIME REQUIRED SHALL BE COORDINATED WITH OWNER AND SHALL BE OUTSIDE OF NORMAL SCHOOL HOURS.
- PANELBOARDS:** ALL EXISTING PANELBOARDS SHALL REMAIN. WHERE PANELBOARDS ARE MODIFIED AS PART OF THIS PROJECT, PROVIDE NEW, UPDATED CIRCUIT DIRECTORIES TO REFLECT ALL CIRCUIT CHANGES. ALL REVISED CIRCUIT DIRECTORIES SHALL BE "TYPED" NOT HANDWRITTEN. EXISTING CIRCUIT BREAKERS NO LONGER BEING USED AFTER DEMOLITION WORK SHALL BE MADE "SPARE" AND SHALL BE PLACED IN THE "OFF" POSITION. PROVIDE BLANK PLATES FOR ALL EXISTING CIRCUIT BREAKERS BEING REMOVED.
- INTERIOR LIGHTING:** EXISTING INTERIOR LIGHTING SHALL REMAIN AS INSTALLED, EXCEPT WHERE SPECIFICALLY INDICATED OTHERWISE ON THE DRAWINGS.
- CONDUIT:** WHERE CONDUIT RISES FROM FLOOR TO FEED DEMOLISHED ITEMS, CUT CONDUIT FLUSH WITH FLOOR AND FILL IT WITH GROUT. FINISH TO MATCH THE SURROUNDING FLOOR SURFACE. ALL ACCESSIBLE UNUSED CONDUIT SHALL BE REMOVED. ALL INACCESSIBLE UNUSED CONDUIT SHALL BE ABANDONED. ALL CONDUIT TO NEW DEVICES AND EQUIPMENT SHALL BE NEW, UNLESS NOTED OTHERWISE.
- WIRING:** ALL WIRING TO DEMOLISHED DEVICES AND EQUIPMENT SHALL BE REMOVED, UNLESS NOTED OTHERWISE. ALL EXISTING WIRING TO EXISTING-TO-REMAIN DEVICES AND EQUIPMENT SHALL REMAIN, UNLESS NOTED OTHERWISE. ALL ACCESSIBLE UNUSED WIRING SHALL BE REMOVED. ALL INACCESSIBLE UNUSED WIRING SHALL BE ABANDONED. ALL WIRING TO NEW DEVICES AND EQUIPMENT SHALL BE NEW, UNLESS NOTED OTHERWISE.
- MAINTAIN CIRCUIT CONTINUITY AS NECESSARY IN ALL DEMOLITION WORK.
- THE CONTRACTOR SHALL INFORM THE OWNER'S REPRESENTATIVE OF ELECTRICAL EQUIPMENT REMOVED FROM THE BUILDING. IF THE OWNER DESIRES TO RETAIN EQUIPMENT, HE WILL REMOVE IT FROM THE SITE. ALL EQUIPMENT NOT RETAINED BY THE OWNER SHALL BECOME PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED FROM THE SITE. DISPOSAL OF ALL EQUIPMENT CONTAINING HAZARDOUS MATERIALS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR, AND THE COST OF DISPOSAL SHALL BE INCLUDED.
- INFORMATION ON DEMOLITION DRAWINGS DOES NOT INDICATE ALL EXISTING EQUIPMENT AND DEVICES. REFER TO THE MECHANICAL DEMOLITION DRAWINGS FOR ADDITIONAL INFORMATION.
- THE CONTRACTOR SHALL VISIT THE SITE PRIOR TO SUBMITTING BID AND SHALL VERIFY ALL DEMOLITION REQUIRED. ADDITIONAL COMPENSATION WILL NOT BE ALLOWED FOR DEMOLITION DUE TO CONTRACTOR NOT VISITING SITE AND DETERMINING FULL SCOPE OF ELECTRICAL DEMOLITION WORK REQUIRED.
- SEE THE DEMOLITION FLOOR PLANS FOR ADDITIONAL DEMOLITION REQUIREMENTS. ON THE DEMOLITION FLOOR PLANS AND RISERS, ALL DASHED ITEMS SHALL BE REMOVED AND ALL SOLID ITEMS SHALL REMAIN, UNLESS NOTED OTHERWISE.

