REQUEST FOR PROPOSALS

Project:
HVAC System Replacements

Owner:
Shawnee Heights School District
Unified School District 450

Sealed proposals for the Shawnee Heights School District (Owner) for HVAC system replacement/renovation work at SHHS will be received via email at whenle@lcgway.com or postage mail/in-person delivery at:

Shawnee Heights Unified School District 450
Attn: Sara Darting
4225 SE Shawnee Heights Road
Tecumseh, KS 66542

until **2:00PM local time, February 24, 2026** at which time and place the bids will be opened and the bid price read aloud. Bids received after the time above will be returned unopened.

Project Description:
The scope of work includes construction, labor, equipment, and all associated materials for the replacement and installation of the following units:

1. See attached plans

Please submit individual bids for each project listed in the project description.

Contractors shall submit Contractor's Qualification Statement, AIA Document A305 with the sealed bid. Upon review of the Qualification Statement document, the Owner shall have the right to take such steps as he deems necessary to determine the ability of the Contractor to perform the Work, and the Contractor shall furnish to the Owner such additional information and data for this purpose, as they may request. The right is reserved to reject any Bid after an investigation or consideration of the information and data submitted by such Contractor.

A pre-bid conference is scheduled for February 17th, 2026 at 9:30 a.m. local time. The pre-bid meeting will begin at:

Shawnee Heights High School
4201 SE Shawnee Heights Road
Tecumseh, KS 66542

This project needs to be substantially complete prior to **the 2026 school year**. In the event the project is not substantially complete prior to the date referenced, Shawnee Heights, USD450 will require the contractor awarded this project a penalty of $1,000 per day. This penalty will be withheld from the final payment issued to the contractor, unless the contractor has written permission from Shawnee Heights USD450 stating that the deadline can be extended. Substantial completion shall be determined by Shawnee Heights USD 450 Director of Support Services, Micah Stegall.

General Work Requirements.

The contractor will be required to start the work per the schedule included herein. Liquidated damages as stated on the bid form will be assessed for each consecutive calendar day which the work is not substantially complete, beginning with the first day beyond the substantial completion time stated. Substantial completion is the owner's ability to utilize the facility for its intended purpose. Shawnee Heights Public Schools will be the sole judge of substantial completion.

The owner reserves the right and may delay work if scheduling between school administration and contractor cannot be resolved.

It will be the contractor's responsibility to have the approaching licenses and permits required by the state and/or municipality in which the work will be performed. It is also the contractor's responsibility to make certain all work ad material meets local and state codes. Bidders shall include permit fees in their bid.

The contractor shall observe and comply with all ordinances, laws, and regulations, and shall protect and indemnify the owner against any claim or liability arising from or based on any violation of the same. The contractor shall comply with all regulations of agencies having jurisdiction with respect to sanitation and safety during construction.

Contractor shall be responsible for protection of the adjacent spaces during all phases of the project, demolition material storage and new construction.

All items furnished must be of their respective kinds and will be free from defects in material and workmanship. Items will be subject to our inspection and approval at any time. Items furnished must be manufactured in compliance with all existing legal or governmental directives.

All work shall be of the highest quality. The contractor and subcontractor shall check their work regularly for quality and conformance as the work is in progress. Unsatisfactory work shall be corrected immediately.

The contractor shall promptly correct work rejected by the owner or failing to conform to the requirements of the contract documents, whether observed before or after substantially completion and whether or not fabricated, installed or completed. The contractor shall bear all costs of correcting such rejected work, including additional testing

and inspections and compensation for owner services and expenses made necessary thereby.

As work is completed by the contractor/subcontractor, it shall be his responsibility to remove all excess material, equipment and debris from the premises.

Upon substantial completion, a scheduled punch list inspection shall be conducted by the school district to identify any item(s) requiring additional work. All items noted on the punch list shall be accomplished by the contractor prior to final payment.

The bidder agrees to furnish all material, labor, tools, expendable equipment, and all utility and transportation services necessary to perform and complete, in a workmanlike manner, all of the work required in accord with the bid documents.

All Bidders **shall** visit the site prior to submitting Bids. This requirement may be fulfilled by attending the pre-bid conference.

Questions can be directed via email to whenle@lcgway.com. Questions must be submitted by 5:00 p.m. February 18th, 2026. Questions will not be taken verbally or in person. Answers to all questions will be added to this invitation on the district website by 5:00 p.m. February 20th, 2026.

The Owner reserves the right to waive any defects and informalities in Bids, to reject any or all Bids, to take any or all Bids under advisement, or to accept any Bid as may be deemed in its interest of meeting the standards of lowest responsible Bid.

TERMS AND CONDITIONS

RESERVATIONS: The Board of Education reserves the right to cancel this Invitation for Bid at any time and for any reason. The Board also reserves the right to reject any or all offers, to accept any item or items in an offer, and to waive any informality or immaterial defect in offers. Failure to adhere to any of these terms and conditions may result in the rejection of the offending bid.

QUANTITIES: The Board reserves the right to increase or decrease the quantity of any bid item. Every effort has been made to provide an accurate estimate of desired quantities or usage, but it is understood quantities are indefinite until time of order.

PRICING: Prices quoted must remain firm for a minimum period of (45) days from Response Due date. Prices shall remain firm for the contract period. Prices quoted are to be the full delivered, set- up, and purchase price to the Unified School District No. 450 (District) including charges of every kind and nature, unless otherwise indicated.

EQUIVALENT ITEMS: Whenever a material, article or piece of equipment is identified in the specifications by reference to a manufacturer's or vendor's name, trade name, catalogs or model number, etc., it is intended to establish a standard, unless otherwise specifically stated. Any material, article or equipment of other manufacturers or vendors shall perform to the standard of the item specified. Equivalent bids must be accompanied by sufficient descriptive literature and specifications to provide for detailed comparison. Samples or demonstrations, if required, will be furnished at no expense to the District.

ALTERNATES: Alternate offers on items comparable to the material, article or pieces of equipment listed in this Invitation for Bid are invited. Bidders should indicate clearly any deviation from the specifications of this solicitation. The District is under no obligation to consider or accept such offers.

DISCOUNTS: Cash discounts will **not** be considered in awarding a contract. Where cash discounts for prompt payment are offered, the discount period shall begin with the date of receipt of a correct invoice, or acceptance of final receipt of goods, whichever is later.

AWARD: Bids will be analyzed and the award made to the lowest responsible bidder whose offer conforms to the solicitation, and is considered the most advantageous to Shawnee Heights USD 450. Award may be made on an item-by-item basis, or based on group or total award. The District may issue a purchase order, contract, or both as its notification of award to the successful bidder.

NEW GOODS: Unless otherwise specified, all materials, supplies, articles or equipment offered by vendor must be new, unused and be the best of their respective kinds, free from defects in material or workmanship. Items will be subject to our inspection and approval. If a substitution is made at the time of delivery, it will be the decision of the USD Board of Education or District Purchasing Department to determine if it is acceptable.

DELIVERY: Delivery of goods or materials to be F.O.B. stated location. All items must be properly packed and crated to ensure delivery in good condition, and in accordance with any special instructions included in the 'Invitation for Bid' or purchase order.

DEFAULT ON DELIVERY: If the supplier refuses or fails to make deliveries of the materials, supplies, articles or equipment as defined in this solicitation or on our purchase order, the Board of education may terminate the right of the supplier to proceed with the transaction. A vendor who defaults on delivery may be barred from bidding on any subsequent Solicitation for a period to be determined.

REJECTED ITEMS: Rejected items will be held at the seller's risk and expense. Seller shall not provide replacement unless agreed to by the Board of Education or the District Purchasing Department.

PAYMENT: The Board of Education normally approves payments of invoices on the first and third Monday of each month. Claims received on or before the Wednesday of the week preceding a Board will be paid immediately following Board approval. Payment of the seller's invoice is subject to adjustment for any shortage or rejected items. Individual invoices must be issued for each shipment applying against a purchase order.

PATENT INFRINGEMENT: The supplier shall provide the standard patent infringement indemnity clause which shall hold and save the Board of Education and its officers, agents, servants, and employees, harmless from liability for use of any patented, or unpatented invention, process, article, or appliance manufactured, or used in the performance of the contract, including its use by the Board of Education.

INDUSTRY STANDARDS: Items must be furnished and performed in accordance with the best- established practice and standards recognized by the contracted industry and comply with all codes, regulations and governmental directives.

COMPETITION: The purpose of this solicitation is to seek competition. The vendor shall advise the District of any specification, language or other requirement inadvertently restricts or limits bidding to a single source. Notification shall be in writing and must be received no later than five business days prior to the bid closing date. The Board reserves the right to waive minor deviations in the specifications if they do not hinder the intent of the solicitation.

SUBMITTALS:
Mail or deliver to:
Shawnee Heights USD 450, Central Office
4401 SE Shawnee Heights Rd., Tecumseh, KS 66542

Refer to the cover page of this document for email, phone or fax numbers. Envelopes containing offers must be sealed and clearly marked on the lower left-hand corner with the firm name and address, quote or project name, and response due date and time. Electronic mail submissions may be delivered to whenle@lcgway.com.

CONTRACTUAL PROVISIONS ATTACHMENT

Shawnee Heights USD No. 450 | DA-146a (Rev. 09-25)

The parties agree that the following provisions are hereby incorporated into the agreement in which this attachment is incorporated and made a part thereof (the "Agreement"):

Terms Herein Controlling Provisions: It is expressly agreed that the terms of each and every provision in this attachment shall prevail and control over the terms of any other conflicting provision in the Agreement and any other document relating to and a part of the Agreement. Any terms that conflict or could be interpreted to conflict with this attachment are nullified.

Kansas Law and Venue: The Agreement shall be subject to, governed by, and construed according to the laws of the State of Kansas, and jurisdiction and venue of any suit in connection with the Agreement shall reside only in courts located in Shawnee County, Kansas.

Termination Due to Lack of Funding Appropriation: If sufficient funds are not appropriated to continue the function performed in the Agreement and for the payment of the charges hereunder, Shawnee Heights Unified School District (the District) may terminate the Agreement at the end of its current fiscal year. The District agrees to give written notice of termination to contractor at least 30 days prior to the end of its current fiscal year, and shall give such notice for a greater period prior to the end of such fiscal year as may be provided in this contract, except that such notice shall not be required prior to 90 days before the end of such fiscal year. Contractor shall have the right, at the end of such fiscal year, to take possession of any equipment provided under any contract for which it has not been paid. The District will pay to the contractor all regular contractual payments incurred through the end of such fiscal year, plus contractual charges incidental to the return of any such equipment. Upon termination of the Agreement by the District, title to any such equipment shall revert to Contractor at the end of the District's current fiscal year. The termination of the contract pursuant to this paragraph shall not cause any penalty to be charged to the agency or the contractor.

Disclaimer of Liability: No provision of this contract will be given effect that attempts to require the District to defend, hold harmless, or indemnify any contractor or third party for any acts or omissions. The liability of the District is defined under the Kansas Tort Claims Act (K.S.A. 75-6101, *et seq*.).

Anti-Discrimination Clause: Contractor agrees: (a) to comply with the Kansas Act Against Discrimination (K.S.A. 44-1001, *et seq*.) and the Kansas Age Discrimination in Employment Act (K.S.A. 44-1111, *et seq*.) and the applicable provisions of the Americans With Disabilities Act (42 U.S.C. 12101, *et seq*.) (ADA), and Kansas Executive Order No. 19-02, and to not discriminate against any person because of race, color, gender, sexual orientation, gender identity or expression, religion, national origin, ancestry, age, military or veteran status, disability status, marital or family status, genetic information, or political affiliation that is unrelated to the person's ability to reasonably perform the duties of a particular job or position; (b) to include in all solicitations or advertisements for employees, the phrase "equal opportunity employer"; (c) to comply with the reporting requirements set out at K.S.A. 44-1031 and K.S.A. 44-1116; (d) to include those provisions in every subcontract or purchase order so that they are binding upon such subcontractor or vendor; (e) that a failure to comply with the reporting requirements of (c) above or if the contractor is found guilty of any violation of such acts by the Kansas Human Rights Commission, such violation shall constitute a breach of contract and the Agreement may be cancelled, terminated or suspended, in whole or in part, by the contracting state agency or the Kansas Department of Administration; (f) if it is determined that the Contractor has violated applicable provisions of ADA, such violation shall constitute a breach of contract and the Agreement may be cancelled, terminated or suspended, in whole or in part, by the District or the Kansas Department of Administration.

Contractor agrees to comply with all applicable state and federal anti-discrimination laws.

The provisions of this paragraph number 5 (with the exception of those provisions relating to the ADA) are not applicable to a Contractor who employs fewer than four employees during the term of such contract or whose contracts with the contracting State agency cumulatively total $5,000 or less during the fiscal year of such agency.

Acceptance: The Agreement shall not be considered accepted, approved or otherwise effective until the statutorily required approvals and certifications have been given, including, but not limited to the signature of an authorized representative of the District, as defined in District policy.

Arbitration, Damages and Warranties: Notwithstanding any language to the contrary, no interpretation of this contract shall find that the State or the District have agreed to binding arbitration, or the payment of damages or penalties. Further, the District does not agree to pay attorney fees, costs, or late payment charges beyond those available under the Kansas Prompt Payment Act (K.S.A. 75-6403), and no provision will be given effect that attempts to exclude, modify, disclaim or otherwise attempt to limit any damages available to the District at law, including but not limited to the implied warranties of merchantability and fitness for a particular purpose.

Representative's Authority to Contract: By signing and entering into contract with the District, the representative of Contractor thereby represents that such person is duly authorized by Contractor to execute the contract on behalf of Contractor and that Contractor agrees to be bound by the provisions thereof.

Responsibility for Taxes: Shawnee Heights USD 450 is exempt from all federal and local taxes unless otherwise imposed by a governmental body and applicable to the items on the proposal. Reference K.S.A. 79-3606 (c) governing items purchased directly by a public or private elementary or secondary school or educational institution.

Insurance: The District shall not be required to purchase any insurance against loss or damage to property or any other subject matter relating to this contract, nor shall this contract require it to establish a "self-insurance" fund to protect against any such loss or damage. Subject to the provisions of the Kansas Tort Claims Act (K.S.A. 75-6101, *et seq*.), Contractor shall bear the risk of any loss or damage to any property in which Contractor holds title.

Information: No provision of this contract shall be construed as limiting the State of Kansas Legislative Division of Post Audit from having access to information pursuant to K.S.A. 46-1101, *et seq*.

Confidentiality: The District's contracts are generally public records. Accordingly, no provision of this contract shall restrict the District's ability to produce this contract and/or any corresponding documents in response to a lawful request or from otherwise complying with the Kansas Open Records Act (K.S.A. 45-215, *et seq*.).

The Eleventh Amendment: The Eleventh Amendment is an inherent and incumbent protection with the State of Kansas and need not be reserved, but prudence requires the State and the District to reiterate that nothing related to this contract shall be deemed a waiver of the Eleventh Amendment.

Campaign Contributions / Lobbying: Funds provided through a grant award or contract shall not be given or received in exchange for the making of a campaign contribution. No part of the funds provided through this contract shall be used to influence or attempt to influence an officer or employee of the District regarding any pending legislation or the awarding, extension, continuation, renewal, amendment or modification of any government contract, grant, loan, or cooperative agreement.

Privacy of Student Records: Contractor understands that the District is subject to the Family Educational Rights and Privacy Act (20 U.S.C. § 1232g) (FERPA) and agrees to handle any student education records it receives pursuant to the contract in a manner that enables the District to be compliant with FERPA and its regulations. Contractor agrees to protect the privacy of student data and educational records in a commercially reasonable manner and shall not transmit, share, or disclose any data about a student without the student's written consent, except to other District officials who seek the information within the context of his/her professionally assigned responsibilities and used within the context of official District business. Contractor shall promptly report to the District any request for or improper disclosure of District's student educational records.

Export Control: Contractor agrees to comply with all U.S. Laws relating to the transfer, export, or re-export of technology and technical data, as defined in the export controls under the International Traffic in Arms Regulations (ITAR) 22 Code of Federal Regulations Parts 120-130 or the Export Administration Regulations (EAR) 15 Code of Federal Regulations Parts 730-774. The release of information to any employee or other person, who is not a U.S. Citizen or permanent resident, as well as to corporations or to any other entity, organization, or group that is not incorporated or otherwise organized to do business in the United States may require advanced written authorization from the appropriate U.S. agency. Contractor shall notify District in writing prior to disclosure of any technical data or other items subject to EAR or ITAR and identify the export controlled items at issue and the applicable categories and subcategories of the United States Munitions List and/or Export Control Classification Number(s). District reserves the right to decline to accept any items or information controlled under ITAR or EAR.

Certification: Contractor certifies that to the best of its knowledge neither it nor any of their principals are presently debarred, suspended, proposed for debarment, the subject of an indictment involving the criminal statutes enumerated in 22 Code of Federal Regulations § 120.6, or otherwise declared ineligible for the award of contracts by any Federal agency. Contractor shall provide immediate written notice to the District if at any time it learns that this certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

Facility Access: To the extent Contractor is required to be on the District's premises in the performance of any contract, Contractor and its representatives will adhere to the District's reasonable safety and security policies and procedures, and will use commercially reasonable efforts not to interfere with the District's regular operations. Contractor further agrees to, upon request, include the District as an additional insured on its general liability insurance policy on a primary and non-contributory basis and provide the District with a certificate of insurance.

Accounts Receivable Set-Off Program: If, during the course of this contract, Contractor is found to owe a debt to the State of Kansas, District payments to Contractor may be intercepted / set-off by the State of Kansas as set forth by law. Notice of the setoff action will be provided to Contractor. Pursuant to K.S.A. 75-6201, *et seq*., Contractor shall have the opportunity to challenge the validity of the debt. If the debt is undisputed, Contractor shall credit the District's account showing payment has been made in an amount equal to the funds intercepted. K.S.A. 75-6201, *et seq*. allows the Director of Accounts and Reports to set off District payments to Contractor against debts owed by Contractor to the State of Kansas. Payments set off in this manner constitute lawful payment for services or goods received. Contractor benefits fully from the payment because its obligation to the State of Kansas is reduced by the amount subject to setoff.

Sexual Harassment and Retaliation Prohibited: In accordance with Kansas Executive Order 18-04, the District has policies prohibiting sexual harassment, discrimination, and retaliation. These policies provide for confidentiality and anonymous reporting. To view these policies or to make a report of sexual harassment, discrimination, or retaliation, please visit https://www.usd450.net/page/board-policies.

Electronic Signature: The parties agree that the contract may be signed with electronic signatures. If an electronic signature is used, the parties agree that it is the legally binding equivalent to the signing party's handwritten signature. Whenever either party executes an electronic signature on the contract, it has the same validity and meaning as a handwritten signature. The parties agree that neither party will, at any time in the future, repudiate the meaning of an electronic signature or claim that an electronic signature is not legally binding.

Defend Trade Secrets Act: Notwithstanding any confidentiality obligations set forth in the Agreement and any other confidentiality provision or document relating to the Agreement, Contractor understands that, pursuant to the Defend Trade Secrets Act of 2016, Contractor will not be held criminally or civilly liable under any Federal or State trade secret law for the disclosure of a trade secret that: (i) is made (A) in confidence to a Federal, State, or local government official, either directly or indirectly, or to an attorney; and (B) solely for the purpose of reporting or investigating a suspected violation of law; or (ii) is made in a complaint or other document filed in a lawsuit or other proceeding, if such filing is made under seal. Contractor understands that in the event it is determined that disclosure of trade secrets was not done in good faith pursuant to the preceding sentence, Contractor will be subject to substantial damages, including punitive damages and attorneys' fees.