**KEY PLAN**



**NOT TO SCALE**



REVISION	DATE

**HIDDEN VALLEY MIDDLE SCHOOL**  
**COOLING TOWER REPLACEMENTS**  
ROANOKE, VIRGINIA

**PARTIAL FLOOR PLAN - ELECTRICAL - DEMOLITION**

DESIGNED JTO	DRAWN JTO
CHECKED WAM	APPROVED LPA
COMM. NO. 21101.51	DATE 12-13-21
SHEET	<b>E1</b>





REVISION	DATE

HIDDEN VALLEY MIDDLE SCHOOL  
COOLING TOWER REPLACEMENTS  
ROANOKE, VIRGINIA

PARTIAL FLOOR PLAN - ELECTRICAL - NEW WORK

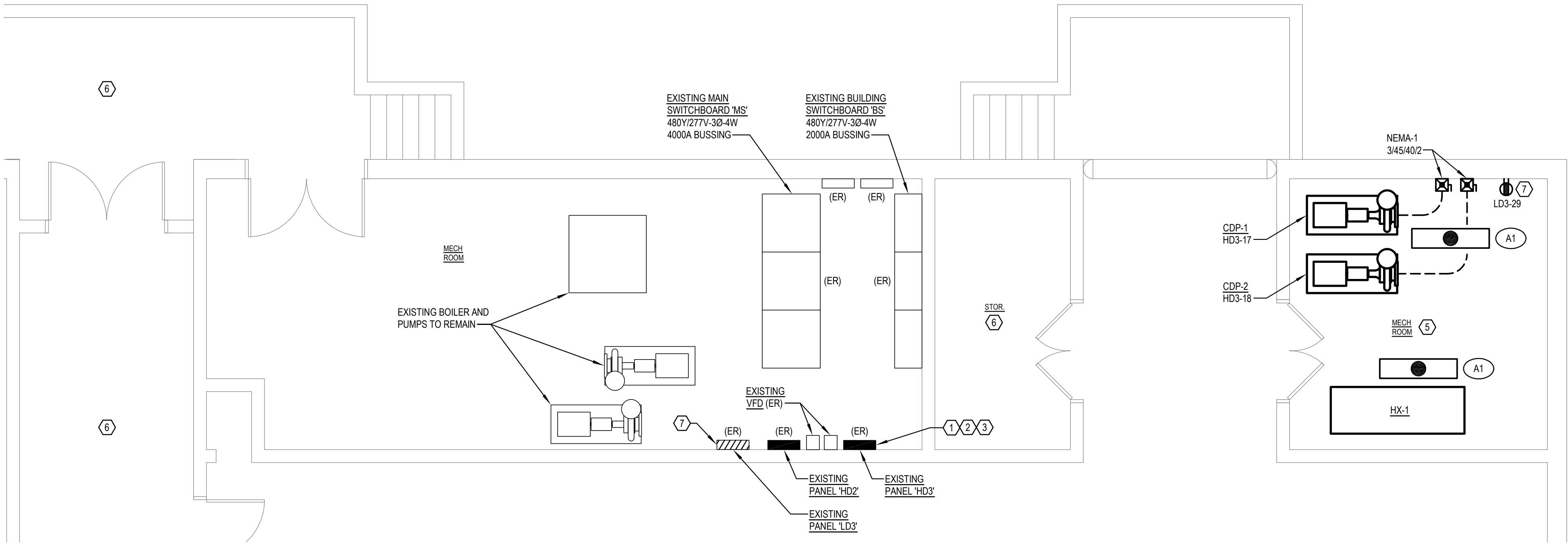
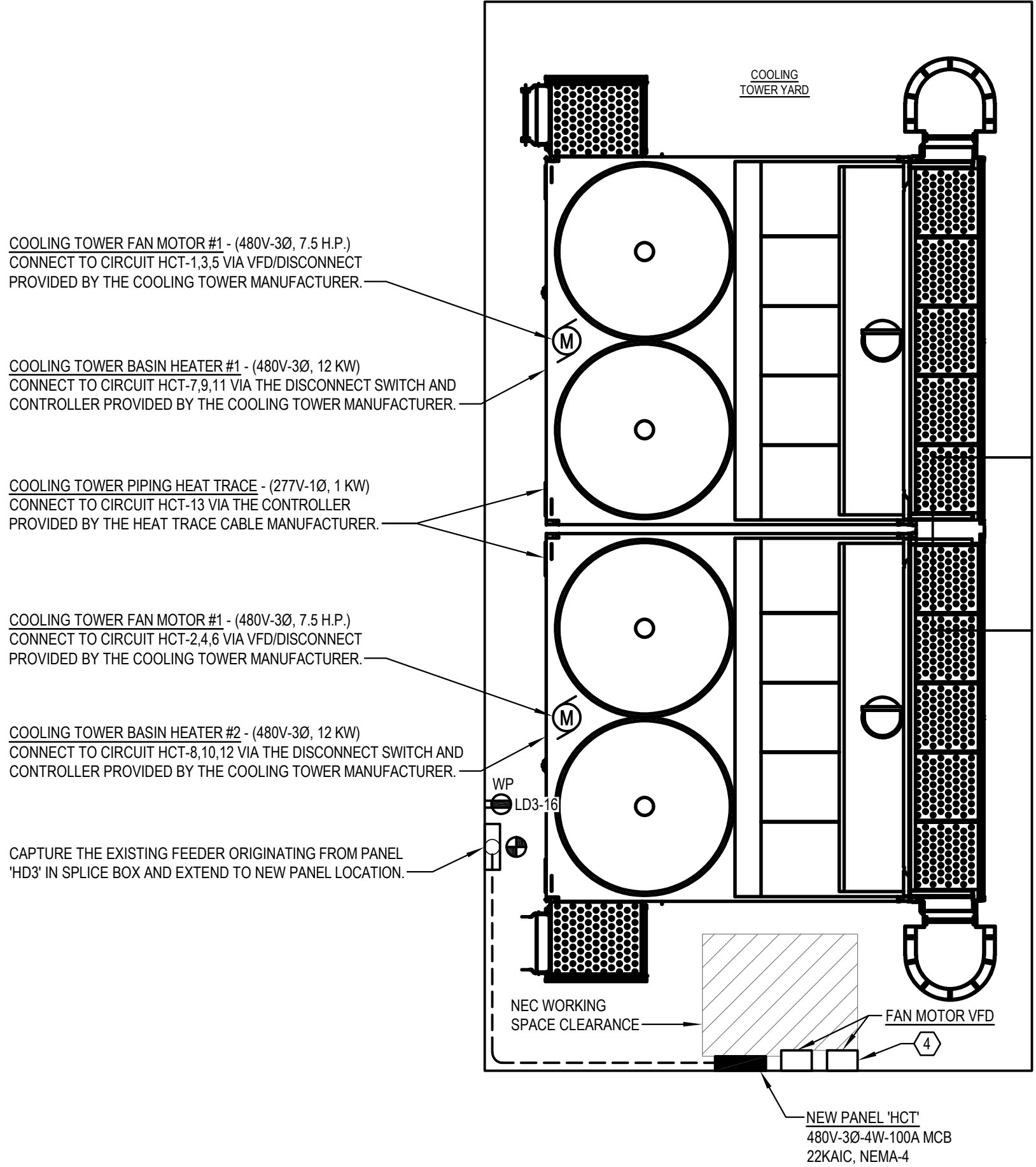
DESIGNED JTO	DRAWN JTO
CHECKED WAM	APPROVED LPA
COMM. NO. 21101.51	DATE 12-13-21