Force Majeure: The District shall not be liable to Contractor or any third party for any failure or delay caused by events beyond The District's reasonable control, whether foreseeable or unforeseeable, including but not limited to: an act of God; inevitable accident, fire, labor dispute, riot or civil commotion; act of public enemy, terror, or war; governmental act; epidemic; pandemic (including but not limited to COVID-19); viral outbreaks; outbreaks of communicable disease or any other public health crisis; quarantines or other restrictions; national or regional emergencies; regulation or rule; governmental regulations or restrictions on travel, movement, and large gatherings; failure of technical facilities; national day of mourning; emergency announcement or news bulletin; inability to obtain supplies, delays in transportation, embargoes; or other reason beyond the reasonable control of the District (each, a "Force Majeure Event"). The District shall notify Contractor as soon as reasonably practicable of any Force Majeure Event and use its reasonable best efforts to mitigate and remedy the adverse effects of such Force Majeure Event. In the event said Force Majeure Event persists for more than thirty (30) days, the District shall have the option to terminate the Agreement, without penalty.

SHAWNEE HEIGHTS UNIFIED SCHOOL DISTRICT 450

REQUEST FOR QUOTATION OR BID

Shawnee Heights Unified School District 450
4401 S.E. Shawnee Heights Road, Tecumseh, KS 66542-9799

Date February 10, 2026

(Sealed) (Submitted) bids will be opened for the Shawnee Heights Unified School District 450 for items or services outlined within.

On February 24, 2026 at the USD 450 Central Services Facility, 4401 SE Shawnee Heights Road, Tecumseh, KS 66542.

Regulations for bidders:

1. Any bid received after time for openings of bids will be returned unopened.
2. All bids will be figured F.O.B. Shawnee Heights USD 450, 4401 S.E. Shawnee Heights Rd., Tecumseh, KS.
3. Any or all items may be accepted or rejected by the (Board) or (Representative of the Board).
4. Samples shall be furnished where specified, otherwise bids will not be considered.
5. Do not bid on items that cannot be furnished.
6. Labor and material bids are to be separated when project bids are made.
7. Firm delivery date must be adhered to by the bidder.
8. See additional terms and conditions for vendors at https://www.usd450.net/page/business-office.

Quantity	Item	Unit	Total

TERMS: _____

Delivery: _____

Firm: _____

Or

Address: _____

Estimated date of Completion of Projects.

_____

_____

Signature: _____

Title: _____

Telephone: _____

THIS IS NOT A PURCHASE ORDER

1. **Scope Outline**
    a. Bid evaluations will include schedule conformance, contract comments, and scope inclusions. In the event that the low responsive bidder and the district cannot come to an agreement on these clarifications, the district will move to the second low responsible bidder to evaluate conformance with district requirements
    b. Furnish and install all work required for the Heating, Ventilation, and Air Conditioning (HVAC) scope, including associated electrical scope, in accordance with contract documents including, but not limited to, the following:
        i. Selective Demolition
            1. Demolish and remove existing units to be replaced.
            2. Disconnect and "make safe" all HVAC components prior to demolition as required
                a. Drain down of all HVAC hydronic piping and systems
                b. Evacuation of all refrigerant from HVAC piping and systems
            3. Removal and haul off all HVAC components as indicated per Contract Documents
            4. Removal of existing rooftop HVAC equipment and ductwork as indicated. Cap existing curbs and ductwork as required. Coordinate with roofer for patching of other penetrations.
            5. Include patching at all penetrations where this scope demolishes items but does not go back with new work.
        ii. General
            1. Furnish and install all system identification
            2. Furnish and install duct and equipment mounted access panels as required.
            3. All roof, wall, and floor penetrations required.
                a. All core drilling/cutting and install sleeves for all floor, wall, and roof penetrations.
                b. Caulking, sealants, non-shrink grout and/or firestopping of all annular space around penetrations, required through non-rated and rated wall assemblies.
            4. All vibration and seismic control and vibration and seismic isolation supports.
        iii. Testing
            1. All inspections, tests, and certifications required for all HVAC systems, control systems, equipment, and material.
            2. HVAC system testing and balancing
                a. Test, adjust, and balance the HVAC system
            3. Start up, testing and owner training of all systems required including all factory authorized startups
            4. Provide Contractor with all testing verification/paperwork
    c. Coordination
        i. Coordinate all fire alarm needs with existing fire alarm system
        ii. Confirm new unit size/weight with MEP Engineer.
    d. Insulation
        i. Furnish and install piping, ductwork, and equipment insulation and jacketing
    e. Controls
        i. Furnish and install the following:
            1. Temperature controls and devices,
            2. Interconnections and instrumentation required to connect to facility management system.

f. Filtration
    i. Furnish and install all filter media at all locations including:
        1. Initial set of filter media at all equipment during start up
        2. One final set of filter media installed before test and balance begins.
g. Equipment
    i. Furnish and install the following:
        1. Packaged HVAC equipment with all contacts required to communicate with building fire alarm and control systems
        2. Curbs
h. Provide electrical scope as required, including all work noted on the electrical drawings associated with the mechanical units.
i. Provide date in which contract must be approved for the following durations to meet substantial completion.
j. Provide durations below (working days)
    i. Generation of Submittals _____
    ii. Submittal Approval Deadline _____
    iii. Leadtime of Units _____
    iv. Complete Installation _____

k. Provide proposed manufacture of units
l. Provide proposed controls subcontractor/Manufacturer
m. Provide proposed electrical subcontractor
n. Provide any comments and/or clarifications on Terms and Conditions
o. Provide itemization of units to be replaced on Request for quotation form that is attached. Include all labor, material, supervision and management, overhead and profit, and equipment cost with each piece of equipment.

ABBREVIATIONS

Ø	ROUND DIAMETER
ALT	ALTERNATE
AFF	ABOVE FINISHED FLOOR
AFMS	AIRFLOW MEASURING STATION
AFUE	ANNUAL FUEL UTILIZATION EFFICIENCY
BAC	BUILDING AUTOMATION CONTROL
BAS	BUILDING AUTOMATION SYSTEM
BTU	BRITISH THERMAL UNITS
BTUH	BRITISH THERMAL UNITS PER HOUR
CAP	CAPACITY
CAV	CONSTANT AIR VOLUME
CFM	CUBIC FEET PER MINUTE
CO	CLEANOUT
DB	DRY BULB TEMPERATURE
DD	DIRECT DRIVE
DEMO	DEMOLISH
DN	DOWN
DP	DIFFERENTIAL PRESSURE
DX	DIRECT EXPANSION
(E)	EXISTING COMPONENT DESIGNATION
EA	EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE
EC	ELECTRICAL CONTRACTOR
ECM	ELECTRONICALLY COMMUNICATED MOTOR
ETR	EXISTING TO REMAIN
EWT	ENTERING WATER TEMPERATURE
°F	DEGREES FAHRENHEIT
FCO	FLOOR CLEANOUT
FPM	FEET PER MINUTE
GC	GENERAL CONTRACTOR
GPM	GALLONS PER MINUTE
HGB	HOT GAS BYPASS
LAT	LEAVING AIR TEMPERATURE
LB/HR	POUNDS PER HOUR
LWT	LEAVING WATER TEMPERATURE
MAT	MIXED AIR TEMPERATURE
MBH	ONE THOUSAND BTU PER HOUR
MC	MECHANICAL CONTRACTOR
MFR	MANUFACTURER
MOA	MINIMUM OUTSIDE AIR
MVSA	MEDIUM VELOCITY SUPPLY AIR
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
NTS	NOT TO SCALE
OA	OUTSIDE AIR
OAT	OUTSIDE AIR TEMPERATURE
OCC	OCCUPANCY
PC	PLUMBING CONTRACTOR
PD	PRESSURE DROP
PSI	POUNDS PER SQUARE INCH
PSIG	POUNDS PER SQUARE INCH GAUGE
PWR	POWER
RA	RETURN AIR
RH	RELATIVE HUMIDITY
RPM	REVOLUTIONS PER MINUTE
SA	SUPPLY AIR
SAT	SUPPLY AIR TEMPERATURE
SF	SQUARE FOOT
SP	STATIC PRESSURE
TA	TRANSFER AIR
TCC	TEMPERATURE CONTROL CONTRACTOR
TCP	TEMPERATURE CONTROL PANEL
UV	ULTRAVIOLET STERILE CONDITIONER
VAV	VARIABLE AIR VOLUME
VENT	VENTILATION
VFD	VARIABLE FREQUENCY DRIVE
WB	WET BULB TEMPERATURE

GENERAL SYMBOLS

(#) (#) (#)	REFER TO PLAN NOTES
	EXISTING COMPONENT PEN WEIGHT
	DEMOLITION PEN WEIGHT - COMPONENT SHADED
ROOM 111	ROOM CALLOUT
	AREA NOT IN SCOPE HATCHING
	REVISION NUMBER
	CONNECT NEW TO EXISTING - VERIFY EXACT LOCATION
	DISCONNECT FROM EXISTING - VERIFY EXACT LOCATION
	PIPE / DUCT CONTINUATION SYMBOL
FC-01	UNIQUE I.D. (FAN COIL UNIT NO. 1) TYPICAL EQUIPMENT CALLOUT EQUIPMENT TYPE (FC=FAN COIL UNIT)

PIPE SYMBOLS

	DIRECTION OF FLOW
	PIPE DROP / SIDE CONNECTION / PIPE RISE
	TEE OUTLET DOWN / TEE OUTLET UP
	BOTTOM / TOP CONNECTION, 45° OR 90°
	CAP / CAPPED OUTLET
	BALL VALVE / GLOBE VALVE
	CONCENTRIC / ECCENTRIC REDUCER OR INCREASER
	PRESSURE REDUCING VALVE / PLUG VALVE
	BUTTERFLY VALVE
	CIRCUIT SETTER
	CHECK VALVE
	STRAINER / UNION

MECH. PIPING SYMBOLS

RL	REFRIGERANT LIQUID LINE (SUPPLY)
RS	REFRIGERANT SUCTION LINE (RETURN)

PLUMBING SYMBOLS

G	NATURAL GAS
CD	CONDENSATE DRAIN
CO / FCO	CLEANOUT (FLOOR)

HVAC SYMBOLS

24x12	(UP)DUCT SECTION, POSITIVE PRESSURE- FIRST SIZE IS TOP DIM.(TYP.)
24x12	(DOWN) DUCT SECTION, POSITIVE PRESSURE
24x12	(UP) DUCT SECTION, NEGATIVE PRESSURE
24x12	(DOWN) DUCT SECTION, NEGATIVE PRESSURE
	FLEXIBLE DUCT
	TURNING VANES
18x12	DUCT SIZE, FIRST IS SIDE SHOWN CLEAR INSIDE DIM.
	SUPPLY FLOW ARROW / RETURN FLOW ARROW
	FLEXIBLE CONNECTION
	BALANCE DAMPER - MANUAL LOCKING QUADRANT RECT: OPPOSED BLADE / ROUND: BUTTERFLY
	BALANCE DAMPER - MOTORIZED LOCKING QUADRANT RECT: OPPOSED BLADE / ROUND: BUTTERFLY
FD	FIRE DAMPER (FD) IN WALL / FLOOR
SD	SMOKE DAMPER (SD) IN WALL / FLOOR
FSD	COMBO FIRE/SMOKE DAMPER (FSD) IN WALL / FLOOR
T	THERMOSTAT (TSTAT) / TEMPERATURE SENSOR
H	HUMIDISTAT (HSTAT) / HUMIDITY SENSOR

GENERAL DEMO. NOTES

1. VERIFY ALL EXISTING CONDITIONS PRIOR TO BEGINNING WORK. BRING ANY DISCREPANCIES FROM THE DRAWINGS AND NOTES TO THE ARCHITECT IMMEDIATELY. MINOR CHANGES IN THE SCOPE OF THE DEMOLITION WORK SHALL NOT JUSTIFY AN ADDITIONAL COST.
2. REMOVAL OF EXISTING FIXTURES AND EQUIPMENT WILL REQUIRE ISOLATING THE PIPING RISERS OR MAINS VIA SHUT-OFF VALVES. INSTALL NEW ISOLATION VALVES WHERE REQUIRED FOR COMPLETION OF WORK.
3. REMOVAL OF EXISTING DUCTWORK, DIFFUSERS, GRILLES, REGISTERS, PLUMBING FIXTURES, ETC. WILL REQUIRE TEMPORARY CAPPING AND SEALING EXISTING MAINS OR BRANCHES AS NECESSARY AND REQUIRED TO ALLOW THE REMAINING SYSTEMS TO FULLY OPERATE WITHOUT DEGRADATION.
4. CONTRACTOR SHALL PROVIDE PROTECTIVE PLASTIC DROP CLOTHS TO PROTECT THE EXISTING OCCUPIED AREAS AND EQUIPMENT FROM DUST AND DEBRIS DURING THE CONSTRUCTION WORK, AND SHALL CLEAN THE AREAS OF ALL CONSTRUCTION DIRT DAILY, AND UPON COMPLETION OF THE WORK.
5. ALL DRAINED PIPING RISERS AND MAINS SHALL BE REFILLED WITH PROPER FLUID AND PROPERLY VENTED BY THIS CONTRACTOR, ONCE NEW WORK HAS BEEN INSTALLED.
6. COORDINATE WITH OWNER THE REMOVAL AND REPLACEMENT OF ALL EXISTING CEILINGS, WALLS, ETC. AS REQUIRED FOR MECHANICAL DEMOLITION WORK.
7. EXISTING DUCTS, PIPING, AND EQUIPMENT, ETC., NOT TO BE UTILIZED IN THE COMPLETED BUILDING SHALL BE DISCONTINUED OR REMOVED AS REQUIRED. ALL ENDS OF DISCONTINUED DUCTS AND PIPING SHALL BE CAPPED IN THE NEAREST WALL, CEILING OR FLOOR SO THAT THEY ARE COMPLETELY CONCEALED. OPENINGS LEFT IN WALLS, CEILINGS, ETC., WHERE EQUIPMENT, PIPE, DUCTS, ETC., ARE REMOVED AND NOT REPLACED, SHALL BE PATCHED NEATLY WITH SIMILAR MATERIAL TO ADJACENT CONSTRUCTION.
8. ALL ACCESSIBLE ABANDONED PIPING AND DUCTWORK SHALL BE REMOVED AND PROPERLY DISPOSED OF.
9. EXISTING PIPING, FIXTURES AND EQUIPMENT THAT ARE NOT TO BE REUSED SHALL BE REMOVED AND SHALL REMAIN THE PROPERTY OF THE OWNER IF THEY WISH TO RETAIN OWNERSHIP OF SAME. IF NOT, EQUIPMENT SHALL BECOME THE PROPERTY OF THIS CONTRACTOR AND SHALL BE REMOVED FROM THE SITE AS SOON AS PRACTICAL AND DISPOSED OF IN ACCORDANCE WITH APPLICABLE LAWS AND REGULATIONS.
10. ALL CUTTING AND CHANNELING OF EXISTING BUILDING SHALL BE ACCOMPLISHED IN A NEAT AND WORKMANLIKE MANNER WITHOUT REMOVAL OF EXCESS MATERIALS. THIS CONTRACTOR SHALL PATCH AND REPLACE WITH MATERIAL SIMILAR TO ADJACENT CONSTRUCTION.
11. CUTTING OF STRUCTURAL MEMBERS IS NOT ALLOWED.
12. PORTIONS OF EXISTING SYSTEMS MAY BE SHOWN FOR CLARITY EVEN THOUGH IT MAY NOT BE NECESSARY TO MODIFY OR REVISE THEM. ALL EXISTING SYSTEMS ARE SHOWN BASED ON ORIGINAL OR REMODEL BUILDING DRAWINGS. CONTRACTOR TO VERIFY ALL EXISTING CONDITIONS.
13. WHERE EXISTING DUCTS, PIPING, AND EQUIPMENT, ETC. THAT ARE TO BE UTILIZED IN THE COMPLETED PROJECT CONFLICT WITH NEW CONSTRUCTION AND THE REQUIRED DEMOLITION, THEY SHALL BE RELOCATED AND RECONNECTED TO MAINTAIN THE DESIRED SERVICE. ALERT ENGINEER TO ANY MAJOR RELOCATIONS REQUIRED.
14. ALL CONTRACTORS SHALL GIVE FULL COOPERATION TO THE OWNER IN THE SCHEDULING AND PROCEDURE OF WORK TO PROVIDE THE LEAST AMOUNT OF DISRUPTION AS POSSIBLE. CONTRACTORS SHALL TAKE EVERY PRECAUTION TO PREVENT DAMAGE FROM FREEZING TO EXISTING SYSTEMS AND SHALL MAINTAIN A CONDITIONED SPACE FOR ALL OWNER OCCUPIED AREAS DURING CONSTRUCTION.

GENERAL NOTES

1. ALL WORK IS TO CONFORM WITH APPLICABLE CODES AND STANDARDS.
2. VERIFY JOB SITE CONDITIONS AND DIMENSIONS BEFORE BEGINNING WORK. PLANS ARE SCHEMATIC IN NATURE. LAYOUT IS BASED ON BEST AVAILABLE INFORMATION. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS AND DIMENSIONS.
3. NO PIPING, DUCTWORK, ETC. SHALL PENETRATE STRUCTURAL MEMBERS.
4. PROVIDE MISCELLANEOUS CUTTING, PATCHING AND REPAIRING OF FINISHES, ROOF, WALLS, ETC., AS REQUIRED TO ACCOMMODATE THE NEW WORK. ALL CUTTING AND PATCHING SHALL BE CLOSELY COORDINATED WITH THE G.C.
5. G.C. IS TO PATCH ANY OPENINGS IN CORRIDORS REQUIRED TO BE CONSTRUCTED TO LIMIT THE TRANSFER OF SMOKE AND IN SMOKE BARRIERS AS REQUIRED TO MEET CODE REQUIREMENTS. SEE ARCHITECTURAL DRAWINGS FOR LOCATIONS.
6. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY EXACT LOCATION, CONFIGURATION AND ROUTING OF EXISTING SYSTEMS REQUIRED TO REMAIN IN OPERATION DURING THE PROJECT TO PREVENT DAMAGE DURING DEMOLITION AND PHASING.
7. REMOVE ALL EXISTING EQUIPMENT, DUCTWORK AND PIPING THAT IS NOT REQUIRED FOR A WORKING INSTALLATION.
8. COORDINATE ALL WORK WITH OTHER TRADES PRIOR TO INSTALLATION.
9. ALL PENETRATIONS THROUGH FIRE RATED ASSEMBLIES SHALL BE FIRE STOPPED BY THE TRADE MAKING THE PENETRATION. REFER TO ARCHITECTURAL DRAWINGS AND SPECIFICATIONS FOR REQUIREMENTS.
10. ALL EQUIPMENT SUPPORT STANDS SHALL BE PRIMED AND PAINTED WITH EPOXY ENAMEL.
11. CONTRACTOR TO INSTALL TEMPORARY FILTERS OVER ALL RETURN AND EXHAUST GRILLES IN WORK AREA DURING CONSTRUCTION.
12. EQUIPMENT THAT REQUIRES MAINTENANCE SHALL BE LOCATED A MINIMUM OF 15'-0" FROM THE BUILDING ROOF EDGE TO OMIT FALL PROTECTION REQUIREMENTS.
13. THESE DRAWINGS ARE ACCOMPANIED BY SPECIFICATIONS. REFER TO SPECIFICATIONS FOR FURTHER INFORMATION.

MECHANICAL SHEET INDEX

SHEET NO.	SHEET TITLE
MP001	MECHANICAL COVER SHEET
MP002	MECHANICAL SPECIFICATIONS
MD101	MECHANICAL ROOF DEMOLITION PLAN
M-100	MECHANICAL FIRST FLOOR PLANS
M-101	MECHANICAL ROOF PLAN
M-601	MECHANICAL SCHEDULES AND DETAILS
M-701	CONTROL DETAILS

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DATE:
02/09/2026

REVISED DATE:

Shawnee Heights High School HVAC Equipment Upgrade

Shawnee Heights ESD 450

4201 SE Shawnee Heights Rd, Tecumseh, KS 66542

SHEET CONTENTS:
MECHANICAL COVER SHEET

HTK PROJECT NUMBER:
2404.01

SHEET NUMBER:
MP001

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SECTION 200500 – COMMON WORK RESULTS FOR FIRE PROTECTION, PLUMBING, AND MECHANICAL

1.1 GENERAL CONDITIONS
A. The General Conditions, Supplemental General Conditions, Special Conditions and General Requirements in Division 01 are part of this contract and shall be referred to as they apply to this section of the specifications.
1.2 EXAMINATION OF SITE
A. Visit the site, inspect the existing conditions, and check the drawings and specifications so as to be fully informed of the requirements for completion of the work. Lack of such information shall not justify an extra to the contract price.
1.3 SCOPE
A. The Mechanical Work shall include labor, materials, and equipment to install systems as shown on plans and hereinafter specified. The installation shall include all labor, materials, tools, transportation, equipment, services, and facilities, required for the complete, proper and substantial installation of all mechanical work shown on the plans, and/or outlined in these specifications. The installation shall include all materials, appliances, and apparatus not specifically mentioned herein or noted on the drawings, but which are necessary to make a complete working installation of all mechanical systems.
B. Show on prints in red ink all changes from original plans made during the installation. Return these prints to the Architect upon completion of the project.
C. By bidding, this contractor acknowledges his understanding of the work to be done and agrees to install complete and workable systems.
1.4 CODES
A. Execute work in compliance with all applicable Federal, State and Municipal laws, codes, ordinances, and local customs regarding the trade to perform the work. The Contractor is required to verify that all installations comply with applicable codes. The codes applicable to this specific project may be listed on the Architect's code compliance sheet. If not, it is the Contractor's responsibility to determine which codes apply to the installations.
B. Codes shall govern in case of any direct conflict between codes and plans and specifications; except when plans and specifications require higher standards than those required by code. Variance from the plan and specifications made to comply with code must be approved by the Architect. If approved, they shall be made with no increased cost to the Owner.
1.5 DEFINITIONS
A. It shall be understood that the drawings and specifications complement one another, and items specified shall also meet the criteria set forth on the drawings.
B. Where any device or item is referred to in the singular sense (such as "the unit"), such reference applies to as many devices as are required to complete the installation as shown on the drawings.
C. The term "work" shall mean all obligations imposed upon the Contractor by the Contract Documents.
1.6 ABBREVIATIONS
ADA - Americans with Disabilities Act
AGA - American Gas Association
AISI - American Iron and Steel Institute
AMCA - Air Moving and Conditioning Association, Inc.
ANSI - American National Standards Institute
ASHRAE - American Society of Heating, Refrigeration & Air-Conditioning Engineers, Inc.
ASME - American Society of Mechanical Engineers
ASTM - American Society for Testing and Materials
AWWA - American Water Works Association
BPVC - Boiler and Pressure Vessel Code of ASME
CISPI - Cast Iron Soil Pipe Institute
NFPA - National Fire Protection Association
SMACNA - Sheet Metal and Air-Conditioning Contractors National Association
UL - Underwriters' Laboratories, Inc.
ETL - ETL Testing Laboratories, Inc.
OSHA - Occupational Safety and Health Administration
1.7 PERMITS
A. Obtain and pay for all licenses and permits, fees, inspection and certificates required for the execution of this work.
B. Pay fees and charges for connection to outside services and use of property.
C. Deliver permits and certificates to the Architect for transmittal to the Owner.
1.8 UTILITY SERVICES:
A. This Contractor shall pay for all expenses, deposits, reimbursements, etc., required by the local rules and codes for the service to the buildings, complete and ready for use.
B. Consult gas, water, and sewer utility for their requirements and for coordinating with their installation. Contractor shall provide any work thus required beyond that indicated by the drawings and specifications. Contractor shall bear all expense involved for the complete installation of the gas service (both temporary and permanent) to the building ready for operation, including utility service charges, except as specifically excluded on the plans.
C. This Contractor shall consult all local departments to verify requirements and bid installation for service in accordance with local codes and Utility company rules and regulations.
1.9 RESPONSIBILITY
A. This contractor will be held responsible for any and all damage to any part of the building or to the work of other contractors, as may be caused through his operation.
B. The operation and maintenance of the new Mechanical equipment during construction shall be the responsibility of this contractor until the acceptance of the building by the Owner.
C. The General Contractor shall pay for all fuel cost for operation of the equipment, unless indicated otherwise in the specifications.
D. The Mechanical and General Contractors shall coordinate to make all provisions for entry of equipment, installed under this Contract, to the installed location. Contractors shall provide openings in existing construction if necessary. Contractors shall perform repairs necessary to restore the building to the original condition. During the period of entry of equipment and removal of trash, no disruption of the Owner's normal business shall occur.
1.10 WORK TO BE DONE BY GENERAL CONTRACTOR
A. Build in all openings, sleeves, chases, etc., for piping, as established, furnished, and set by this contractor.
B. Mechanical Contractor shall furnish bolts, brackets, hangers, etc., required for work established and arrange for General Contractor to build into concrete structure. General Contractor shall install all factory sleeved fire dampers, furnished by Mechanical Contractor, in walls and floors.
C. Frame around and provide openings for ductwork, louvers, roof drains, etc.
D. Build curb or install factory curb and provide flashing for roof mounted mechanical equipment. Provide heavy steel angle support under entire perimeter of roof curb for rooftop equipment. Metal deck and roof insulation shall be installed within the roof curb area of rooftop equipment for acoustical considerations.
E. Provide lintels over wall openings.
F. Build concrete base for equipment furnished and set by this contractor.
G. Provide concrete housing for sewage ejector and sump pump basins.
H. Paint all mechanical equipment so specified. Use paint which is specified by the Architect.
I. Do excavation, provide moisture barrier, sand and/or gravel, tie down wire, and a minimum thickness of 3" of lightweight concrete for installation of duct below grade. Mechanical Contractor shall furnish duct and set in place in preparation for concrete pour.
1.11 WORK TO BE DONE BY ELECTRICAL CONTRACTOR
A. The Electrical Contractor shall provide all motor starters complete with auxiliary contacts where required for the function of this system unless specifically noted otherwise on the plans or in these specifications.
B. All required line voltage wiring for the mechanical control system shall be furnished and installed by the Electrical Contractor under supervision of the Control Manufacturer's representative.
C. Check mechanical specifications to verify wiring requirements for motor driven equipment. Provide complete wiring for the equipment including all required interlocking. Provide complete wiring for power factor correction capacitors.
D. The Electrical Contractor shall install the power factor correction capacitors furnished by the Mechanical Contractor for equipment so specified.
1.12 ELECTRICAL REQUIREMENTS BY MECHANICAL CONTRACTOR
A. Mechanical Contractor shall furnish all motors, motor interlocking control devices, certain magnetic starters, etc.
B. Submittals shall include complete equipment wiring diagrams and temperature control drawings for all the equipment furnished.
C. Submittals shall show all wiring connections, starters, auxiliary contactors, interlocking selector switches, separate control voltage power supplies, for each and every item of equipment, etc., requiring wiring.
D. Provide one copy of Engineer approved shop drawings showing all wiring and temperature control requirements of all mechanical equipment to the Electrical Contractor.
1.13 WORKMANSHIP AND COORDINATION
A. Make installation substantially as shown on the plans.
B. Pipe and duct routing and equipment location shown on the drawings are schematic in nature. Make alterations in location of apparatus or piping as may be required to conform to building construction without extra charge.
C. Equipment service clearances, per equipment manufacturers' specifications, shall be maintained from general construction. No pipe or ductwork shall be installed within these clearances. No piping, coils, or ductwork shall be installed above electrical panels, starters, or switch gear, or in elevator equipment rooms.
D. Cooperate with other contractors in their installation of work.
E. The ductwork shall take precedence over all pipe work except where it is necessary to maintain an even grade or specific slope on the piping.
F. Use only experienced mechanics.
1.14 MATERIALS
A. Material and equipment shall be new, of best quality and design and free from defects. A manufacturer's nameplate affixed in a conspicuous place will be required on each major component of equipment stating manufacturer's name, address, and catalog number.
1.15 MATERIALS OF APPROVED EQUAL
A. Where items of equipment and/or materials are specifically identified herein by a manufacturer's name, model, or catalog number, only such specific items may be used in the base bid, except as hereinafter provided.
B. Unless requests for changes in base bid specifications are received and approved and noted by addendum prior to the opening of bids, the successful contractor will be held to furnish specified item.
C. After contract is awarded, changes in specifications shall be made only as defined under "Substitution of Equipment".
1.16 SUBSTITUTION OF EQUIPMENT
A. After execution of the contract, substitution of equipment of makes other than those specifically named in the contract documents will be approved by the Engineer only if the equipment named in the specifications cannot be delivered to the job in time to complete the work in proper sequence to work of other contractors, due to conditions beyond control of the contractor.
B. Requests for substitutions must be accompanied by documentary proof of equality or difference in price and delivery, if any, in form of certified quotations from suppliers of both specified and proposed equipment.
C. The Owner shall receive all benefits of the difference in cost involved in any substitution, and the contract altered by change order to credit Owner with any savings so obtained.
1.17 SUBMITTALS
A. Contractor shall send to the Architect for approval submittals on all equipment, accessories, and components.
B. Submittals shall be in electronic format (PDF) and all submittals by each trade shall be submitted together as a package to be reviewed together. Incomplete submittals packages or submittals sections sent in a piecemeal manner will not be reviewed until all sections are received.
C. Where catalog cuts are used, mark them to indicate equipment, capacities, controls, fittings, valves, sizes, etc.
D. Reference each item to applicable specification paragraph number and plan sheet number. Reference items not appearing in base specification to applicable alternate numbers, change order numbers, letters of authorization, etc.
E. All shop drawings shall be checked and signed by the mechanical contractor prior to submittal to the Engineer.
F. Shop drawings submitted without contractor's signature or approval and verification will not be approved. Quantities will not be checked or verified. It is the contractor's responsibility to provide the proper quantities required to complete the job.
G. Portions of the work requiring a shop drawing submittal shall not begin until the shop drawing has been approved by the Engineer.
H. Submit wiring diagrams for all mechanical equipment requiring field wiring clearly showing all required connections.
I. Engineer's acceptance of Compliance Submittals will not relieve Contractor from his responsibility for any deviations from the requirements of the Contract Documents unless Contractor has in writing called Engineer's attention to such deviation at the time of submission and Engineer has given written approval to the specific deviation, nor shall any acceptance by Engineer relieve Contractor from responsibility for errors or omissions in Compliance Submittals.
1.18 CUTTING AND PATCHING
A. Notify the General Contractor in ample time, of the location of all chases, sleeves, and any other openings required in connection with the work of this contract.
B. Cutting and patching made necessary because of failure to comply with the above shall be done by the General Contractor at the expense of the Mechanical Contractor.
1.19 TESTING
A. Furnish testing equipment and test all piping systems under methods and conditions as specified or per code.
B. Make all necessary replacements and repair and repeat tests until the entire system is approved and satisfactory.
C. Test under pressure with liquid or gas as directed or specified.
D. Refer to TAB and piping sections for further information on duct and pipe testing.
1.20 PAINTING
A. All painting shall be done by the General Contractor.
B. Painting shall be for the following items: all piping, ductwork, framework, and all equipment not furnished with factory finish, etc., in all exposed areas of the building and/or as noted on the drawings. Omit painting of piping in tunnels and in concealed areas.
1.21 OPERATING INSTRUCTIONS
A. Prepare and submit to the Engineer for approval operating instructions made in conjunction with Equipment Manufacturer's representative. Instruction shall contain equipment starting sequence, interlocks, controls, switches, etc. which affect the equipment operation. Place copies in maintenance instructions brochure.
1.22 MAINTENANCE INSTRUCTIONS
A. Prepare a brochure including all systems and equipment furnished and installed under this contract. Each brochure shall include certified equipment drawings and/or catalog data as submitted, complete maintenance instructions, parts lists for each item of equipment, any special emergency operating instructions, all equipment warranties, starting dates identified, and a list of service organizations including addresses and telephone numbers.
B. Label cover with the following:
1. Project name and address
2. Section of work covered by brochure, i.e., "Plumbing Heating, Ventilation, Air Conditioning", etc.
3. Name and address of Architect, Engineer, Contractor.
4. Telephone number of servicing night and day and emergency numbers.
C. Brochures shall be submitted to the Engineer for approval and delivery to the Owner.
1.23 LOOSE EQUIPMENT
A. All keys and special wrenches furnished with the equipment shall be kept in a safe place during construction and presented to the Owner at the completion of the project.
1.24 FINAL INSPECTION
A. Final inspection will be made upon written request from the Mechanical Contractor after the project is completed and Test and Balance (TAB) has been complete.
B. Furnish a workman familiar with this project to accompany the Engineer on final inspection and have available ladders, drop cords, and other equipment as required to gain access to any portion of this system.
C. Submit TAB Report to Engineer for review at least 5 days prior to final inspection.
D. This contractor and his principal sub-contractors shall be represented at the inspection by a person of authority responsible to demonstrate to the Engineer that his work conforms to the intent of the plans and specifications.
E. Extra inspections made necessary by the Mechanical Contractor's failure to comply with the conditions as set forth above shall be charged to the contractor at the inspector's time both on the job and spent in travel between the office and the project site.
1.25 GUARANTEE
A. Guarantee all work, material and equipment for a period of one year after date of final certificate of acceptance by the Architect.
B. During the year guarantee period the mechanical contractor shall be responsible for any defects which develop in the mechanical systems. Upon notification of a defect by the Architect, the Contractor shall make immediate effort to correct it and shall notify the Architect when this work is completed.
C. Repairs and/or replacements shall be made with no cost to Owner.

SECTION 200600 – MATERIALS AND METHODS COMMON TO FIRE PROTECTION, PLUMBING, AND MECHANICAL.