SHEET

E2

PLAN NOTES: ○

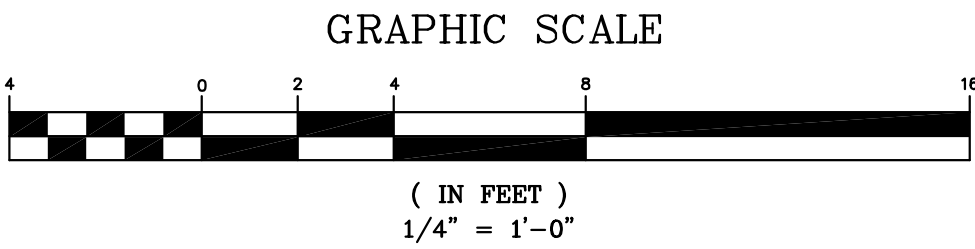
- REMOVE THE EXISTING 175 AMP CIRCUIT BREAKER FROM SPACE #16 IN PANEL 'HD3'. PROVIDE AND INSTALL ONE (1) NEW 3-POLE 100 AMP CIRCUIT BREAKER OF MATCHING AIC RATING AND TYPE IN THIS SPACE TO SERVE NEW PANELBOARD 'HCT'. RECONNECT THE EXISTING #2 AWG COPPER FEEDER CONDUCTORS TO THIS CIRCUIT BREAKER.
- PROVIDE AND INSTALL ONE (1) NEW 3-POLE 60 AMP CIRCUIT BREAKER OF MATCHING AIC RATING AND TYPE IN EMPTY SPACE #17 IN PANEL 'HD3' TO SERVE NEW PUMP 'CDP-1.' PROVIDE 3-#6 AND 1-#10 GROUND IN 1" CONDUIT AND CONNECT TO THE PUMP VIA THE NEW FUSIBLE COMBINATION MOTOR STARTER/DISCONNECT SWITCH.
- PROVIDE AND INSTALL ONE (1) NEW 3-POLE 60 AMP CIRCUIT BREAKER OF MATCHING AIC RATING AND TYPE IN EMPTY SPACE #18 IN PANEL 'HD3' TO SERVE NEW PUMP 'CDP-2.' PROVIDE 3-#6 AND 1-#10 GROUND IN 1" CONDUIT AND CONNECT TO THE PUMP VIA THE NEW FUSIBLE COMBINATION MOTOR STARTER/DISCONNECT SWITCH.
- PROVIDE A NEW KINDORF CHANNEL SUPPORT RACK SECURED TO THE EXISTING CONCRETE PAD FOR MOUNTING OF THE NEW ELECTRICAL EQUIPMENT.
- CONNECT THE NEW TYPE 'A1' LIGHTING FIXTURES IN THIS SPACE TO THE EXISTING LIGHTING CIRCUIT RETAINED DURING DEMOLITION. PROVIDE NEW MATERIALS TO MATCH EXISTING AS REQUIRED FOR CONNECTION OF NEW FIXTURES. THE EXISTING LIGHTING CONTROL DEVICES SHALL REMAIN AS INSTALLED. COORDINATE THE EXACT LOCATIONS OF THESE FIXTURES WITH LOCATIONS OF NEW AND EXISTING PIPING AND EQUIPMENT.
- NO NEW ELECTRICAL WORK IN THIS SPACE.
- PROVIDE AND INSTALL ONE (1) NEW 1-POLE 20 AMP CIRCUIT BREAKER OF MATCHING AIC RATING AND TYPE IN EMPTY SPACE #29 IN PANEL 'LD3' TO SERVE THE NEW RECEPTACLE FOR THE COOLING TOWER CHEMICAL PUMP. PROVIDE 2-#12 AND 1-#12 GROUND IN 3/4" CONDUIT FOR THE NEW CIRCUIT. COORDINATE THE EXACT ELECTRICAL INSTALLATION REQUIREMENTS WITH THE CHEMICAL PUMP MANUFACTURER PRIOR TO ROUGH-IN.



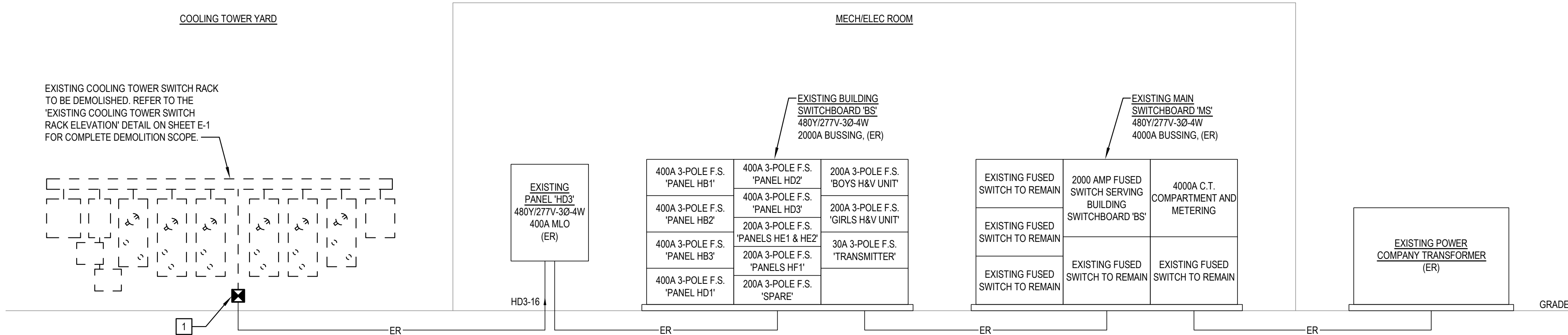
**PARTIAL FLOOR PLAN - ELECTRICAL - NEW WORK**  
SCALE: 1/4" = 1'-0"

KEY PLAN

NOT TO SCALE

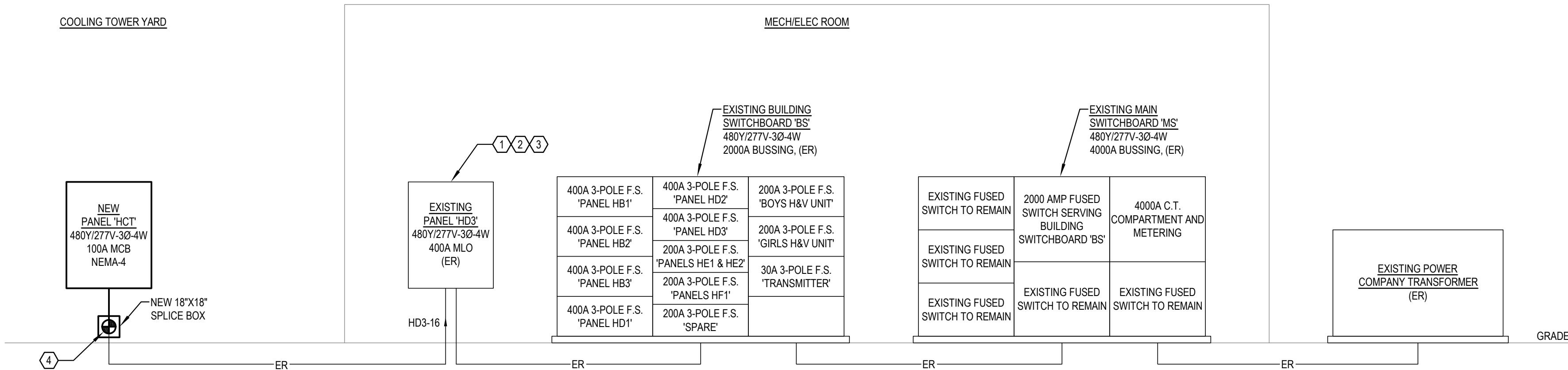






### PARTIAL EXISTING POWER RISER DIAGRAM

SCALE: NONE



### PARTIAL REVISED POWER RISER DIAGRAM

SCALE: NONE

#### PARTIAL EXISTING POWER RISER DIAGRAM NOTES:

- DISCONNECT AND RETAIN THE EXISTING FEEDER CONDUIT AND CONDUCTORS ORIGINATING FROM CIRCUIT BREAKER #16 (3-POLE, 175 AMP) IN 480V PANEL 'HD3' FOR RE-USE IN NEW WORK. DISCONNECT AND RETAIN THE EXISTING POWER CONDUCTORS IN THIS CONDUIT THAT ORIGINATE FROM CIRCUIT BREAKERS #16 AND #18 (1-POLE, 20 AMP) IN 208V PANEL 'LD3'. LABEL CIRCUIT BREAKER #16 IN PANEL 'LD3' 'COOLING TOWER YARD REC.' PROVIDE ONE (1) 18" X 18" NEMA-3R SPLICE BOX ABOVE GRADE TO CAPTURE THE EXISTING PANEL-'HD3 AND PANEL-'LD3 CIRCUITS FOR EXTENSION IN NEW WORK.