1.1 PIPING SYSTEMS - GENERAL
A. Pipe for piping systems shall be cut accurately to measurements taken on the job.
B. Install offset connections for alignment of vertical to horizontal piping wherever required to make a true connection.
C. Make branch connections with offsets to provide for movement with the expansion of the piping system.
D. Install horizontal piping parallel to the building walls and partitions.
E. Install hangers and supports to allow controlled movement of piping systems and to permit freedom of movement. Resting of pipe in framing or structural members is not permitted.
F. Load Distribution: Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.
G. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes, and so that maximum pipe deflections allowed by ANSI B31 are not exceeded.
H. Insulated Piping: Comply with the following installation requirements:
1. Clamps: Attach clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed pipe stresses allowed by ANSI B31.
2. Shields: Where low-compressive-strength insulation or vapor barriers are indicated on cold or chilled water piping, install coated protective shields.
3. Saddles: Where insulation without vapor barrier is indicated, install protection saddles.
1.2 VALVES
A. Provide all valves required for operation, service, and maintenance of systems and equipment, i.e., shut-off valves both sides of equipment, coils, etc.
B. Where Used:
1. Domestic and Hydronic Piping shut-off valves 2" and smaller shall be ball valves
2. Domestic and Hydronic Piping shut-off valves 2-1/2" and larger shall be butterfly valves.
3. Valves in air lines and throttling valves shall be globe valves.
4. Flow control valves shall be plug valves.
5. Steam piping shut-off valves shall be globe or gate valves. On low pressure applications, at the appliance or 2" or smaller, ball valves are acceptable, UNO.
6. Steam piping valves 2-1/2" and larger shall be gate valves.
C. Ball Valves:
1. Ball valves two inches and smaller shall have a forged bronze body with screwed pipe ends for steel pipe and sweat ends for copper pipe. Body shall be two-piece assembly full port. Hard chrome plated brass ball or stainless steel ball with full port flow, self-aligning and free floating between two Viton seats (300 psi) to provide positive seal in either direction. Stem shall be brass or stainless steel and extended 1 1/4" above the valve to clear insulation and to receive molded packing brass packing nut and handle nut. Handle shall be constructed of zinc plated steel with partial plastic coating. Valve shall be rated for 150 psig at 180°F.
D. Check Valves:
1. Unless a composition disc is specified, swing check valves two inches and smaller shall be bronze, regrinding, with seating angle 40 to 45 degrees. A stop plug is required as a renewable stop for the hanger, unless otherwise specified. Disc and hanger shall be separate parts, and the disc shall be free to rotate. Hanger pins shall be supported on both ends by removable side plugs.
2. Lift check valves two inches and smaller shall be bronze or forged steel, to suit the service.
3. Check valves 2 1/2 inches and larger shall be flanged, swing type, unless otherwise specified.
E. Standard valves shall have 125 psi. working steam pressure or 200 psi. for water, oil and gas.
F. Sweat joint valves shall be used on all copper pipe.
G. Bronze valves with the basic saturated steam rating of 125 psi or 150 psi shall have pressure containing parts of a material having at least the physical properties of ASTM Specification B-62. Metallic seated bronze globe, angle, check and gate valves with a basic steam rating of 200 or 300 psi shall have pressure containing parts of material conforming to ASTM Specification B-61, for temperatures to 550°F.
H. Stems of bronze and Iron Bodied Bronze Mounted valves shall be of ASTM-B-198 Class 13C (cast silicon brass), ASTM B-371, Alloy A (rolled silicon brass), or other material equally resistant to dezincification.
I. All pressure casting shall be free of any impregnating materials.
1.3 JOINTS
A. Provide joints of type indicated in each piping system.
1. Full and clean cut.
2. Ream to the full inside diameter of the pipe with all burrs removed.
3. Sweat joints in copper tubing - with 95-5 solder.
4. Thread pipe in accordance with ANSI B2.1; cut threads full and clean using sharp dies. Ream threaded ends to remove burrs and restore full inside diameter. Apply pipe joint compound, or pipe joint tape (Teflon) where recommended by pipe/fitting manufacturer, on male threads at each joint and tighten joint to leave not more than 3 threads exposed.
5. Braze copper tube-and-fitting joints where indicated, in accordance with ANSI B31.
6. Solder copper tube-and-fitting joints where indicated, in accordance with recognized industry practice. Cut tube ends squarely, ream to full inside diameter, and clean outside of tube ends and inside of fittings. Apply solder flux to joint areas of both tubes and fittings. Insert tube full depth into fitting, and solder in manner which will draw solder full depth and circumference of joint. Wipe excess solder from joint before it hardens.
7. Copper Pressure Seal Joint fittings shall be in accordance with ASME B16.18 or ASME B16.23.
B. Use insulating unions on HVAC and domestic water lines where steel and copper pipe are joined.
C. Use brass ferrules on plumbing systems where dissimilar metals are joined.
1.4 UNIONS
A. Unions 2" and Smaller (150 WSP - 200 WOG): Standard Weight brass to iron seat malleable iron body with screwed ends.
B. Unions 2 1/2" and Larger: (125 PSI WSP) Standard cast iron body with flanged ends.
C. Install wherever necessary for repair, replacement, or service of the equipment or system.
1.5 SLEEVES AND COVER PLATES
A. Install for all pipes passing through floors, walls, or partitions. Size sleeves large enough to allow for free movement of the pipes with expansion.
B. Floor sleeves: 20-gauge galvanized sheet metal flanged at the bottom and attached to the forms before concrete is poured (straighten sleeve after floor is poured).
C. Sleeves for insulated pipe passing through walls or partitions: 24-gauge galvanized sheet metal with plaster bead set flush with the wall finish.
D. Sleeves for uncovered pipe passing through walls or partitions: Galvanized steel pipe sleeves, extending outside of the wall finish as required to attach the cover plates.
E. Sleeves for basement walls or floors: Provide "Link-Seal" as manufactured by GPT or silicone pressure sealants as manufactured by General Electric or Dow Chemical Co., field applied under the direction of the local Manufacturer's Representative.
F. Provide chrome plated brass cover plates attached to the sleeves independent of the pipe on all pipes which pass through floors, walls, ceilings, and partitions in finished rooms.
G. Provide pipe escutcheons as specified herein with inside diameter closely fitting pipe outside diameter, or outside of pipe insulation where pipe is insulated. Select outside diameter of escutcheon to completely cover pipe penetration hole in floors, walls, or ceilings; and pipe sleeve extension, if any. Furnish pipe escutcheons with nickel or chrome finish for occupied areas, escutcheons not required for unoccupied areas.
H. Pipe Escutcheons for Moist Areas: For waterproof floors, and areas where water and condensation can be expected to accumulate, provide cast brass or sheet brass escutcheons, solid or split or split hinged.
I. Pipe Escutcheons for Dry Areas: Provide sheet steel escutcheons, solid or split hinged.
J. Install pipe escutcheons on each pipe penetration thru floors, walls, partitions, and ceilings where penetration is exposed to view, and on exterior of building. Secure escutcheon to pipe or insulation so escutcheon covers penetration hole and is flush with adjoining surface.
D. Openings 4" or Greater: Use sealing system capable of passing 3-hour fire test in accordance with ASTM E-814, consisting of sealing unit, or liner, partitions, and end caps capable of expanding when exposed to temperatures of 250 to 350 deg F (121 to 177 deg C), UL-listed.
E. Execution: Fill entire opening with sealing compound. Adhere to manufacturer's installation instructions.
1.6 PRESSURE GAGES
A. Manufacturers: Ashcroft – Flo Fab – Miljoco – Palmer Wahl – Tel-Tru – Trerice – Watts – Weiss - Winters.
B. Capacity: Anticipated pressure to be 50% of full scale unless otherwise indicated on the plans.
C. Features: Phosphor bronze bourdon tube - 4 1/2" diameter dial of white laminated phenol with black figures and graduation lines - nylon movement in rotary gear design - adjustable micrometer type pointer readily accessible from front of gage - black enameled cast - glass face window - tightly constructed to be dust and moisture resistant - accuracy within 1/2 of 1% of scale range.
D. Accessories: Pressure snubber utilizing porous metal filter to damper pulsations - syphon loop (steam duty only) - 1/4" brass T handle cock.
1.7 THERMOMETERS
A. Manufacturers: Ashcroft - Miljoco – Palmer Wahl – Tel-Tru – Trerice – Weiss - Winters
B. Capacity: Full range of anticipated temperatures or as indicated on plans.
C. Features: Industrial glass thermometer - full 9" scale opening - metal scale with etched, scribed, or inlaid lines and figures vividly contrasting with background material - red reading mercury tube - heavy rattle proof glass cover to make unit dust and moisture resistant - non-corrosive steel bulb chamber - threaded connection - swivel and lock nut.
D. Accessories: Separable socket on all liquid or vapor sensing thermometers - union connection on all air sensing thermometers.
1.8 EQUIPMENT SUPPORTS
A. Provide each piece of equipment or apparatus suspended from ceilings or mounted above floor level with suitable structural support, platform or carrier in accordance with best recognized practice. All such supporting or mounting means shall be furnished by respective contractor who shall arrange for their inclusion and attachment to building structure, unless otherwise indicated on plans or herein specified. Contractors shall exercise extreme care that structural members of building are not overloaded by such equipment. In all cases details of such hangers, platforms, and supports, together with total weights of mounted equipment shall be approved by Architect-Engineer.
1.9 MOTORS
A. Polyphase motors: NEMA MG 1, Design B medium induction motor, premium efficient, with 1.15 service factor. Multispeed motors shall have a separate winding for each speed. Bearings shall be regreasable, antifriction ball bearings suitable for radial and thrust loading. Class B temperature rise with class F insulation.
B. Polyphase motors with additional requirements: With motors used with reduced voltage and multispeed controllers, match winding connection with requirements for controllers and with characteristics of load. Motors used with variable frequency controllers shall have copper magnet wire windings, premium efficient motors shall be Class B temperature rise with Class F insulation, and inverter duty motors shall be Class F temperature rise with Class H insulation. All motors 1/0 HP and larger, driven by a variable frequency PWM drive shall include a factory installed maintenance free, circumferential, conductive micro-fiber or carbon brush shaft grounding ring to discharge shaft currents to ground. The conductive microfibers shall redirect shaft currents and provide a reliable, very low impedance path from shaft to motor frame by-passing motor bearings entirely. For vertical turbine pump motors, the upper shaft shall be provided with a coating to isolate the shaft from the bearings and the shaft grounding ring shall be installed within the motor casing. This information shall be provided with the shop drawing submittal for verification of method of installation and to ensure they are to be supplied. Comply with NEMA MG 1 for thermally protected motors.
C. Single phase motors: Motors larger than 1/20 HP shall be permanent-split capacitor, split phase, or capacitor start. Multispeed motors shall be variable torque, permanent-split capacitor type. Bearings shall be prelubricated, antifriction ball bearings or sleeve bearings. Motors 1/20 HP and smaller shall be shaded pole type. All motors shall have internal automatic thermal protection calibrated to insulation temperature rating.
1.10 MOTOR STARTERS
A. Unless specifically noted otherwise on the mechanical plans, or in the specifications, all motor starters shall be furnished and installed by the Electrical Contractor. Refer to the Electrical Specifications for Motor Starter requirements.
1.11 V-BELT DRIVES
A. Capacity of V-Belt Drives at rated RPM shall be not less than 150 percent of motor nameplate horsepower rating.
B. V-Belt Drive combinations shall be limited to A, B, C, and fractional horsepower belts. 3V, 5V, and 8V belts and sheaves shall not be used.
C. Drives requiring single belt application shall be of the adjustable pitch type. Multiple belt drives shall be of the non-adjustable type. All fixed pitch sheaves, including single groove fan sheaves, shall be of the bushed type. Fixed bore sheaves will not be acceptable for non-adjustable pitch sheaves.
1.12 ACCESS DOORS
A. Where valves, traps, dampers, devices or equipment of any kind is subject to service and maintenance are installed in inaccessible concealed spaces, access doors shall be furnished by the Mechanical Contractor and installed by the General Contractor. Doors shall be 12" x 12" for handhole and 24" x 24" for manhole where required.
B. Doors shall be:
1. Milcor Style "K" in plastered wall or ceiling.
2. Milcor Style "M" in masonry wall.
3. Doors in unfinished areas shall have a rustproof prime coat finish.
4. Doors in tile finished walls shall be all stainless steel with satin finish.
5. Milcor Style "DW" in drywall construction.
6. Fire rated doors - Milcor style as described above for various types of construction except with U.L. 1 1/2 hr. "B" label.
C. Equivalent doors as manufactured by Bilco, J.L. Industries, MIFAB, Karp Assoc, Nystrom.
1.13 DRIP PANS
A. Provide drip pans fabricated from corrosion-resistant sheet metal with watertight joints, and with edges turned up 2-1/2". Reinforce top, either by structural angles or by rolling top over 1/4" steel rod. Provide hole, gasket, and flange at low point for watertight joint and 1" drain line connection.
B. Locate drip pans under piping passing within 3' horizontally of electrical equipment, and elsewhere as indicated. Hang from structure with rods and building attachments, weld rods to sides of drip pan. Brace to prevent sagging or swaying. Connect 1" drain line to drain connection, and run to nearest plumbing drain or elsewhere as indicated.
1.14 CONDENSATE DRAIN PIPING (COOLING COIL DRIP)
A. Type M copper pipe with sweat drainage fittings, Schedule 40 steel pipe with screwed drainage fittings or Schedule 40 PVC plastic pipe with solvent welded fittings.
B. Pitch all horizontal lines to drain at a minimum fall of 1" per 10 feet of run.
C. Provide air trap at each equipment connection.

SECTION 200700 - INSULATION

1.1 PIPE COVERING
A. Manufacturers: Johns Manville - Owens Corning - CertainTeed - Knauf.
B. Features: All completed insulation of pipe and fittings shall have the following Underwriters Laboratories Fire Hazard Classification:
1. Flame spread not to exceed - 25.
2. Fuel contributed not to exceed - 50.
3. Smoke developed not to exceed - 50.
C. Four (4 lb.) density glass fiber insulation used for all pipe covering in this section shall have a maximum "K" factor of .23 at 75° F. mean temperature.
D. Prepare all exposed insulated covering for painting. Apply insulation over clean dry surface. Butt all longitudinal joints tightly together. Insulate domestic hot and domestic cold water and condensate drains in their entirety. Rain leaders need not be insulated below grade.
E. Refrigerant Suction Lines: insulate with 1" thick and condensate drain lines with 1/2" thick Armstrong AP Armaflex, applied in strict accordance with manufacturer's instruction. Finish all exposed piping with two coats of white Armstrong Armaflex finish. Manville Aerotube or Owens-Corning O.C. flexible tubing approved equal.
1.2 EQUIPMENT
A. Insulate roof drain sumps, with Armstrong Armaflex II sheet insulation 1/2" thick. Apply in accordance with manufacturers recommendations.
B. Prepare all exposed insulated covering for painting. Apply insulation over clean dry surface. Butt all longitudinal joints tightly together.
1.3 DUCT LINER (INTERNAL)
A. Manufacturers: Johns Manville – Owens Corning - CertainTeed - Knauf.
B. Internal Liner Thickness:

DUCTWORK SYSTEM	THICKNESS (IN.)
Low velocity, rectangular supply	1.0
Low velocity, rectangular return	0.5
Ductwork routed in unconditioned building spaces	1.5
Return air transfer ducts	1.0
Ductwork located exterior to the building, liner thickness listed plus 2" external rigid glass board insulation with vapor retarder jacket, cover with membrane duct jacket and aluminum jacket. Caulk all seams.	1.0
Rectangular exhaust ducts for last 15 feet before fan in all directions	0.5

C. Liner shall be Type I per ASTM C 1071 and have a NRC not less than 0.45 as tested per ASTM C423, with a minimum density of 2 pounds per cubic foot and a maximum "K" factor of 0.26 at 75°F mean temperature. The liner air stream surface coating shall contain an EPA registered, anti-microbial agent.
D. Use mechanical fastening of Graham Welded pins, or Stick-Klips on maximum 16" centers at top sections when width exceeds 12" and on sides when height exceeds 24".
E. Manufacturers shall print density and thickness on face of duct liner.
F. Duct liner shall have an Underwriters Laboratories flame spread rating not to exceed 25, fuel contributed rating not to exceed 50, and smoke developed rating not to exceed 50.
G. DUCT SIZES ON DRAWINGS ARE FOR DIMENSIONS INSIDE OF LINING AND SHEET METAL SIZE SHALL BE INCREASED ACCORDINGLY.
H. Adhesive and Application:
1. Adhere liner to interior sides of duct with minimum 90% coverage of fire retardant adhesive.
2. Apply a brush width of Foster's Fire Retardant Coating over all joints, visible cut edges and leading edges of insulation to prevent fiber erosion.
3. Apply with coated side to air stream in cut to fit pieces fastened to interiors of duct with adhesive. Coat all exposed edges with adhesive.
4. Adhesives shall be approved and listed by Underwriters Laboratories and shall bear the U. L. Label.
1.4 DUCT WRAP INSULATION (EXTERNAL)
A. Manufacturers: Johns Manville - CertainTeed - Owens Corning - Knauf.
B. Insulate externally all concealed round ducts and rectangular outdoor air ducts with 0.75-pound per cubic foot minimum density fiberglass ductwrap with a Foil-scrim Kraft vapor barrier applied with outward-clinching staples.
C. The duct insulation shall have Underwriters Laboratories flame spread rating not to exceed 25 - fuel contributed rating not to exceed 50 - smoke developed rating not to exceed 50.
D. Insulation shall be continuous through partitions, coils, etc. Insulate fire damper sleeves to partitions.
1.5 DUCT INSULATION APPLICATION AND THICKNESS
A. Ductwork insulation minimum R-values to comply with the latest adopted year of ASHRAE/IESNA 90.1, based on Climate Zone and duct location. If not adopted, utilize 90.1-2016 values: Exterior Ducts: R-12, Fully Ducted Plenums: R-6, and Un-ducted (Return Air) Plenums: R-1.9.
B. Duct Wrap Insulation Thickness:

DUCTWORK SYSTEM	THICKNESS (IN.)
Non-hospital, Low velocity, round/oval supply	1.5
Non-hospital, Medium and high velocity supply	1.5
Non-hospital, Round supply and return exposed to Outdoor Air or Exterior to Building	3.0
Non-hospital, Rectangular supply and return exposed to Outdoor Air or Exterior to Building (Liner, plus external rigid glass board insulation with vapor retarder jacket, cover with membrane duct jacket & aluminum jacket. Caulk all seams.)	1.0 Liner, plus 2.0 Wrap

SECTION 230593 - AIR TEST AND BALANCE

1.1 SCOPE
A. The Mechanical Contractor shall procure the services of an independent air balancing agency, fully certified with the National Environmental Balancing Bureau (NEBB) to test air moving equipment and air distribution and exhaust systems and to supervise the balance and adjustment of these systems. All work shall be done under direct supervision of a qualified and licensed Heating and Ventilating Engineer. The mechanical contractor shall provide workmen of the proper trade to make adjustments to the systems as determined by the Engineer. The Contractor shall provide access as required, including any necessary scaffolding, and shall cooperate with testing laboratory personnel. All instruments used in this work shall be accurately calibrated and maintained in good working order. If requested the tests shall be conducted in the presence of the Mechanical Engineer responsible for the project and/or his representative. Air balance and testing shall not begin until the system has been completed and is in full working order. The Contractor shall put all heating, ventilating, and air conditioning systems and equipment into full operation 24 hours prior to the start of testing and balancing and shall continue the operation of same during each working day until the completion of all test and balance work. The Contractor shall award the test and balance contract upon receipt of his contract to proceed with the air conditioning installation, to allow the Air Balance and Testing Engineer to schedule his work in cooperation with other trades involved and comply with completion date. Upon completion of the air conditioning system installation, the Air Balance and Testing Engineer shall perform the following tests, supervise adjustments and system modifications, and compile the test data as required for evaluation and approval.
B. In addition to procuring the services of an air balancing engineer as hereinafter specified the mechanical contractor shall:
1. Clean air filters, ductwork, coils, fans, etc. in the air system to remove all construction dust and debris.
2. Start, lubricate and balance all fans. Change and/or adjust drive pulleys on fans to give required capacity.
3. Supply and install all balancing dampers as required for final balancing as determined by the balancing engineer.
4. Furnish workmen familiar with this project and of the proper trade to assist the balancing engineer in the air and water balancing. Also make available subject to request by the balancing engineer trained servicemen of the control and equipment suppliers to assist as needed during the testing of their portion of the project.
5. Furnish plans, operating manuals, and shop drawings of all equipment installed for use by the Air and Water Balancing Agency.
6. Have all systems in full operation a minimum of 24 hours before Balancing Engineer arrives on job.
1.2 AIR SYSTEM TEST AND BALANCE PROCEDURE
A. Procedure:
1. Bring all fans to design RPM.
2. Bring air volume in each air handling system to the design air volume using pitot tube transverse method.
3. Test and record fan motor data.
4. Bring air diffusers and registers to design CFM.
5. Make recommendations for system modifications and adjustments required to facilitate proper system balancing as determined by preceding test.
6. Retest and readjust all system segments affected by system modifications.
B. If any issues arise during the test and balance procedure that prevent it from being properly completed, bring issues to owner and engineer before submitting report to investigate.

SECTION 230800 - AIR DISTRIBUTION

1.1 DEFINITIONS
A. Low Velocity Ductwork: Supply, return, make-up, and exhaust ductwork systems that are sized at 2,000 FPM or lower.
B. Medium Velocity Ductwork: Supply ductwork systems sized at greater than 2,000 FPM to 3,000 FPM.
C. Low Pressure Ductwork: Ductwork connected to fan systems with a 2" w.c. or less deadhead rating.
D. Medium Pressure Ductwork: Ductwork connected to fan systems with greater than 2" w.c. and less than 6" w.c. deadhead rating.
E. High Pressure Ductwork: Ductwork connected to fan systems with 6" w.c. or greater deadhead rating.
1.2 PERFORMANCE REQUIREMENTS
A. Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and performance requirements and design criteria indicated in "Duct Schedule" Article.
B. All work shall comply with the Mechanical Codes.
C. Structural Performance: Duct hangers and supports [and seismic restraints] shall withstand the effects of gravity [and seismic] loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" [and] [ASCE/SEI 7].
D. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
1.3 SHEET METAL DUCT WORK CONSTRUCTION
A. The work under this heading includes all sheet metal work as required to complete supply and exhaust systems including ducts, housings, ventilating hoods, exhaust hoods, louvers, dampers, grilles, diffusers, registers, access doors, access panels, etc.
B. Duct material shall be galvanized steel unless noted otherwise on the drawings.
C. Seal all ducts to Seal Class A per SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"
D. Make ductwork and installation in conformance with the applicable local Mechanical Code and Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) HVAC Duct Construction Standards (Latest Edition) amended as follows:
1. Seal all transverse joints, fittings, connections, and seams with Hardcast DT tape and FTA adhesive, Hardcast AFG-1402 "Foil-Grip" applied per manufacturers instructions, or brushed-on liquid based joint and seam sealant.
2. Make all branch connections with 45° entry clinch collar.
3. Round branch duct take-offs shall be high efficiency takeoffs (HETO), made with 45° entry clinched collar and rectangular to round transition. If damper is provided with HETO, it shall meet the requirements of the manual balance damper section below.
E. Use square type elbows with turning vanes for changes in direction and fittings for branch ducts. Radius elbows may also be used for duct changes in direction, refer to drawings.
F. Offset ducts to clear pipes and obstructions.
G. Patch all duct holes airtight after installation.
H. All round ductwork shall be a minimum of 26 gauge sheet metal or heavier as required by SMACNA and the Mechanical Code.
I. Exposed Spiral Ductwork:
1. Provide factory-fabricated duct and fittings, manufactured on automatic spiral duct forming machines, for round (spiral) low, medium and high velocity duct systems.
2. Round and Oval Ductwork: Construct of galvanized sheet steel complying with ASTM A527 by the following methods and in minimum gages listed.
J. Duct up to 14" diameter shall be a minimum gage of 26.
K. Duct 16" to 26" diameter shall be minimum of 24 gage.
L. Duct 28" to 36" diameter shall be minimum of 22 gage
M. Duct 38" to 50" diameter shall be minimum of 20 gage
1. Fittings and Couplings: Construct of minimum gages

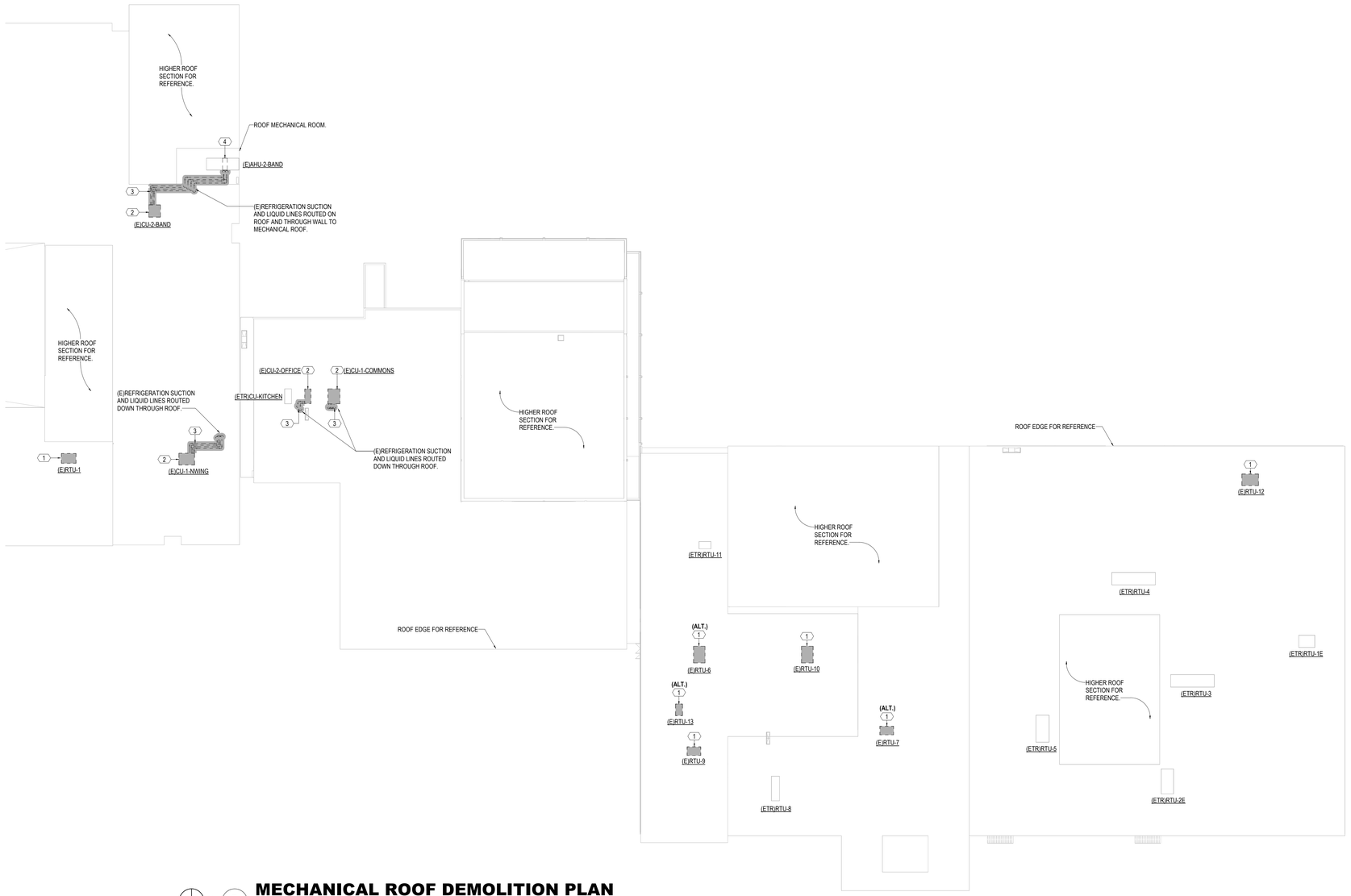
HVAC DEMO NOTES

1. PLANS ARE SCHEMATIC IN NATURE. LAYOUT IS BASED ON BEST AVAILABLE INFORMATION. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS AND DIMENSIONS. BRING ANY DISCREPANCIES FROM THE DRAWINGS AND NOTES TO THE OWNER'S REPRESENTATIVE IMMEDIATELY. MINOR CHANGES IN THE SCOPE OF THE DEMOLITION WORK SHALL NOT JUSTIFY AN ADDITIONAL COST.
2. DEMOLISH ALL DUCTWORK, PIPING, AND EQUIPMENT SHOWN SHADED, DASHED AND IN A DARK LINE WEIGHT.

SHEET KEYNOTES

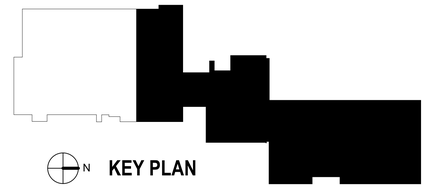
1. REMOVE EXISTING PACKAGED ROOFTOP UNIT AS SHOWN AND REUSE EXISTING CONTROLS, WIRING, SUPPORTS, AND ACCESSORIES TO THE GREATEST EXTENT POSSIBLE.
2. REMOVE EXISTING AIR COOLED CONDENSING UNIT AS SHOWN AND REUSE EXISTING CONTROLS, WIRING, SUPPORTS, AND ACCESSORIES TO THE GREATEST EXTENT POSSIBLE.
3. REMOVE EXISTING REFRIGERANT PIPING, INSULATION, AND ALL ASSOCIATED HANGERS AND SUPPORTS ASSOCIATED WITH (E)CU/AHU.
4. REMOVE EXISITNG DX CONDENSING UNITS' EVAPORATOR COOLING COIL IN AIR HANDLER. REMOVE ALL ACCESSORIES AND SUPPORTS. PREPARE FOR NEW DX EVAPORATOR COIL INSTALL.

ALT:
CONTRACTOR SHALL PROVIDE ALTERNATE ADDITIONAL PRICING TO REPLACE EXISTING RTU-6, RTU-7, AND RTU-13.



N A **MECHANICAL ROOF DEMOLITION PLAN**

0' 10' 20' 30' **1" = 30'-0"**



N **KEY PLAN**

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SHAUN M. CONWAY LICENSED 19761 02/06/2026 KANSAS PROFESSIONAL ENGINEER

DATE:
02/09/2026

REVISED DATE:

Shawnee Heights High School HVAC Equipment Upgrade

Shawnee Heights ESD 450
4201 SE Shawnee Heights Rd, Tecumseh, KS 66542

SHEET CONTENTS:
MECHANICAL ROOF DEMOLITION PLAN

HTK PROJECT NUMBER:
2404.01

SHEET NUMBER:
MD101

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2. DEMOLISH ALL DUCTWORK, PIPING, AND EQUIPMENT SHOWN SHADED, DASHED AND IN A DARK LINE WEIGHT.

HVAC GENERAL NOTES

1. THE INTENT OF THIS PROJECT IS TO REPLACE ROOFTOP EQUIPMENT AND REUSE ALL DUCTWORK AND DUCTWORK ACCESSORIES CURRENTLY IN PLACE. CONTRACTOR SHALL VISIT THE SITE BEFORE BEGINING WORK AND NOTIFY OWNER AND ENGINEER OF ANY POTENTIAL ISSUES.

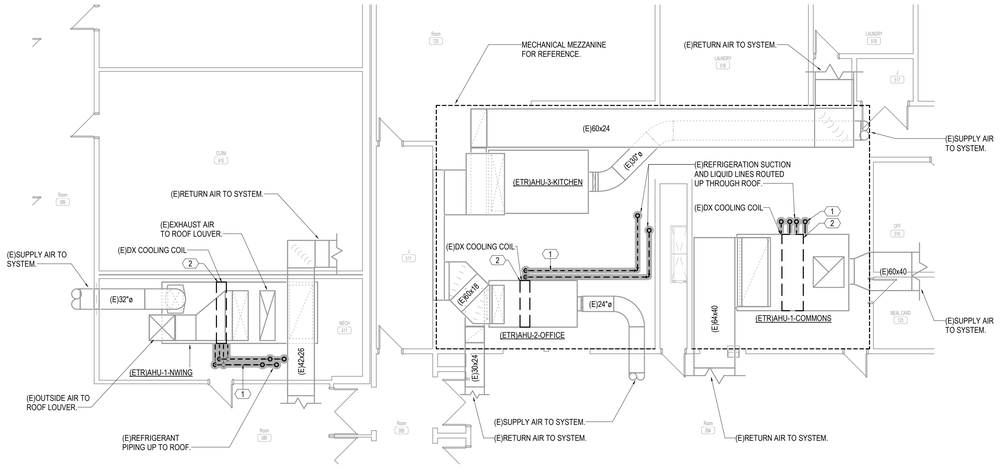
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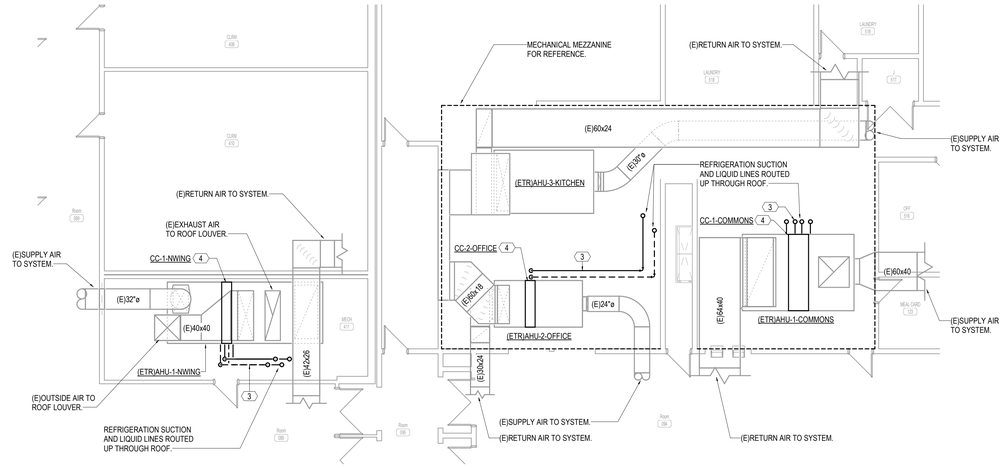
3 PROVIDE REFRIGERATION SUCTION AND DISCHARGE LINES SIZED PER MANUFACTURERS RECOMMENDATION.

4 PROVIDE DX CONDENSING UNIT EVAPORATOR COIL IN EXISTING AHU. MODIFY EXISTING AHU CASEWORK TO FIT EVAPORATOR COIL INSIDE AS REQUIRED.



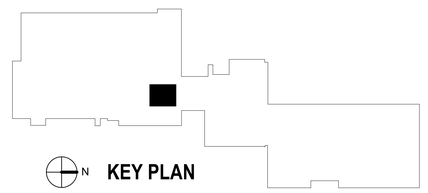
N 1 **FIRST FLOOR MECHANICAL DEMO PLAN**

0' 4' 8' 12' **1/8" = 1'-0"**



N 2 **FIRST FLOOR MECHANICAL PLAN**

0' 4' 8' 12' **1/8" = 1'-0"**



N **KEY PLAN**

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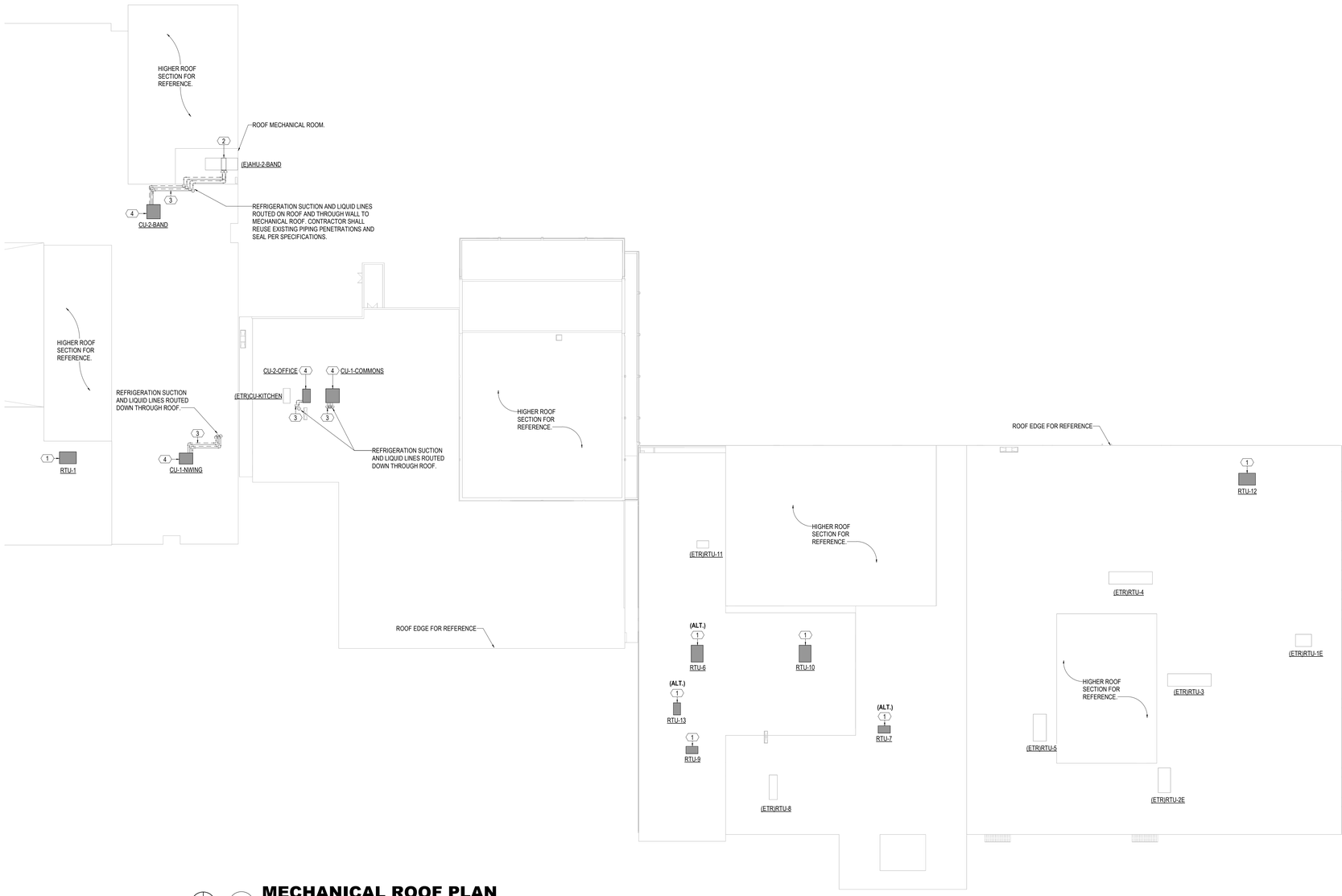
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SHEET CONTENTS:
- MECHANICAL FIRST FLOOR PLANS

HTK PROJECT NUMBER:
- 2404.01

SHEET NUMBER:
M-100

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N A **MECHANICAL ROOF PLAN**

0' 15' 30' 45' **1" = 30'-0"**

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SHEET KEYNOTES

1 PROVIDE PACKAGED ROOFTOP UNIT AND ALL ACCESSORIES PER SCHEDULE. PROVIDE CURB ADAPTER AS REQUIRED. RECONNECT TO EXISTING DUCTWORK AND TRANSITION AS REQUIRED. PROVIDE CONDENSATE PIPING ROUTED IN THE SAME WAY AS THE EXISTING CONDENSATE PIPING.

2 PROVIDE DX CONDENSING UNIT EVAPORATOR COIL IN EXISTING AHU. MODIFY EXISTING AHU CASEWORK TO FIT EVAPORATOR COIL INSIDE AS REQUIRED.

3 PROVIDE REFRIGERATION SUCTION AND DISCHARGE LINES SIZED PER MANUFACTURERS RECOMMENDATION.

4 PROVIDE DX CONDENSING UNIT WITH EVAPORATOR COIL IN ASSOCIATED EXISTING AHU. PROVIDE STRUCTURAL MODIFICATIONS TO SECURE THE CONDENSING UNIT ON THE EXISTING STRUCTURE.

ALT:
CONTRACTOR SHALL PROVIDE ALTERNATE ADDITIONAL PRICING TO REPLACE EXISTING RTU-6, RTU-7, AND RTU-13.

N **KEY PLAN**

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PACKAGED RTU SCHEDULE - DX COOL - COOLING ONLY

REMARKS:

1. BASIS OF DESIGN IS TRANE. DESIGN INTENT IS TO USE ROOFTOP UNITS THAT FIT WITHIN THE EXISTING FOOTPRINT.
2. PROVIDE SINGLEZONE VAV PACKAGED ROOFTOP UNIT.
3. PROVIDE MULTIZONE VAV PACKAGED ROOFTOP UNIT.
4. PROVIDE WITH MODULATING HOT GAS REHEAT AND HUMIDITY SENSOR.
5. DISCONNECT SHALL BE PROVIDED AND INSTALLED BY E.C. COORDINATE WITH ELECTRICAL PLANS AND E.C.
6. PROVIDE HIGH EFFICIENCY DX COOLING PACKAGED ROOFTOP UNIT WITH SCROLL COMPRESSORS, FACTORY HAIL GUARD, FACTORY VFD, FACTORY SMOKE DETECTORS, FACTORY CONVENIENCE OUTLET, ENTHALPY ECONOMIZER WITH BAROMETRIC RELIEF, BACNET BAS CARD, MOTOR SHAFT GROUNDING RING, AND 2" HIGH EFF. MERV 8 FILTERS.
7. PROVIDE MANUFACTURERS RECOMMENDED CURB ADAPTER AS REQUIRED.
8. PROVIDE AS PART OF ALTERNATE PRICING FOR UNIT REPLACEMENT.

MARK	MFR	MODEL	MIN OA (CFM)	SUPPLY FAN					DX COOLING						CONDENSER						EER	FILTER	ELECTRICAL				UNIT WT (LBS)	REMARKS
				AIRFLOW (CFM)	ESP (IN WC)	DESIGN TSP (IN WC)	MOTOR		EAT		LAT		COOLING CAPACITY		AMBIENT TEMP (°F)	COMPRESSOR				COND FAN			MERV	VOLT	PHASE	MCA	MOCP		
							HP	BHP	DB (°F)	WB (°F)	DB (°F)	WB (°F)	TOTAL (MBH)	SENS (MBH)		TYPE	RLA#1	RLA#2	CAP STEPS	FLA (EA)	NO								
RTU-1	TRANE	THK150A4S00	750	5000	1	1.18	3	1.81	80	67	57.38	56.69	158.36	121.6	95	R454B	14.4	7	2	1.3	2	12.7	8	460	3	37	50	2100	1,5,6,7
RTU-6	TRANE	THK150A4S00	1000	5000	1	1.18	3	1.81	80	67	57.38	56.69	158.36	121.6	95	R454B	14.4	7	2	1.3	2	12.7	8	460	3	37	50	2100	1,5,6,7,8
RTU-7	TRANE	THK120A4S00	555	3700	1	1.29	3	1.69	80	67	56.97	55.94	125.9	92.79	95	R454B	13.7	5.9	2	3	1	11.7	8	460	3	31	40	1200	1,2,5,6,7,8
RTU-9	TRANE	THK120A4S00	740	3700	1	1.38	3	1.83	80	67	56.97	55.94	125.9	92.79	95	R454B	13.7	5.9	2	3	1	11.7	8	460	3	31	40	1200	1,2,4,5,6,7
RTU-10	TRANE	THK210A4S00	1330	6650	1.5	1.79	3	2.67	80	67	57.2	56.27	217.6	162.66	95	R454B	17.8	10.5	2	2.5	2	12.1	8	460	3	47	60	2100	1,2,5,6,7
RTU-12	TRANE	THK240A4S00	1380	6900	1.5	1.8	3	2.86	80	67	56.73	55.46	242.74	173.32	95	R454B	22.4	12.2	2	2.5	2	11.2	8	460	3	55	70	2200	1,3,5,6,7
RTU-13	TRANE	THK072A4S00	360	2400	1	1.18	3	0.927	80	67	55.65	55.55	82.96	62.41	95	R454B	7	4.2	2	1.5	1	12.4	8	460	3	20	25	1100	1,2,4,5,6,7,8

COOLING ONLY CONDENSING UNIT SCHEDULE

1. BASIS OF DESIGN IS DAIKIN. DESIGN INTENT IS FOR G.C. TO SECURE CONDENSING UNIT TO EXISTING STRUCTURE.
2. DISCONNECT SHALL BE PROVIDED AND INSTALLED BY E.C. COORDINATE WITH ELECTRICAL PLANS AND E.C.
3. PROVIDE WITH HOT GAS BYPASS.
4. PROVIDE CONDENSING UNIT WITH LOUVERED HAIL GUARDS AND CRANK CASE HEATER. SIZE AND ROUTE REFRIGERANT PIPING PER MANUFACTURER'S INSTRUCTIONS. PROVIDE ALUMINUM JACKETING FOR EXPOSED REFRIGERANT LINE-SETS.