#### PARTIAL REVISED POWER RISER DIAGRAM NOTES:

- REMOVE THE EXISTING 175 AMP CIRCUIT BREAKER FROM SPACE #16 IN PANEL 'HD3'. PROVIDE AND INSTALL ONE (1) NEW 3-POLE 100 AMP CIRCUIT BREAKER OF MATCHING AIC RATING AND TYPE IN THIS SPACE TO SERVE NEW PANELBOARD 'HCT'. RECONNECT THE EXISTING #2 AWG COPPER FEEDER CONDUCTORS TO THIS CIRCUIT BREAKER.
- PROVIDE AND INSTALL ONE (1) NEW 3-POLE 60 AMP CIRCUIT BREAKER OF MATCHING AIC RATING AND TYPE IN EMPTY SPACE #17 IN PANEL 'HD3' TO SERVE NEW PUMP 'CDP-1'. PROVIDE 3-#6 AND 1-#10 GROUND IN 1" CONDUIT AND CONNECT TO THE PUMP VIA THE NEW FUSIBLE COMBINATION MOTOR STARTER/DISCONNECT SWITCH.
- PROVIDE AND INSTALL ONE (1) NEW 3-POLE 60 AMP CIRCUIT BREAKER OF MATCHING AIC RATING AND TYPE IN EMPTY SPACE #18 IN PANEL 'HD3' TO SERVE NEW PUMP 'CDP-2'. PROVIDE 3-#6 AND 1-#10 GROUND IN 1" CONDUIT AND CONNECT TO THE PUMP VIA THE NEW FUSIBLE COMBINATION MOTOR STARTER/DISCONNECT SWITCH.
- EXTEND THE EXISTING FEEDER CONDUIT AND THE #2 AWG COPPER CONDUCTORS (NOW ORIGINATING FROM NEW 3-POLE 100 AMP CIRCUIT BREAKER #16 IN 480V PANEL 'HD3') AND CONNECT TO NEW PANEL 'HCT'. PROVIDE NEW MATERIALS TO MATCH EXISTING AS REQUIRED FOR THE EXTENSION OF THE EXISTING FEEDER. COORDINATE THE ROUTING OF THE FEEDER EXTENSION IN THE FIELD TO AVOID CONFLICTS WITH EXISTING OPENINGS IN FENCING. ALL NEW CONDUITS SHALL BE ROUTED AS HIGH AS POSSIBLE ALONG THE INSIDE PERIMETER OF THE EXISTING FENCE. REFER TO SHEET E-2 FOR THE LOCATION OF NEW PANELBOARD 'HCT'.

PANEL HCT																																		
VOLTAGE: 480Y/277V SYSTEM: 3PH, 4W SOLID NEUTRAL: YES						MAIN: 100A MCB BUS RATING: 100A GROUND BUS: YES						INTEGRAL SPD: YES MOUNTING: SURFACE INTERRUPT RATING: 22,000 AIC																						
CKT	LOAD SERVED				BKR	PHASE	NEUT	GND	COND	DMD	L1	L2	L3	CKT	LOAD SERVED				BKR	PHASE	NEUT	GND	COND	DMD	L1	L2	L3							
1	COOLING TOWER FAN MOTOR #1				20/3	#12	-	#12	1/2"	A	3.05			2	COOLING TOWER FAN MOTOR #2				20/3	#12	-	#12	1/2"	A	3.05									
3	"				-	#12	-	-	-	A		3.05		4	"				-	#12	-	-	-	A		3.05								
5	"				-	#12	-	-	-	A			3.05	6	"				-	#12	-	-	-	A			3.05							
7	COOLING TOWER BASIN HEATER #1				20/3	#12	-	#12	1/2"	W	4			8	COOLING TOWER BASIN HEATER #2				20/3	#12	-	#12	1/2"	W	4									
9	"				-	#12	-	-	-	W		4		10	"				-	#12	-	-	-	W		4								
11	"				-	#12	-	-	-	W			4	12	"				-	#12	-	-	-	W			4							
13	HEAT TRACE CABLING				20/1	#12	#12	#12	1/2"	N	1			14	SPARE				20/1	-	-	-	-	-	-									
15	SPARE				20/1	-	-	-	-	-		-		16	SPARE				20/1	-	-	-	-	-	-		-							
17	SPARE				20/1	-	-	-	-	-			-	18	SPARE				20/1	-	-	-	-	-	-		-							
19	SPACE ONLY				-/3	-	-	-	-	-	-			20	SPACE ONLY				-/3	-	-	-	-	-	-		-							
21	"				-	-	-	-	-	-		-		22	"				-	-	-	-	-	-	-		-							
23	"				-	-	-	-	-	-			-	24	"				-	-	-	-	-	-	-		-							
25	SPACE ONLY				-/3	-	-	-	-	-	-			26	SPD BREAKER				60/3	#6	#6	#6	1-1/4"	N	.03									
27	"				-	-	-	-	-	-		-		28	"				-	#6	-	-	-	N		.03								
29	"				-	-	-	-	-	-		-		30	"				-	#6	-	-	-	N			.03							
NOTE 1. PROVIDE GROUND FAULT EQUIPMENT PROTECTION FOR CIRCUIT(S) 13																							PHASE LOAD TOTALS				15.13	14.13	14.13					
LOADS (KVA)												CONNECTED	DEMAND FACTOR	DEMAND	LOADS (KVA)												CONNECTED	DEMAND FACTOR	DEMAND					
LIGHTING												0	1.25	0	KITCHEN EQUIPMENT												0	1.0	0					
REC TO 10 KVA												0	1.0	0	CONTINUOUS												0	1.25	0					
REC REMAINING												0	0.5	0	NON-CONTINUOUS												1.09	1.0	1.09					
SPACE HEATING												0	0.0	0	DEMAND												0	1.0	0					
AIR CONDITIONING												18.3	1.0	18.3	TOTAL CONNECTED LOAD												43.4	KVA	52.2	AMPS				
NON-SEASONAL MOTORS												0	1.0	0	MIN. FEEDER / PANEL CAPACITY												45.7	KVA	55	AMPS				
LARGEST MOTOR												9.14	0.25	2.29	OVERALL DEMAND FACTOR												1.05							
WATER HEATING												24	1.0	24																				