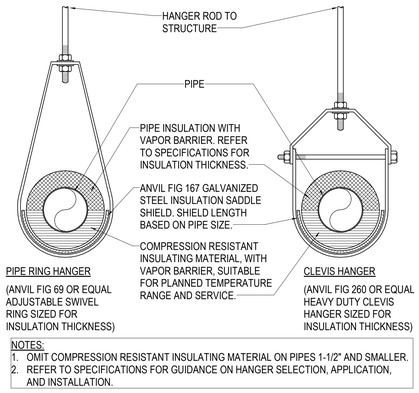
MARK	MFR	MODEL	MATCH WITH ___	CAP (MBH)	AMBIENT TEMP (°F)	COMPRESSOR						COND FAN		EER	ELECTRICAL				UNIT WT (LBS)	REMARKS
						TYPE	RLA#1	RLA#2	RLA#3	RLA#4	RLA#5 & #6	FLA (EA)	QTY		VOLT	PHASE	MCA	MOP		
CU-1-COMMONS	DAIKIN	RCS080D	(E)AHU-1-COMMONS	844	95	R410A	19.2	19.2	19.2	19.2	19.2 (EA)	2	6	10.7	460	3	133.9	150	3600	1,2,3,4
CU-1-NWING	DAIKIN	RCS062D	(E)AHU-1-NWING	646	95	R410A	23.1	23.1	23.1	23.1	--	2	6	10.8	460	3	112.1	125	2600	1,2,3,4
CU-2-BAND	DAIKIN	RCS040D	(E)AHU-2-BAND	445	95	R410A	16.7	16.7	16.7	16.7	--	2	4	11.3	460	3	80	90	2500	1,2,3,4
CU-2-OFFICE	DAIKIN	RCS025D	(E)AHU-2-OFFICE	284	95	R410A	19.2	10.6	10.6	--	--	2	2	11	460	3	50	60	1900	1,2,3,4

COIL SCHEDULE - DX

REMARKS:

1. PROVIDE SPLIT DX COOLING COIL AND MANUFACTURER'S RECOMMENDED ACCESSORIES. COILS TO BE INSTALLED AT A LATER DATE.

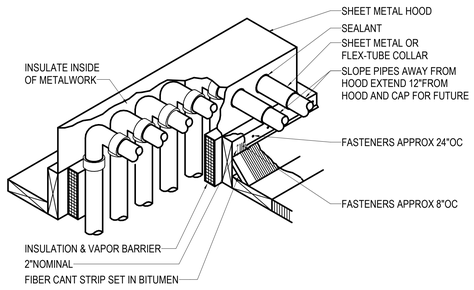
MARK	MATCH WITH	AIRFLOW CFM	AIR				COIL		COIL DESCRIPTION		REMARKS
			EAT		LAT		FACE VEL (FPM)	COOLING CAPACITY	REF. TYPE	CKTS	
			DB (°F)	WB (°F)	DB (°F)	WB (°F)		TOTAL (MBH)			
CC-1-COMMONS	CU-1-COMMONS	23545	80	65.5	54.5	53.6	480	844	R410A	2	1
CC-1-NWING	CU-1-NWING	14400	83.2	67.8	54.5	53.8	558	646	R410A	2	1
CC-2-BAND	CU-2-BAND	10800	84.4	68.2	54.1	53.9	519	445	R410A	2	1
CC-2-OFFICE	CU-2-OFFICE	6800	80	64.8	54.9	52.7	486	284	R410A	1	1



NOTES:
1. OMIT COMPRESSION RESISTANT INSULATING MATERIAL ON PIPES 1-1/2" AND SMALLER.
2. REFER TO SPECIFICATIONS FOR GUIDANCE ON HANGER SELECTION, APPLICATION, AND INSTALLATION.

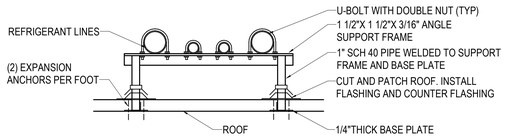
1 INSULATED PIPE AT HANGER DETAIL

NO SCALE



2 WEATHERPROOF HOOD DETAIL

NO SCALE



3 PIPE SUPPORT DETAIL - REFRIGERANT ON ROOF

NO SCALE

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SHAUN M. CONWAY LICENSED 19761 02/06/2026 KANSAS PROFESSIONAL ENGINEER

DATE:
02/09/2026

REVISED DATE:

Shawnee Heights High School HVAC Equipment Upgrade

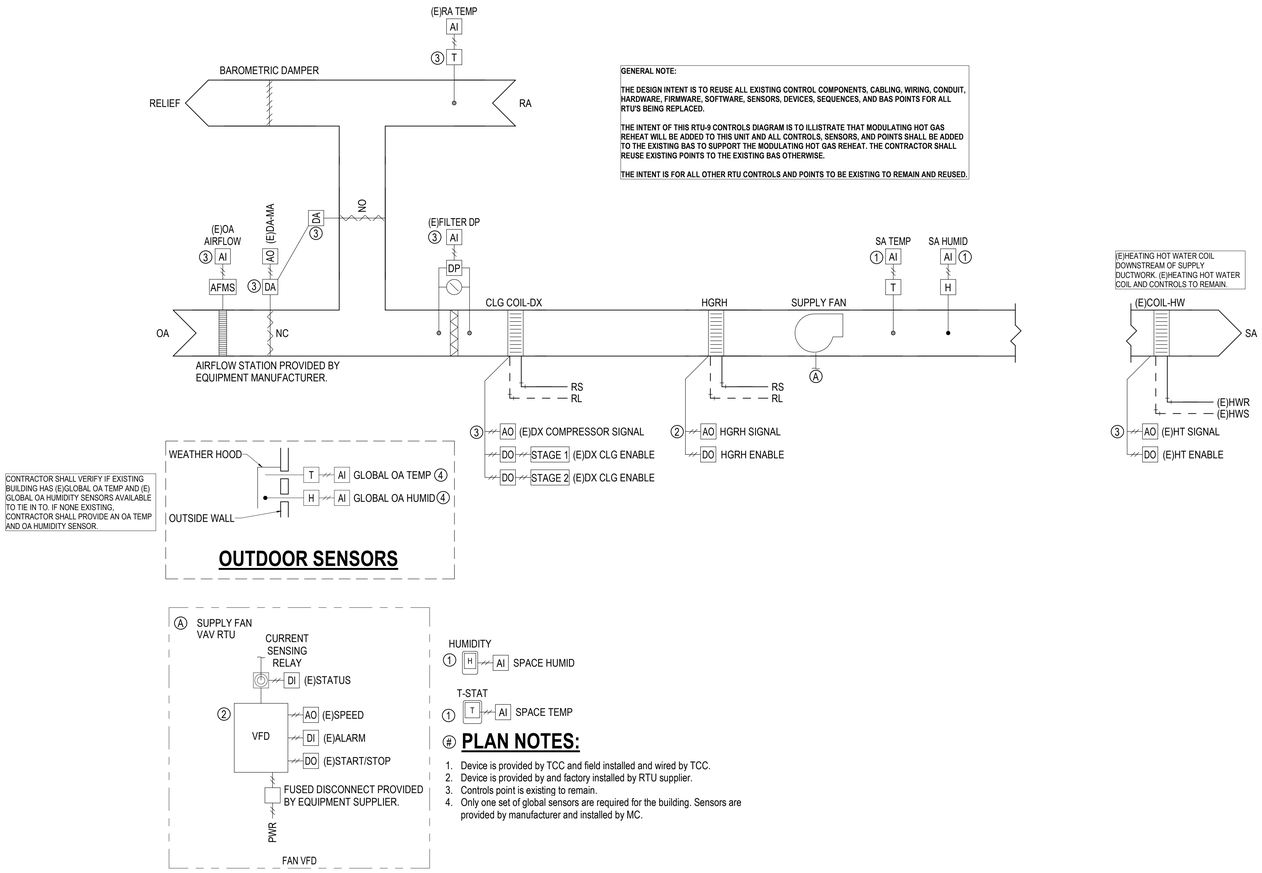
Shawnee Heights ESD 450
4201 SE Shawnee Heights Rd, Tecumseh, KS 66542

SHEET CONTENTS:
MECHANICAL SCHEDULES AND DETAILS

HTK PROJECT NUMBER:
2404.01

SHEET NUMBER:
M-601

2/6/2026 11:23:21 AM Autodesk Docs://251402-000 - USD Shawnee Heights HS HVAC Upgrades/251402-000_MECH_R24.rvt



PLAN NOTES:

1. Device is provided by TCC and field installed and wired by TCC.
2. Device is provided by and factory installed by RTU supplier.
3. Controls point is existing to remain.
4. Only one set of global sensors are required for the building. Sensors are provided by manufacturer and installed by MC.

SEQUENCE OF OPERATION:

Occupancy Schedule:
System shall run continuously based on pre-determined time-of-day scheduling. Time of day scheduling shall incorporate an offset that prevents any two units from being started simultaneously. Suggested offset is 2 minutes for rooftop units.

Optimized Start Time:
An algorithm, using outside offsets temp and recent startup history, shall determine the optimum start time based on user defined earliest and latest start time offsets prior to the occupied time schedule. Suggested earliest start time is 1-1/2 hours prior to occupancy and latest start time is 0 minutes prior to occupancy.

System Startup:
Upon entering the occupied mode, the supply fan VFD is enabled and control dampers remain in their "normal" positions. Supply fan is enabled to operate. VFD minimum speed shall be 18hz. VFD shall incorporate a 30 second ramp upon startup. After supply fan proves operation and a short time delay expires, dampers are allowed to operate as described.

Ventilation:
Upon supply fan proving airflow, outside air dampers are enabled to operate. Once enabled, dampers modulate to maintain minimum outside airflow, as seen by airflow monitoring station, regardless of fan speed. Time schedule shall call for ventilation when occupancy is anticipated, but not during warmup or cool-down periods. Outside air dampers remain closed during warmup / cooldown cycles.

Unoccupied Mode:
In the unoccupied mode, as determined by time-of-day scheduling, the unit supply is off and outside air dampers are closed, cooling capacities are disabled and heating capacities are disabled. Occupied mode may be restored for a pre-determined amount of time by placing the system in occupancy override from the room thermostat.

Room temperature sensors setback to unoccupied setpoints of 85°F(adj.) cooling and 60°F(adj.) degree heating. When room dewpoint temp rises above 62F (adj.) or above 80 deg cooling, unit operation is restored. Once restored, supply fan operates normally (as described in occupied sequence) and the outside air dampers remain closed, subject to economizer cooling sequence. Once unit operation is restored, unit remains enabled for a minimum of time delay of 15 minutes (or as long as call for cooling is present). Unit runs until dewpoint falls below 55 deg or room temp drops below 78 deg. On a call for heating, unit operation is restored. Once restored, supply fan operates normally (as described in occupied sequence) and outside air dampers remain closed.

Outside air damper modulates independently to maintain outside airflow as seen by corresponding airflow station.

Warmup / Cooldown Mode:
If upon entering the occupied mode, return air temperature is below an operator definable limit of 68 degrees, then a "warm-up cycle" shall initiate. The discharge temperature setpoint is reset to 90 degrees and outside air damper is closed. When return air temperature increases above 70 degrees, the warmup cycle shall be terminated. Once the warmup cycle has terminated, it may not occur again until the following occupied mode.

Conversely, if upon entering the occupied mode, return air temperature is above an operator definable limit of 78 degrees, then a "cool-down cycle" shall initiate. The discharge temperature setpoint is reset to 55 degrees. When return air temperature drops below 76 degrees, the cooldown cycle shall be terminated. Once the cooldown cycle has terminated, it may not occur again until the following occupied mode. Outside air dampers remain closed during cooldown cycle, subject to air side economizer operation for cooling.

Cool Mode:
In the cool mode supply fan VFD modulates between max and min speed in order to maintain room temp setpoint. If supply fan reaches minimum speed setpoint (50%) and additional reduction in cooling is required, then discharge air setpoint is reset in order to maintain room temperature setpoint.

Add Sequence:
When supply fan has proven flow, then cooling capacities are enabled. Once enabled, lead stage of cooling is enabled and modulates to maintain discharge setpoint (55 degrees). When lead compressor is fully loaded and additional cooling is required and after a 5 minute time delay, the 2nd stage of cooling is energized. Lead compressor continues to modulate to maintain discharge setpoint. Lead compressor continues to modulate to maintain discharge setpoint. Once energized, cooling stage must remain energized for a period of 5 minutes.

Subtract Sequence:
When all stages of cooling are energized and lead compressor is at minimum capacity and after a 2 min delay, then stage 2 cooling is de-energized and lead compressor continues to modulate to maintain discharge temperature setpoint. When only lead compressor is running and operating at minimum capacity and after a 2 min delay, then lead compressor is cycled at minimum capacity in order to maintain discharge air setpoint. Once a compressor has been disabled, it may not be enabled again for 5 min.

Below 55°F ambient temperature, mechanical cooling capacities are disabled.

Dehum Mode:
If space humidity rises above 55% OR when ambient dewpoint rises above 60 degrees, dehumidification mode is enabled. Once enabled, then DX cooling modulates to maintain discharge air dewpoint temperature of 55 degrees and hot gas reheat is enabled to modulate to maintain discharge air temperature setpoint. If discharge dewpoint temperature is not available, acceptable alternatives to discharge air temperature dewpoint are leaving cooling coil temp or refrigerant pressure. Dehum mode is disabled when space humidity drops to 50%RH(adj) AND ambient dewpoint drops below 55 degrees.

OA Economizer Control - Enthalpy
Ambient enthalpy is calculated from relative humidity and dry bulb temperature. When enthalpy of outside air drops below 23 BTU per lbm and below 60 degrees, unit outside air is utilized for "free cooling". Once enabled, outside air dampers in conjunction with return dampers modulate in order to maintain discharge air temperature setpoint using cool outside air. Transition into economizer mode occurs slowly. Outside air damper position shall not be allowed to open faster than 10 minute ramp time initiated upon entering the mode. Outside air dampers position must not drop below minimum outside air damper position calculation. When outside air dampers are fully open and additional cooling is necessary, cooling capacities may be enabled in order to maintain discharge air temperature setpoint. When enthalpy of outside air rises above 25 BTU per lbm, unit economizer is disabled.

Heating Mode:

In the heating mode, supply fan operates at a fixed speed (80% of design cooling max speed).

Below 65 degrees ambient temp and after supply fan has proven airflow, the ducted heating hot water coil operation is enabled to operate. Once enabled, the ducted heating hot water heater heater modulates to maintain room setpoint. When room temp is far below the control range of the room temp sensor, heating hot water heating capacity is at max signal, subject to maximum discharge temp of 95 degrees. As room temperature rises to within the control range of the temp sensor, heating hot water flow modulates in order maintain room temperature. When room temperature rises above the control range of the room temp sensor, heating hot water coil cycles off. Above 70 degrees ambient temp, heater operation is disabled.

Heat Cool Switchover:
While in the heating mode, if room temperature rises above the room control setpoint by 2 degrees for a period of 10 minutes (adjustable), the unit auto-switches from heating to cooling. While in the cooling mode, if room temperature falls below the room control setpoint by 2 degrees for a period of 10 minutes (adjustable), the unit auto-switches from cooling to heating. Unit may be manually driven to heat or cool modes.

Alarms:

Low Supply Air Temp Protection:
If supply air temp drops below 45°F, fan is disabled and outside air dampers are closed. A message is sent to the user workstation and staff are notified via email or text. This condition may be reset manually from graphic interface.

When fan is off in the unoccupied mode and supply air temperature drops below 45 degrees, an alarm is sent to the operator's workstation. This condition may be reset manually from graphic interface.

Fan Alarm:
Supply fan proves operation by monitoring status through an adjustable current switch. When amps exceed the operational threshold, the fan is considered to be proven on. If the fan fails to exceed the operational threshold and the feedback time delay of 30 seconds expires, then an alarm is sent to the user workstation and staff are notified via email or text. The alarm condition may be automatically corrected at any time if the operational threshold is exceeded. Conversely, if the fan is commanded off, but amps exceed the operational threshold, an alarm is sent to the operator's workstation.

Filter Pressure:
When differential pressure across filters exceeds 150% of clean filter value and after a 300 sec delay expires, then an alarm is present at the user's workstation and a "dirty" run timer is started. When filter returns to below 125% of clean filter value, and after a 300 sec delay has expired, the alarm is automatically reset and a "clean" run timer is started.

CONTROL POINT LIST

REMARKS:
THE DESIGN INTENT IS TO REUSE ALL EXISTING BAS POINTS FOR RTU-9. THE DESIGN INTENT IS FOR THE CONTRACTOR TO PROVIDE ALL POINTS SHOWN IN SCHEDULE INCOORPERATED INTO EXISTING BAS. THE DESIGN INTENT IS TO PROVIDE ADDITION NECESSARY POINTS REQUIRED MODULATING HOT GAS REHEAT SYSTEM IN RTU-9.

THIS POINTS LIST INDICATES THE MINIMUM ANTICIPATED POINTS NEEDED BY THE OWNER AND NEEDED TO EXECUTE THE SEQUENCE OF OPERATIONS. THE CONTRACTOR SHALL SUPPLY THESE AND ALL OTHER POINTS NEEDED TO EXECUTE THE SEQUENCE OF OPERATIONS AND TO MEET THE CODE REQUIREMENTS FOR THE PROJECT.