#### LOAD JUSTIFICATION FOR EXISTING PANEL 'HD3':

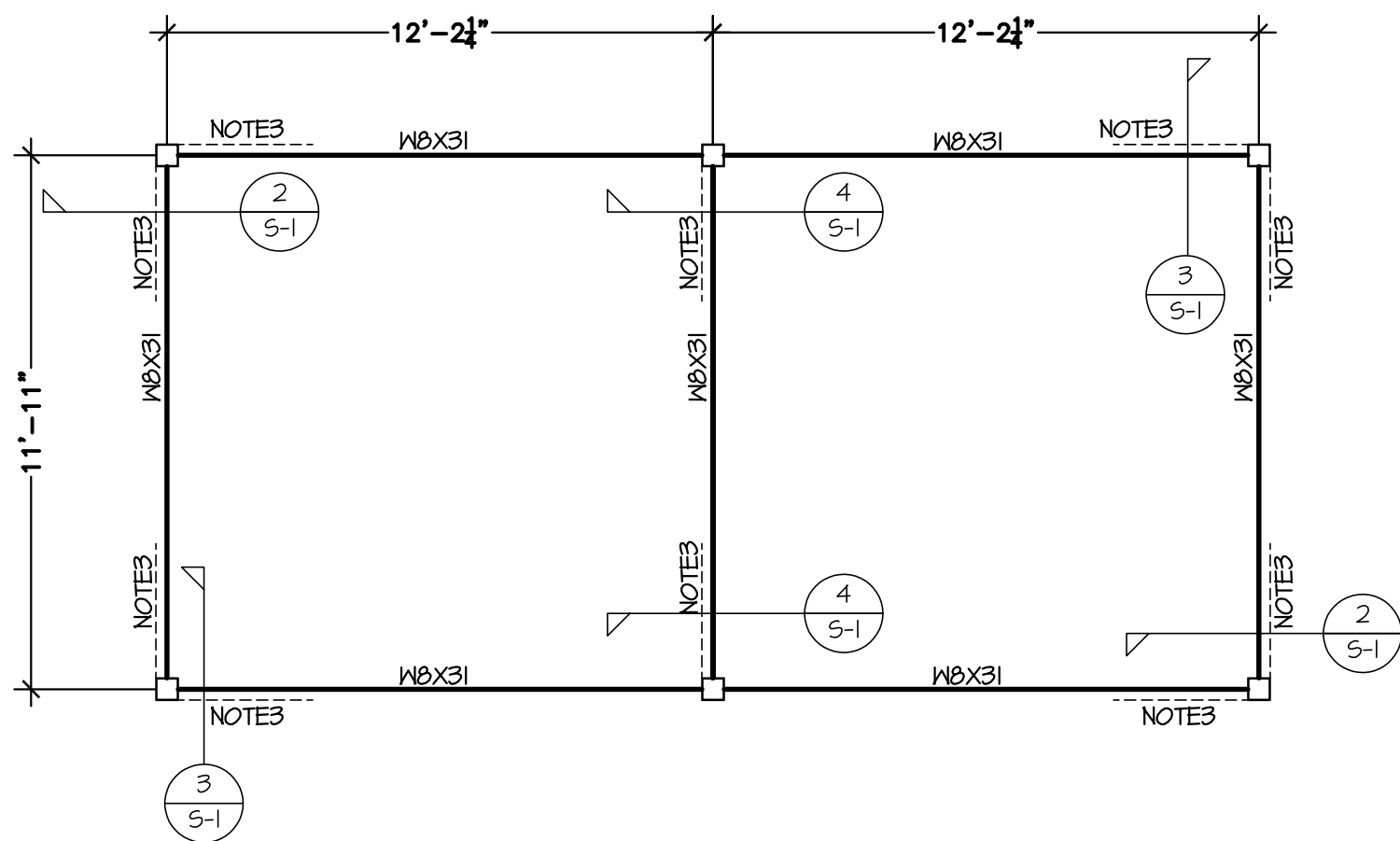
- EXISTING EQUIPMENT REMOVED FROM PANEL 'HD3':
  - EXISTING COOLING TOWER FAN #1: 480V-3Ø, 20 H.P. (22.44 KVA)
  - EXISTING COOLING TOWER FAN #2: 480V-3Ø, 20 H.P. (22.44 KVA)
  - EXISTING COOLING TOWER BASIN HEATER #1: 480V-3Ø, 8 KW (8.00 KVA)
  - EXISTING COOLING TOWER BASIN HEATER #2: 480V-3Ø, 8 KW (8.00 KVA)
  - EXISTING COOLING TOWER SPRAY PUMP #1: 480V-3Ø, 3 H.P.(3.99 KVA)
  - EXISTING COOLING TOWER SPRAY PUMP #2: 480V-3Ø, 3 H.P.(3.99 KVA)
  - TOTAL EXISTING LOAD REMOVED FROM PANEL 'HD3': 68.86 KVA
- NEW EQUIPMENT ADDED TO PANEL 'HD3':
  - NEW COOLING TOWER FAN MOTOR #1: 480V-3Ø, 7.5 H.P. (9.14 KVA)
  - NEW COOLING TOWER FAN MOTOR #2: 480V-3Ø, 7.5 H.P. (9.14 KVA)
  - NEW COOLING TOWER BASIN HEATER #1: 480V-3Ø, 12 KW (12.00 KVA)
  - NEW COOLING TOWER BASIN HEATER #2: 480V-3Ø, 12 KW (12.00 KVA)
  - NEW PUMP CDP-1: 480V-3Ø, 20 H.P. (22.44 KVA)
  - NEW PUMP CDP-2: 480V-3Ø, 20 H.P. (0.00 KVA)\*\*
  - PIPING HEAT TRACE: 277V-1Ø, 1.00 KW (1.00 KVA)
  - TOTAL NEW LOAD ADDED TO PANEL 'HD3': 65.72 KVA
- THE LOAD ON PANEL 'HD3' IS BEING REDUCED BY 3.14 KVA IN THIS PROJECT

\*\* NEW PUMPS CDP-1 AND CDP-2 ARE CONFIGURED FOR REDUNDANT OPERATION; ONLY ONE (1) PUMP WILL RUN AT ANY TIME.