MARK	CONTROL POINT		DESCRIPTION	FAIL POSITION	SETPOINT		ALARM						TREND HISTORY			
	NAME	TYPE			VALUE	RANGE	PARENT	MODE	LEVEL	TYPE	THRESHOLD	TIME DELAY	TREND	TYPE	SAMPLES	INTERVAL
--	GLOBAL OA HUMID	AI	HUMIDITY SENSOR	--	--	--	--	--	--	--	--	--	Yes	TIME	600	5 MIN
--	GLOBAL OA TEMP	AI	TEMPERATURE SENSOR	--	--	--	--	--	--	--	--	--	Yes	TIME	600	5 MIN
--	HGRH ENABLE	DO	HGRH RELAY	OFF			--	--	--	--	--	--	No	--	--	--
--	HGRH SIGNAL	AO	0-10 VDC	0	--	--	--	--	--	--	--	--	Yes	TIME	300	5 MIN
--	SA HUMID	AI	DUCT POINT HUMIDITY SENSOR	--	--	--	--	--	--	--	--	--	Yes	TIME	300	5 MIN
--	SA TEMP	AI	DUCT POINT TEMPERATURE SENSOR	--	--	--	--	--	--	--	--	--	Yes	TIME	300	5 MIN
--	SPACE HUMID	AI	SPACE RH% SENSOR	--	55%	--	--	--	--	--	--	--	Yes	TIME	300	5 MIN
--	SPACE TEMP	AI	SPACE TEMPERATURE SENSOR	--	72/74	--	--	--	--	--	--	--	Yes	TIME	300	5 MIN

1 RTU-9 - POINTS LIST AND CONTROLS

NO SCALE

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SHAUN M. CONWAY LICENSED 19761 02/09/2026 KANSAS PROFESSIONAL ENGINEER

DATE:
- 02/09/2026

REVISED DATE:
-

Shawnee Heights High School HVAC Equipment Upgrade

Shawnee Heights ESD 450
4201 SE Shawnee Heights Rd, Tecumseh, KS 66542

SHEET CONTENTS:
- CONTROL DETAILS

HTK PROJECT NUMBER:
- 2404.01

SHEET NUMBER:
M-701

2/6/2026 11:23:21 AM Autodesk Docs://2514O2-000 - USD Shawnee Heights HS HVAC Upgrades/251402-000_MECH_R24.rvt

GENERAL NOTES

1. ALL ELECTRICAL WORK SHALL COMPLY WITH THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE (NEC) & THE AMERICANS WITH DISABILITIES ACT (ADA).
2. REFER TO RELATED ARCHITECTURAL, MECHANICAL, STRUCTURAL, TECHNOLOGY, AND CIVIL DRAWINGS FOR RELATED INFORMATION.
3. REFER TO THE SPECIFICATIONS FOR DATA NOT ON THE DRAWINGS.
4. E.C. SHALL REFER TO MECHANICAL DRAWINGS AND SPECIFICATIONS FOR THE REQUIREMENTS ASSOCIATED WITH WIRING AND CONNECTION OF INTERLOCKING AND CONTROLS OF MECHANICAL UNITS AND THERMOSTAT LOCATIONS.
5. COORDINATE OUTLET BOX LOCATIONS WITH MASONRY TO MINIMIZE CUTTING OF BRICK OR BLOCK.
6. ALL MOUNTING HEIGHTS TO CENTERLINE OF ITEM UNLESS OTHERWISE NOTED. VERIFY ALL OUTLET LOCATIONS ON THE JOB PRIOR TO ROUGH-IN.
7. CONDUIT RUN W/CONDUCTORS AS INDICATED & GROUND WIRE SIZED PER N.E.C. 250.122. CONDUIT SIZE AS REQUIRED.
8. WHEN INCREASED CONDUCTOR SIZES ARE SHOWN ON THE PLANS, THE LARGER CONDUCTOR SIZE SHALL BE USED THROUGHOUT THE LENGTH OF THE CIRCUIT, INCLUDING NEUTRAL AND GROUND.
9. E.C. SHALL REFERENCE ARCHITECTURAL FINISH DRAWINGS FOR LOCATIONS AND HEIGHTS OF RIGID WALL COVERINGS, TILE, CHAIR RAIL, WAINSCOATING, ETC. AND ADJUST ELECTRICAL BOX ROUGH-IN HEIGHTS SO THAT COVERPLATES DO NOT PARTIALLY OVERLAP THESE ITEMS.
10. BRANCH CIRCUITS ARE INDICATED AS ONE CIRCUIT HOME RUNS WITH INDIVIDUAL NEUTRALS. A MAXIMUM OF THREE CIRCUITS (MAXIMUM OF THREE PHASE CONDUCTORS) MAY BE GROUPED IN A SINGLE CONDUIT. WHERE MULTIPLE CIRCUITS ARE LOCATED IN THE SAME RACEWAY, JUNCTION BOX OR ENCLOSURE, NEUTRALS SHALL BE MARKED OR LABELED TO INDICATE WHICH CIRCUIT THEY ARE ASSOCIATED WITH. SEE SPECIFICATION SECTION "LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES" FOR ADDITIONAL INFORMATION.
11. JUNCTION BOX OR RECEPTACLE FOR DRINKING FOUNTAINS SHALL BE LOCATED BEHIND THE EQUIPMENT SKIRT UNLESS OTHERWISE NOTED. COORDINATE CONNECTION TYPE AND LOCATION WITH EQUIPMENT PROVIDED.
12. LABEL THE FRONT OF EACH RECEPTACLE COVERPLATE WITH PANEL DESIGNATION AND CIRCUIT NUMBER USING CLEAR THERMAL TRANSFER (ELECTRONIC DYMO) LABELS WITH 1/8" HIGH BLACK LETTERS (OR CONTRASTING COLOR IF COVERPLATES ARE BLACK OR BROWN). LABELS SHALL BE SUITABLE FOR INDOOR/OUTDOOR USE. LABEL THE BACK OF EACH LIGHT SWITCH COVERPLATE WITH PANEL DESIGNATION AND CIRCUIT NUMBER USING A FINE BLACK PERMANENT MARKER.
13. PROVIDE 18" LONG (MIN.) CONDUIT SLEEVES THRU ALL WALLS WHERE CABLES ARE INDICATED OR REQUIRED TO PASS THRU WALLS. PROVIDE BUSHINGS ON BOTH ENDS. SIZE CONDUIT FOR CABLES INSTALLED. AT CABLE TRAYS, PROVIDE ONE 4" CONDUIT SLEEVE FOR EACH 4" WIDTH OF CABLE TRAY. MAXIMUMS SHALL BE:
    1"C. = 10 CABLES
    2 1/2"C. = 20 CABLES
    3"C. = 30 CABLES
    4"C. = 50 CABLES
14. LOCATE CABLE TRAYS 6" ABOVE CEILING. OFFSET TRAY UP AND OVER LIGHT FIXTURES AND DUCTWORK (FIELD VERIFY AND PROVIDE AS REQUIRED). IF PHYSICALLY IMPOSSIBLE TO RUN CABLE TRAY UP AND OVER, THEN PROVIDE CABLE SUPPORT HOOKS FROM STRUCTURE ABOVE, SIZED AND RATED FOR INSTALLED CABLES PLUS 25% SPARE.
15. PROVIDE DIMMER PER THE SPECIFICATIONS. COORDINATE DIMMER TYPE AND WIRING WITH ASSOCIATED LIGHT FIXTURE DIMMING REQUIREMENTS (I.E. 3-WIRE, 0-10V, ELECTRONIC OR MAGNETIC LOW VOLTAGE, ETC.) OR WITH LIGHTING CONTROL SYSTEM PROPRIETARY REQUIREMENTS (I.E. LUTRON, nLIGHT, DALI, ETC.) AS NECESSARY. 3-WIRE DIMMERS SHALL BE PROVIDED WITH A DEDICATED NEUTRAL FOR EACH CONTROL ZONE. 0-10V DIMMERS SHALL BE PROVIDED WITH DIM/ON/OFF CONTROL. COORDINATE PHASE CONTROL OF LED DRIVERS (I.E. REVERSE PHASE, FORWARD PHASE, ETC.) WITH LIGHT FIXTURE MANUFACTURER'S RECOMMENDATIONS. LOW VOLTAGE CONTROL WIRING IS NOT SHOWN ON PLANS FOR CLARITY, BUT SHALL BE PROVIDED AS REQUIRED.
16. "CT" INDICATED ADJACENT TO DEVICE INDICATES DEVICE MOUNTED ABOVE BACKSPLASH OF COUNTER TOP. VERIFY EXACT HEIGHT WITH ARCHITECTURAL PLANS AND ELEVATIONS.

FIRE ALARM

F1. THE FIRE ALARM SYSTEM SHOWN HAS BEEN DESIGNED PER THE REQUIREMENTS OF NFPA 72, 2013 EDITION. DEVICES SHOWN INDICATE DESIGN INTENT AND SHALL BE THE MINIMUM PROVIDED. SYSTEM SUPPLIER SHALL PROVIDE ANY ADDITIONAL CODE REQUIRED DEVICES OR DEVICES REQUIRED BY THE AUTHORITY HAVING JURISDICTION.

F2. FIELD VERIFY LOCATIONS OF AREA SMOKE DETECTORS AND HEAT DETECTORS. DO NOT LOCATE WITHIN 36" OF A HVAC DIFFUSER (SUPPLY OR RETURN), IN A DIRECT AIR FLOW, WITHIN 36" OF A SPRINKLER HEAD, OR WITHIN 36" OF THE TIP OF A CEILING FAN BLADE. SMOKE DETECTORS FOR DOOR RELEASE SHALL BE LOCATED ON THE CENTER LINE OF THE DOOR AND A MAXIMUM OF 5 FEET FROM THE DOOR. THE MINIMUM DISTANCE FROM THE DOOR IS THE DEPTH OF THE WALL SECTION ABOVE THE DOOR, BUT NOT LESS THAN 12".

F3. FAN SHUTDOWN RELAY WIRING SHALL BE LOCATED WITHIN 3 FEET OF THE FAN CONTROLS AND THE WIRING TO THE RELAY SHALL BE MONITORED.

F4. LABEL REMOTE ALARM INDICATOR FOR DUCT MOUNTED SMOKE DETECTORS (I.E. RTU-1 SUPPLY, RTU-2 RETURN, FIRE/SMOKE DAMPER, ETC.). DUCT DETECTORS SHOULD BE LOCATED IN THE AREA BETWEEN 6 AND 10 DUCT EQUIVALENT DIAMETERS OF STRAIGHT, UNITERRUPTED DUCTWORK. DUCT DETECTORS FOR FIRE/SMOKE DAMPERS SHOULD BE LOCATED BETWEEN THE LAST INLET OR OUTLET UPSTREAM OF THE DAMPER AND THE FIRST INLET OR OUTLET DOWNSTREAM OF THE DAMPER.

F5. PROVIDE 120V POWER AND FUSTAT FOR EACH FIRE/SMOKE DAMPER. INTERLOCK WITH FIRE ALARM CONTROL PANEL TO CLOSE THE FIRE/SMOKE DAMPER UPON ANY ALARM AT THE FIRE ALARM CONTROL PANEL AND TO SHUTDOWN THE ASSOCIATED MECHANICAL UNIT.

SYMBOL LIST

SYMBOL	DESCRIPTION	MOUNTING
ONE-LINE		
LSIG, GFI, ST, K	CIRCUIT BREAKER ACCESSORIES: LSIG = LONG TIME, SHORT TIME, INSTANTANEOUS, GROUND FAULT GFI = GROUND FAULT ST = SHUNT TRIP K = KIRK KEY INTERLOCK	
	INDICATOR LIGHT(G=GREEN, R=RED)	
	ENERGY REDUCING MAINTENANCE SWITCH (ERMS) INDICATING LIGHT PER SPECIFICATIONS	
	CONTACTS (N.O., N.C.)	
	FUSE	
	CIRCUIT BREAKER	
	OVERLOADS	
	DRAWOUT CONTACTS	
	DISCONNECT SWITCH (SEE EQUIP CONN SCHED) (VOLTAGE / SWITCH SIZE / FUSE SIZE / # OF POLES - NOTED IF EQUIPMENT NOT SCHEDULED)	
	STARTER (SEE EQUIP CONN SCHED) (VOLTAGE / STARTER SIZE / # OF POLES - NOTED IF EQUIPMENT NOT SCHEDULED)	
	GROUND CONNECTION	
	LIGHTNING ARRESTOR	
SPD	SURGE PROTECTIVE DEVICE	
M	METER (UTILITY / PANEL MOUNTED)	
HP, KW	EQUIPMENT (SINGLE MOTOR / MULTI-MOTOR OR OTHER TYPE AS NOTED)	
VFD	VARIABLE FREQUENCY DRIVE (HP SIZE IF NOT SCHEDULED)	

SYMBOL	DESCRIPTION	MOUNTING
1	FEEDER DESIGNATION	
#A, A, 2P	FUSIBLE SWITCH (CIRCUIT NUMBER / SWITCH SIZE / FUSE SIZE / # OF POLES) (# OF POLES IF OTHER THAN 3)	
#A, A, 2P, 1"1"	STARTER WITH FUSIBLE SWITCH (CIRCUIT NUMBER / SWITCH SIZE / FUSE SIZE / # OF POLES / STARTER SIZE) (# OF POLES IF OTHER THAN 3)	
#, A, AF, AT, 2P	CIRCUIT BREAKER (MOLDED CASE NON-ADJUSTABLE TRIP / ADJUSTABLE TRIP) (CIRCUIT NUMBER / TRIP SIZE / # OF POLES) (FRAME SIZE / TRIP SIZE) (# OF POLES IF OTHER THAN 3)	
	3Ø TRANSFORMER (DELTA PRIMARY / WYE SECONDARY)	
	1Ø TRANSFORMER	
PANEL, SPD	PANELBOARD (BUILT-IN SPD)	
N, E, ATS	TRANSFER SWITCH (ATS = AUTOMATIC, MTS = MANUAL) (AMP SIZE / VOLTAGE / POLES / AIC RATING / NEMA RATING) (NEMA RATING IF OTHER THAN NEMA-1)	
"1", RV, AT	MOTOR STARTER [SINGLE SPEED ACROSS-THE-LINE (UON)] (NEMA SIZE / RV AT= REDUCED VOLTAGE / AUTO-TRANSFORMER / SS = SOLID STATE)	
FIRE ALARM		
'FACP'	FIRE ALARM CONTROL PANEL	WALL
'FAAP'	FIRE ALARM REMOTE ANNUNCIATOR	WALL
'VEP'	VOICE EVACUATION PANEL	WALL
H	FIRE ALARM HORN	BOTTOM 80"
H, C	FIRE ALARM HORN	CEILING
	FIRE ALARM VISUAL SIGNAL	BOTTOM 80"
	FIRE ALARM VISUAL SIGNAL	CEILING
H	COMB. F.A. HORN & VISUAL SIGNAL	BOTTOM 80"
H, C	COMB. F.A. HORN & VISUAL SIGNAL	CEILING
S	FIRE ALARM SPEAKER	WALL
S, C	FIRE ALARM SPEAKER	CEILING
S	COMB. F.A. SPEAKER & VIS SIGNAL	BOTTOM 80"
S, C	COMB. F.A. SPEAKER & VIS SIGNAL	CEILING
	COMB. F.A. SPEAKER & VIS SIGNAL HIGH OUTPUT CLUSTER	CEILING
C	CHIME	WALL
B	FIRE SPRINKLER ALARM BELL	WALL
DH	ELECTROMAGNETIC DOOR HOLDER	WALL
R	FIRE ALARM RELAY (GEN NOTE F3)	
CM	FIRE ALARM CONTROL MODULE	
MM	FIRE ALARM MONITOR MODULE	

SYMBOL	DESCRIPTION	MOUNTING
FH	FIRE ALARM MANUAL STATION	46"AFF
S, S, S, S, AC, UF	PHOTO ELECTRIC AREA SMOKE DETECTOR (GEN NOTE F2)	CLG/WALL ABOVE CLG UNDER FLR
S, LF	AREA SMOKE DETECTOR W/ LOW-FREQUENCY SOUNDER BASE	CEILING (GEN NOTE F2)
S	DUCT SMOKE DETECTOR (GEN NOTE F4)	DUCTWORK
S, S, FSD, SD	DUCT SMOKE DETECTOR & FIRE/ SMOKE DAMPER (FSD) OR SMOKE DAMPER (SD) (GEN NOTES F4 & F5)	DUCTWORK
H, R, H, H	HEAT DETECTOR (GEN NOTE F2) (FIXED TEMPERATURE UON) R = RATE OF RISE H = HIGH TEMPERATURE	
CO	CARBON MONOXIDE DETECTOR	
CO2	CARBON DIOXIDE DETECTOR	
SMOKE	SMOKE CAMERA (EQUAL TO XTRALIS OSID)	WALL (AS HIGH AS POSSIBLE)
PS	FIRE SPRINKLER PRESSURE SWITCH	
TS	FIRE SPRINKLER TAMPER SWITCH	SPRKLR RSR
FS	FIRE SPRINKLER WATER FLOW SW	SPRKLR RSR

- - - SYMBOL LIST IS FOR REFERENCE ONLY. ALL SYMBOLS MAY NOT BE USED ON THIS PROJECT. - - -

SYMBOL LIST

SYMBOL	DESCRIPTION	MOUNTING
ABBREVIATIONS		
NL	NIGHT LIGHT - WIRE AHEAD OF CONTROLS	
EM	ON EMERGENCY POWER	
WP	WEATHERPROOF	
CT	COUNTERTOP (SEE GEN. NOTE 16)	
UON	UNLESS OTHERWISE NOTED	
W	WALL	
AFF	ABOVE FINISHED FLOOR	
AFG	ABOVE FINISHED GRADE	
DF	DRINKING FOUNTAIN - SEE GENERAL NOTE 11	
GAP	GENERATOR ANNUNCIATOR PANEL	
CLG	CEILING	
TV	COORDINATE MOUNTING HEIGHT WITH BRACKET	
CONDUIT AND WIRING		
	EMERGENCY CIRCUIT	CLG/WALL
	LOW VOLTAGE WIRING	CLG/WALL
	CDT RUN 2#12 & 1#12 GRD.- 1/2"C. OR CDT RUN AS NOTED ON PLAN	CLG/WALL
	CDT RUN 2#12 & 1#12 GRD.- 3/4"C. OR CDT RUN AS NOTED ON PLAN	EARTH/ FLOOR
#10	CONDUIT HOME RUN, 1 CIRCUIT. 2#10 & 1#10 GRD. (GEN. NOTES 7 & 8)	CLG/WALL
	CONDUIT RUN PARTIAL CIRCUIT. 2#12 & 1#12 GRD. - 1/2"C.	CLG/WALL
	MISC. EQUIPMENT CONNECTION	
	CONDUIT SEAL OFF	
	CONDUIT HOME RUN, 1 CIRCUIT. 2#12 & 1#12 GRD. - 1/2"C.	CLG/WALL
	CONDUIT HOME RUN, 2 CIRCUITS. 4#12 & 1#12 GRD. - 1/2"C.	CLG/WALL
	CONDUIT HOME RUN, 3 CIRCUITS. 6#12 & 1#12 GRD. - 1/2"C.	CLG/WALL
	CONDUIT HOME RUN, 2 CIRCUITS PHASE CONDUCTORS/ NEUTRAL CONDUCTOR (#12 UON) SWITCH LEGS (#12 UON) GROUND CONDUCTOR (#12 UON)	CLG/WALL
POWER		
	SINGLE GROUNDED RECEPTACLE	18"
	DUPLEX GROUNDED RECEPTACLE	18"
	DUPLEX GROUNDED RECEPTACLE	CEILING
	DOUBLE DUPLEX GROUNDED REC	18"
	GROUND FAULT DUPLEX REC	18"
	GRD FAULT DOUBLE DUPLEX REC	18"
	DUPLEX GRD REC BOTTOM SWITCHD	18"
	TAMPER-PROOF DUPLEX REC	18"
	TAMPER-PROOF GFCI DUPLEX REC	18"
A, A	SPECIAL OUTLET (SEE SCHEDULE OR AS NOTED)	FLOOR/WALL
FB#, PT#	FLOOR BOX / POKE-THRU (SEE SCHEDULE OR AS NOTED)	FLOOR
2	FEEDER DESIGNATION	
J1	JUNCTION BOX - 1-GANG	
J	JUNCTION BOX - 2-GANG	
F	FUSTAT BUSS #SSY	46"
TS	THERMOSTAT/TEMP SENSOR	46"
P	PLUG LOAD SENSOR	CEILING
H	HANDICAP DOOR PUSHBUTTON	36" AFF
	DUPLEX ISOLATED GROUND REC (GEN NOTES C1, C2, & C3)	18"
	DOUBLE DUPLEX ISOLATED GROUND (GEN NOTES C1, C2, & C3)	18"
A	BRANCH CIRCUIT PANEL AND PANEL DESIGNATION	72" TO TOP
	ELECTRICAL DISTRIBUTION EQUIP	
X-X, X-X	EQUIPMENT - SEE EQUIPMENT CONNECTION SCHEDULE	
	CONDUIT SLEEVE (GEN NOTE 13)	
	CABLE TRAY - WIRE BASKET,	
	LADDER (GEN NOTE 14)	
M	MOTOR	
	DISCONNECT SWITCH	
M	MANUAL STARTER	
	CIRCUIT BREAKER	
	STARTER OR ATS (AS NOTED)	
	COMBINATION STARTER/DISC	
R	RELAY	
	PUSHBUTTON (1-, 2-, 3-BUTTON)	46"
T	BOX MOUNTED TRANSFORMER	
C	CONTACTOR	
	METER	
	PLUGMOLD SURFACE RACEWAY	WALL
	BUSDUCT PLUG	
	DUPLEX GRD REC DEDICATED FOR COMPUTERS (GEN NOTE C1)	18"