REVISION	DATE

DESIGNED JTO	DRAWN JTO
CHECKED WAM	APPROVED LPA
COMM. NO. 21101.51	DATE 12-13-21

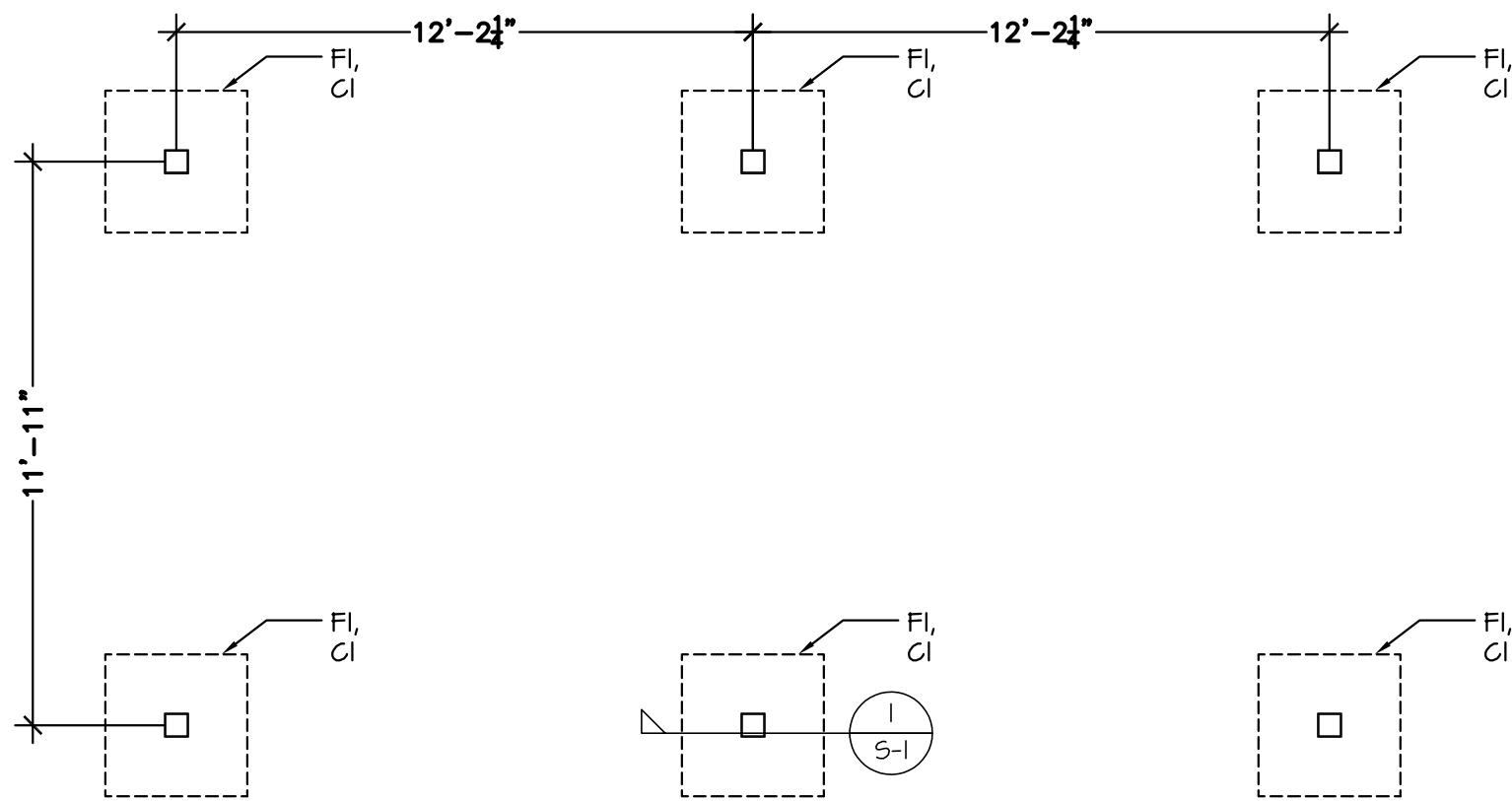




### COOLING TOWER – SUPPORT FRAME

SCALE: 1/4" = 1'-0"

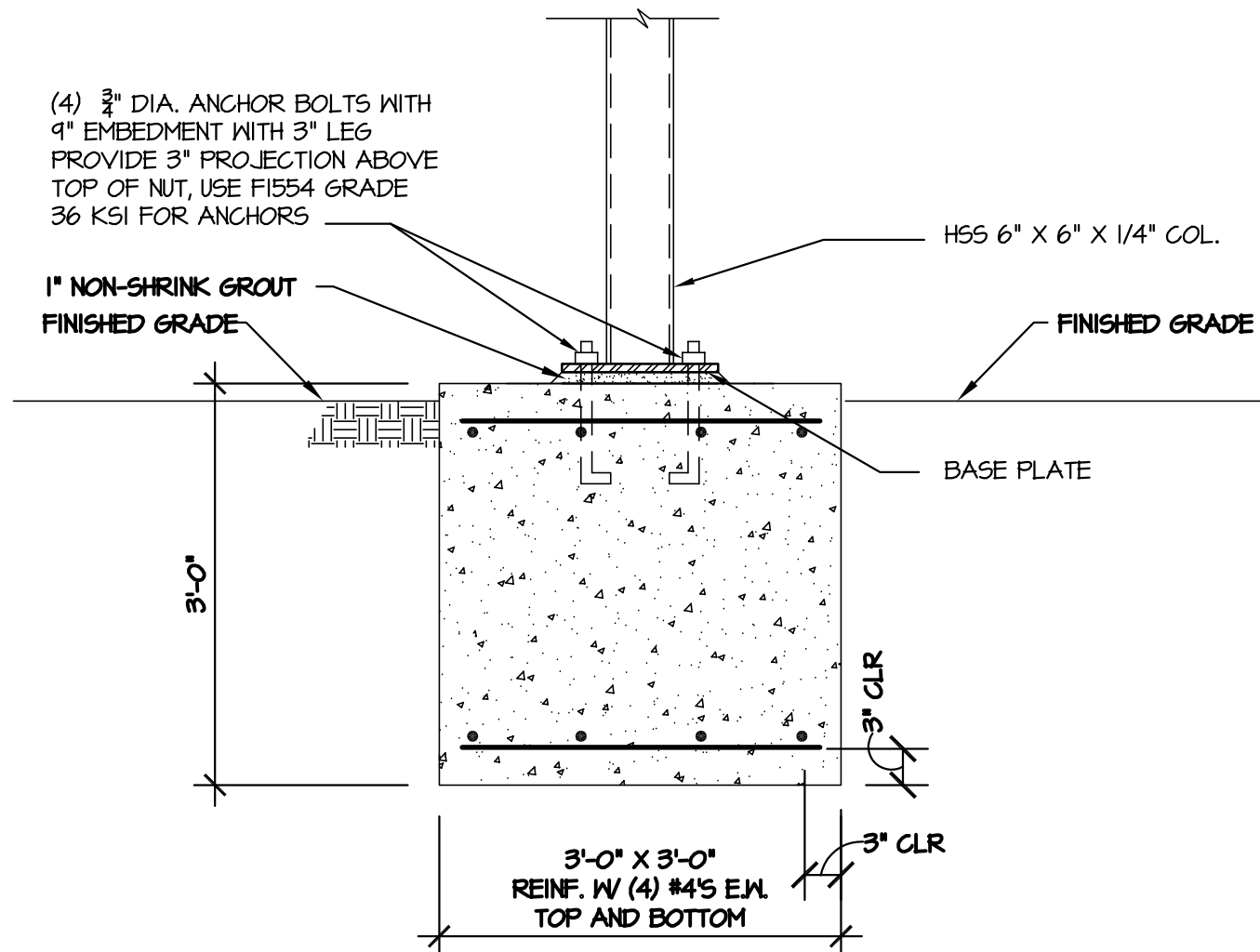
1. TOP OF STEEL (46'-0") ABOVE TOP OF FOUNDATION.
2. FRAME DESIGNED TO SUPPORT A TOWER WEIGHT OF 30.0 KIPS.
3. SEE SECTION 5/5-1 FOR TYPICAL BEARING DETAIL.



### COOLING TOWER – FOUNDATION PLAN

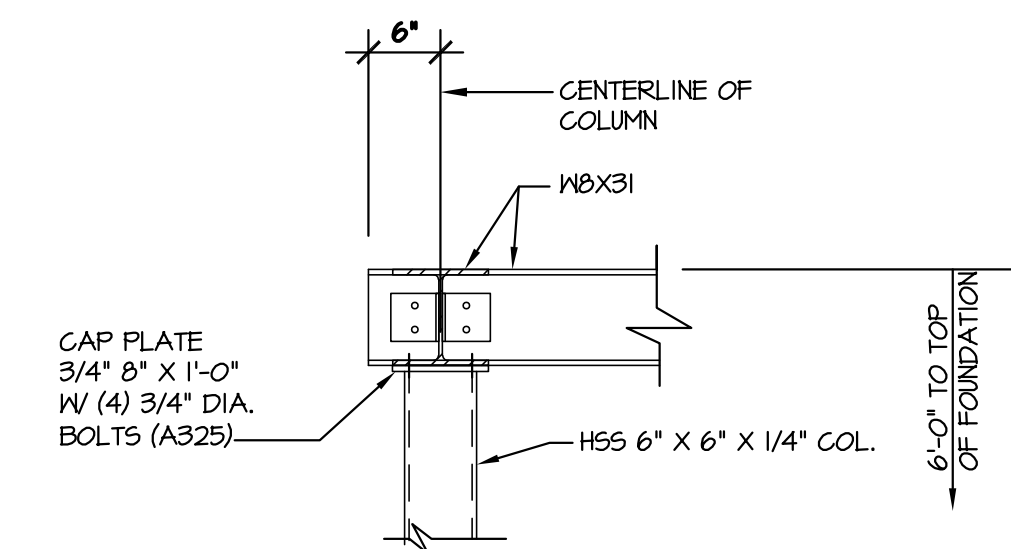
SCALE: 1/4" = 1'-0"

1. FOOTING F1: 3'-0" X 3'-0" X 3'-0" REINFORCED WITH (4) #5'S E.W. TOP AND BOTTOM.
2. COLUMN C1: H55 6" X 6" X 1/4" WITH BASE PLATE 3/4" X 14" X 14" WITH (4) 3/4" DIA. ANCHOR BOLTS.
3. G.C. VERIFY ALL DIMENSIONS WITH COOLING TOWER PROVIDED.
4. TOP OF FOOTING F1 (40'-0").



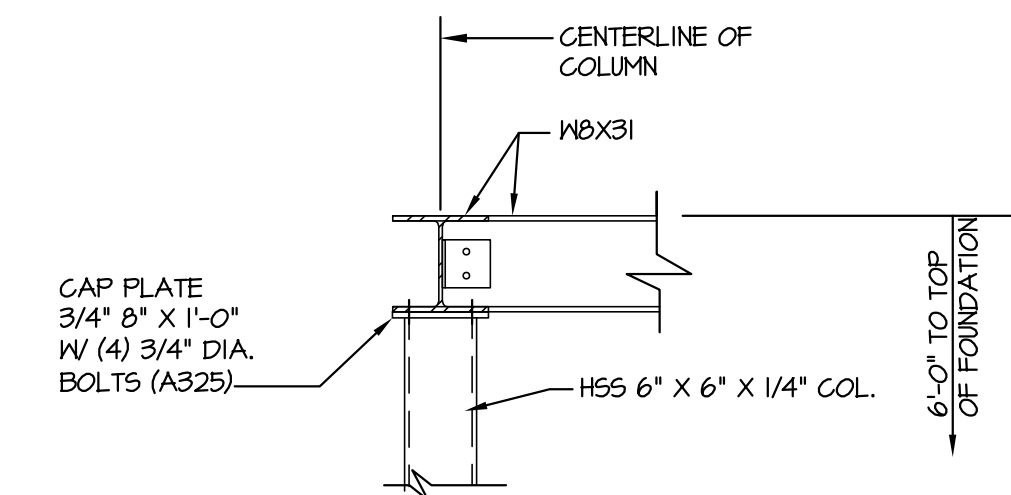
1 SECTION  
S-1

SCALE: N.T.S.



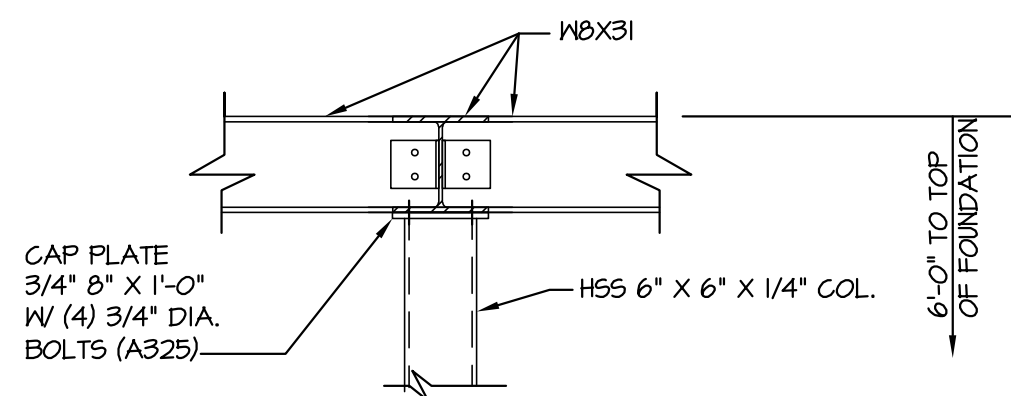
2 SECTION  
S-1

SCALE: N.T.S.



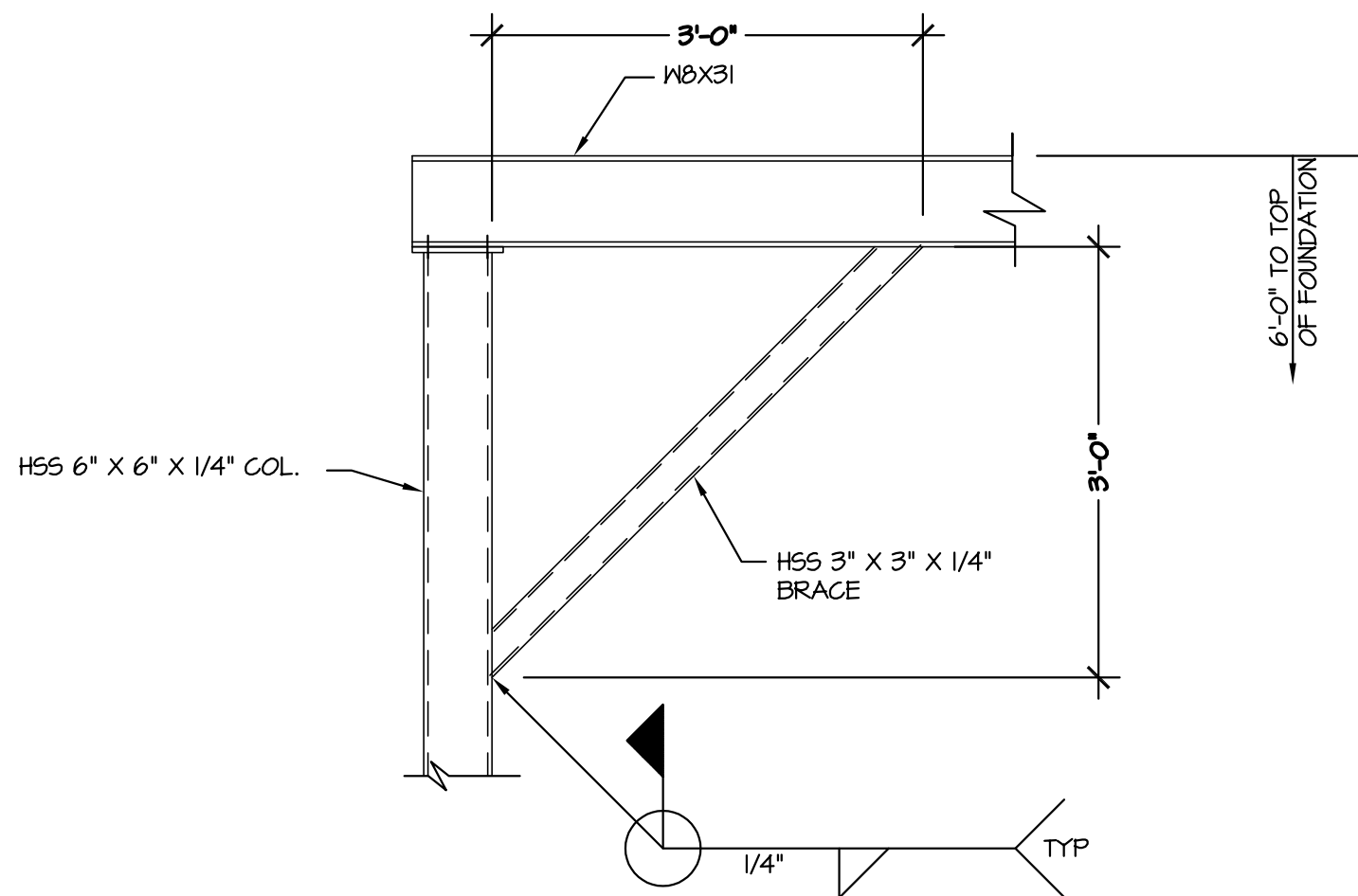
3 SECTION  
S-1

SCALE: N.T.S.



4 SECTION  
S-1

SCALE: N.T.S.



5  
S-1

TYPICAL BRACING SECTION

SCALE: N.T.S.

### STRUCTURAL NOTES:

STEEL ASTM A992 Fy=50 KSI (GALVANIZED)

CONCRETE: 4000 PSI AT 28 DAYS - NON AIR ENTRAINED  
SLUMP 4 TO 5 INCHES

REINFORCING STEEL ASTM A615, GRADE 60 KSI.

ALL BOLTS ASTM A325, UNLESS OTHERWISE NOTED.

Fp SOIL (ASSUMED) = 1500 PSF

UNLESS NOTED OTHERWISE, ALL BEAM SHEAR CONNECTIONS SHALL BE DESIGNED FOR ONE HALF THE ALLOWABLE UNIFORMLY DISTRIBUTED LOADING IN ACCORDANCE WITH THE UNIFORM LOAD CONSTANTS AS TABULATED IN THE AISC MANUAL (FOURTEENTH EDITION) FOR THE INDICATED SPAN PLUS 2 KIPS.

### DEMOLITION NOTES:

THE GENERAL CONTRACTOR SHALL CUT THE EXISTING CONCRETE PAD AS REQUIRED FOR THE INSTALLATION OF THE NEW FOUNDATIONS.\*  
REPOUR SECTIONS OF DEMOLISHED SLAB AS REQUIRED.

REVISION	DATE

DESIGNED BMB	DRAWN BMB
CHECKED JFK	APPROVED JFK
COMM. NO. 21101.51	DATE 12-13-21

SHEET