PEN WEIGHT LEGEND

ALL DEVICES, LIGHT FIXTURES, ETC., DRAWN IN DARK SOLID LINES ARE NEW TO BE INSTALLED	
	NEW DUPLEX GROUNDED RECEPTACLE
	NEW LIGHT FIXTURE
ALL DEVICES, LIGHT FIXTURES, ETC., DRAWN IN HALFTONE SOLID LINES ARE EXISTING TO REMAIN	
	EXISTING DUPLEX GROUNDED REC TO REMAIN
	EXISTING LIGHT FIXTURE TO REMAIN
ALL DEVICES, LIGHT FIXTURES, ETC., DRAWN IN DARK DASHED LINES ARE EXISTING TO BE REMOVED	
	DUPLEX GROUNDED REC TO BE REMOVED
	LIGHT FIXTURE TO BE REMOVED
ALL DEVICES, LIGHT FIXTURES, ETC., DRAWN IN LIGHT DASHED LINES ARE EXISTING TO BE RELOCATED	
	DUPLEX GROUNDED REC TO BE RELOCATED
	LIGHT FIXTURE TO BE RELOCATED

COLOR CODING

	MISCELLANEOUS		EQUIPMENT BRANCH
	120/208V		LIFE SAFETY BRANCH
	277/480V		UPS POWER
	EMERGENCY/CRITICAL BRANCH		

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ELECTRICAL SHEET INDEX

SHEET NO.	SHEET TITLE
E-001	ELECTRICAL GENERAL NOTES AND SYMBOLS
E-002	ELECTRICAL SPECIFICATIONS
E-003	ELECTRICAL SPECIFICATIONS
E-101	ELECTRICAL DEMOLITION PLAN
E-131	POWER PLAN
E-501	ELECTRICAL SCHEDULES & DETAILS
E-601	ELECTRICAL ONE-LINE DIAGRAM - DEMOLITION
E-611	ELECTRICAL SCHEDULES

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DATE:
- 02/09/2026

REVISED DATE:
-

Shawnee Heights High School HVAC Equipment Upgrade

Client/Architect

4201 SE Shawnee Heights Rd, Tecumseh, KS 66542

SHEET CONTENTS:
- ELECTRICAL GENERAL NOTES AND SYMBOLS

HTK PROJECT NUMBER:
- Project Number

SHEET NUMBER:
E-001

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DIVISION 26 - ELECTRICAL

SECTION 260500 - BASIC METHODS AND REQUIREMENTS (ELECTRICAL)

PART 1 - GENERAL

1.1 GENERAL CONDITIONS
A. The General Conditions, Supplementary General Conditions, General Requirements, and Special Conditions shall be and are hereby made a part of this Section of the specifications.

1.2 SCOPE
A. The Electrical work shall include all labor, materials, tools, transportation,equipment, services and facilities, required for the complete, proper and substantial installation of all electrical work shown on the plans, and/or outlined in these specifications. The Installation shall include all materials, appliances, and apparatus not specifically mentioned herein or noted on the drawings but which are necessary to make a complete working installation of all electrical systems.
B. All of the electrical related work required for this project (unless specified otherwise) is a part of the Electrical Contract price and is not necessarily specified under this division of the specifications or shown on the electrical drawings. Therefore, all divisions of the specifications and all drawings shall be consulted.
C. The drawings showing the layout of the work indicate the approximate locations of outlets, apparatus, and equipment. The drawings are schematic only and are not intended to show the exact routing of conduits, etc. The final determination as to the routing shall be governed by structural conditions and other obstructions. This shall not be construed to mean the design of the system may be changed. It merely refers to the exact run of a raceway between given points. The Contractor shall consult all contract drawings which may affect the location of any outlet, apparatus or equipment to avoid possible interference and permit full coordination of all work. The right to make any reasonable change (within 6"-0") in the location of apparatus, outlets, and equipment up to the time of roughing-in is reserved by the Architect without involving any additional expense to the Owner.

1.3 MINIMUM REQUIREMENTS
A. Codes, Rules, and Regulations: Execute all work under the latest rules and regulations of the National Electrical Code Standard of the National Board of Fire Underwriters and with all laws, regulations and ordinances of the County, State, City, and the Utility Company.
B. Codes shall govern in case of any direct conflict between codes and plans and specifications; except when plans and specifications require higher standards than those required by code. Variance from the plan and specifications made to comply with code must be approved by the Architect. If approved they shall be made with no increased cost to the Owner.

1.4 EXAMINATION OF SITE
A. Visit the site, inspect the existing conditions and check the drawings and specifications so as to be fully informed of the requirements for completion of the work.
B. Lack of such information shall not justify an extra to the contract price.
C. ***Existing systems and conditions shown on drawings for existing buildings are to be noted "for guidance only". The Electrical Contractor shall field check all existing conditions prior to bidding and is to include in his bid an allowance for extension, removal and/or relocation of existing conduits, wires, devices, or other equipment as indicated on the plans or as required to coordinate and adapt new and existing electrical system to all other work.***

1.5 PERMITS
A. Obtain and pay for all licenses and permits, fees, inspection and certificates required for the execution of this work.
B. Deliver permits and certificates to the Architect to be transmitted to the Owner.

1.6 RESPONSIBILITY AND EQUIPMENT PROTECTION
A. This Contractor will be held responsible for any and all damage to any part of the building or to the work of other contractors, as may be caused through his operation.
B. Any mutilation of building finishes or equipment initiated by electrical construction shall be properly corrected by the respective finishing contractor and paid for by the Electrical Contractor.
C. During installation, equipment, controls, controllers, circuit protective devices, and other like items, shall be protected against entry of foreign matter and be vacuum cleaned both inside and outside before testing, operating and painting.

1.7 WORK TO BE DONE BY GENERAL CONTRACTOR
A. Build in all openings sleeves, chases etc., for conduit and equipment as established, furnished and set by this Contractor. He shall seal or grout all openings after this Contractor has installed his conduits.
B. Build in bolts, brackets, hangers etc. for work established, furnished and set by this Contractor.
C. Do all concrete work required for equipment furnished and set by this Contractor, including clean up pads under electrical gear, fixture bases, etc.

1.8 WORK DONE BY THE MECHANICAL CONTRACTOR
A. The Mechanical Contractor shall furnish wiring diagrams and temperature control drawings of all equipment furnished to the Electrical Contractor. Catalog information is unacceptable, provide point to point drawings.
B. The Mechanical Contractor shall furnish and install all control equipment requiring connections to air, water, steam, etc., such as pneumatic electric relays, remote bulb temperature controls, solenoid valves, aquastats and pressure controls.
C. The Mechanical Contractor shall reimburse the Electrical Contractor for any changes in system design i.e.; control or equipment which effects the Electrical Contractor.

1.9 WORKMANSHIP AND COORDINATION
A. Make installation substantially as shown on the plans.
B. Make alterations in location of apparatus or conduit as may be required to conform to building construction without extra charge.
C. Mechanical equipment service clearances and electrical apparatus service clearances as specified in their respective manufacturer's product data shall be maintained free from conduit.
D. Cooperate with other contractors in their installation of work.
E. Complete the installation in a workmanlike manner, completely connected and ready to give proper and continuous service.
F. Use only experienced licensed electricians.

1.10 CUTTING AND PATCHING
A. Notify the General Contractor in ample time, of the location of all chases, sleeves, and any other openings required in connection with the work of this contract.
B. Cutting and patching made necessary because of failure to comply with the above shall be done by the General Contractor at the expense of the Electrical Contractor.
C. When it is necessary for the Electrical Contractor to cut building materials to install his work, it shall be done in a neat and workmanlike manner meeting with the approval of the Architect.
D. Holes through concrete shall be carefully done with a "Concrete Termite" drill. A Star drill or Air Hammer will not be permitted. Structural members shall not be cut without approval from the Architect.
E. Any penetrations thru roof shall be made with "Stoneman" flashing connections as manufactured by Stoneman Engineering and Manufacturing Co., Inglewood, California.
F. Any penetrations made in exterior or basement foundation walls shall be sealed with Thunderline "Link-Seal" connections, as manufactured by Thunderline Corporation, Wayne, Michigan.

1.11 MANUFACTURER'S INSTRUCTIONS
A. Apply, install, connect, erect, use, clean, and condition articles, materials and equipment as directed by the manufacturer.

1.12 EQUIPMENT INSTALLATION AND REQUIREMENTS:
A. Equipment location shall be as close as practical to locations shown on the drawings.
B. Working spaces shall not be less than specified in the National Electrical Code for all voltages specified.
C. Inaccessible Equipment:
1. Where the Engineer determines that the Contractor has installed equipment without proper clearances or not conveniently accessible for operation and maintenance, equipment shall be removed and reinstalled as directed at no additional cost to the Owner. Install access panels as approved by the Architect to provide access to all equipment, J-boxes, and outlets located in non-accessible spaces. Panels shall be flush, locking type with a fire rating equal to the ceiling system.
2. "Conveniently accessible" is defined as being capable of being reached without the use of ladders, or without climbing or crawling under or over obstacles such as motors, pumps, belt guards, transformers, piping, and ductwork.
D. Distribution Equipment:
1. All items of Electrical Distribution Equipment shall be of one manufacturer, unless specifically noted on the drawings, in the specifications, or approved by the Engineer. Intermixing of distribution equipment by different manufacturers will not be permitted.
2. Equipment layouts on the drawings are based on one manufacturer. Verify all actual equipment sizes with equipment manufacturer prior to bidding.
3. If layout changes are required due to other electrical manufacturers equipment size, they must be submitted to and approved by the engineer. National Electric Code working clearances must be maintained at all times. In no case will extra remuneration be allowed for layout changes that differ from those shown.
4. Provide and install all steel supports as required for mounting of electrical equipment.
5. Anchor all free standing electrical equipment to the floor with plated 1/2" minimum anchor bolts as recommended by the manufacturer.
6. Electrical equipment that is likely to require maintenance while energized shall be field or factory marked to warn qualified persons of potential electric arc flash hazard per N.E.C. Section 110.16.

1.13 EQUIPMENT CONNECTIONS, CONTROLS AND INSTRUMENTATION
A. General: The following applies to all Electrical Power and Control Connections for all equipment requiring electrical installation work provided by others.
B. The Electrical Contractor shall furnish, install and connect all wiring, conduit, boxes, toggle switches, thermal switches, disconnect switches, remote pushbutton stations not included in magnetic starters, etc., for all equipment requiring electrical power that is either furnished or specified by other Contractors and/or the Owner, shown on drawings or listed below. The Electrical Contractor shall receive, install and connect all starters, controllers, variable frequency drives, over current devices, capacitors, power factor correction devices, transformers, alarms, bells, horns, relays, remote switches for equipment supplied by others (i.e. starters or capacitors or power factor correction devices for Mechanical Equip., etc.).
C. The Contractor shall be familiar with the equipment to be furnished by the other Contractors and/or the Owner in connection with this work and provisions for such connections and work shall be included in the Contractor's price. In no case will extra remuneration be allowed for such work.

1.14 NAMEPLATES
A. General: The following items shall be equipped with nameplates:
1. Disconnect Switches (fused or nonfused), switchgear, switchboards, panelboards, separately mounted circuit breakers, contactors and relays.
2. Special Electrical Systems (JCI Controls, etc.) shall be so identified at junction and pull boxes, terminal cabinet and equipment racks.
B. Inscription: Nameplates shall adequately describe the function or use of the particular equipment involved. Nameplates for panelboards and switchboards shall include the panel designation, voltage, phase, and A.I.C. rating of the supply (See Schedules). For example, "Panel A" 120/208 V, 3-Phase, 4-Wire, 10,000 A.I.C.". The name used for a machine nameplate shall be the same as the one used on the machine's motor starter, disconnect and P.B. station nameplates. Nameplates for fused switches and panels shall also indicate fuse type and size.
C. Construction: Nameplates shall be as follows:
1. Normal Power - laminated phenolic plastic white front and back with black core.
D. Lettering shall be engraved through front layer to form 1/4-inch white characters (1/2" white letters for distribution panel and switchboard names). Branch switch labels shall be 1/4-inch letters. Nameplates shall be securely fastened to the equipment to be identified, with No. 4 Phillips, round head, cadmium plated, steel self tapping screws or nickel plated brass bolts. Motor nameplate may be nonferrous metal not less than 0.03 inches thick, die stamped. In lieu of separate plastic nameplates, engraving directly on device plates is acceptable. Letters engraved thus, shall be filled with contrasting enamel. All nameplates and their installation are part of this work. Free hand lettering or dymo label marker will not be acceptable.

1.15 MATERIALS
A. Materials and equipment furnished shall be new, of best quality and design, free from defects, of current production by manufacturers regularly engaged in the manufacture of such items for at least 3 years, for which replacement parts should be available. All items used on this project shall be free of asbestos, PCB, and mercury material. A manufacturer's nameplate affixed in a conspicuous place will be required on each major component of equipment stating manufacturer's name, address and catalog number.
B. All material and equipment shall be listed, labeled or certified by Underwriter's Laboratories, Inc., where such standards have been issued. Equipment and material which are not covered by UL Standards will be accepted provided equipment and material is listed, labeled, certified or otherwise determined to meet safety requirements of a nationally recognized testing laboratory.
C. Where items of equipment and/or materials are specifically identified herein by a manufacturer's name, model or catalog number, only such specific items may be used in the base bid, except as hereinafter provided.
D. Unless requests for changes in base bid specifications are received and approved and noted by written addendum prior to the opening of bids, the successful contractor will be held to furnish specified items.
E. After contract is awarded, changes in specifications shall be made only as defined under "Substitution of Equipment"

1.16 SUBSTITUTION OF EQUIPMENT
A. After execution of the contract, substitution of equipment of makes other than those specifically named in the contract documents may be approved by the Engineer only if the equipment named in the specifications cannot be delivered to the job in time to complete the work in proper sequence to work of other Contractors, due to conditions beyond control of the contractor.
B. Requests for substitutions must be accompanied by documentary proof of equality or difference in price and delivery, if any, in form of certified quotations from suppliers of both specified and proposed equipment.
C. The Owner shall receive all benefits of the difference in cost involved in any substitution, and the contract altered by change order to credit Owner with any savings so obtained.

1.17 SUBMITTALS
A. The Engineer's approval shall be obtained for all equipment and material before delivery to the job site. Delivery, storage or installation of equipment or material which has not had prior approval will not be permitted at the job site.
B. All submittals shall be submitted electronically and include adequate descriptive literature, catalog cuts, shop drawings and other data necessary for the Engineer to ascertain that the proposed equipment and materials comply with specification requirements. Catalog cuts submitted for approval shall be legible and clearly identify equipment being submitted.
C. Submittals shall be complete and submitted together for each section. Individual systems and equipment assemblies which consist of more than one item or component shall be made for the system or assemble as a whole. Partial submittals will not be considered for approval.
D. Mark the submittals, "SUBMITTED UNDER SECTION_____". Mark out all statements on sheets that do not apply otherwise. The Engineer may select options and equipment not originally specified. All options that are not marked out will be assumed that the Contractor will furnish the same.
E. Mark catalog cuts to indicate equipment, capacities, finishes, sizes, etc. Each individual item shall have its own sheet provided for approval. (Example: Separate sheets for each panelboard.)
F. All shop drawings shall be checked and signed by this contractor and general contractor prior to submittal to the Architect/Engineer.
G. Shop drawings submitted without Contractor's signatures or approval and verification will not be approved.
H. The submittals shall include the following:
1. Information that confirms compliance with contract requirements. Include the manufacturer's name, model or catalog numbers, catalog information, technical data sheets, shop drawings, pictures, nameplate data and test reports as required.
2. Elementary and interconnection wiring diagrams for communication and signal systems, control system and equipment assemblies. All terminal points and wiring shall be identified on wiring diagrams.
3. Quantities of materials will not be verified by the Architect or Engineer. Approval stamp on shop drawings does not constitute approval of quantities listed on shop drawings.
I. Shop drawings shall be submitted on devices, motor starters, disconnects, low-voltage systems, etc.
J. Submittals for low-voltage systems shall include complete riser diagrams showing all conductors and conduit sizes.
K. Engineer's acceptance of Compliance Submittals will not relieve the Contractor from his responsibility for any deviations from the requirements of the contract documents, unless Contractor has in writing called Engineer's attention to such deviation at the time of submission and the Engineer has given written approval to the specific deviation; nor shall any acceptance by Engineer relieve Contractor from responsibility for errors or omissions in Compliance Submittals.

1.18 ELECTRICAL WORK COMPLETION
A. Before requesting final inspection the following work must be completed.
B. Operating Instructions:
1. The Contractor shall submit along with the shop drawings of the equipment, three (3) copies of operating instructions for all items. Instructions shall be prepared by the manufacturer of the equipment.
2. After the operating instructions have been approved by the Architect, the Contractor shall include the three (3) copies in maintenance instructions brochures.
3. The Contractor shall also obtain all manufacturer's instructions, manuals, and one complete set of drawings and turn these over to the Architect at the completion of the project.
4. The Contractor shall keep in a safe place, all keys and special wrenches furnished with equipment under this contract and shall give same to the Engineer at the completion of the project.
5. The Contractor shall prepare a complete brochure, in triplicate, covering all systems and equipment furnished and installed under this Contract. Brochures shall be submitted to the Architect for approval and delivery to the Owner. The cost of this brochure shall be included in the contract cost. Brochures shall contain the following:
a. Certified equipment drawings and/or catalog data clearly marked for equipment furnished as required for approval submission under detailed section of the specifications.
b. Complete operating and maintenance instructions for each item of equipment.
c. Complete part list for each equipment item.
d. Any special emergency operating instructions or a list of service organizations (including addresses and telephone numbers) capable of rendering emergency service to the various parts of the system.
6. Brochures shall be bound in hard backed three ring binders with an index, subdividers and reinforced sheets.
a. Project name and address.
b. Section of work covered by brochure, i.e. "Electrical Work".
c. Name and address of Architect., Engineer, and Contractor.
d. Telephone number of Contractor, including night or emergency number.
7. In addition to these written instructions, each respective contractor shall fully and carefully instruct the Owner, or the Owner's representatives, as to the proper operation, care and maintenance of each system and its equipment.

1.19 TESTING AND ADJUSTMENT
A. Upon completion of the project, record loads for a 48 hour period on each phase of all existing panelboards, distribution panels and switchboards, in which new loads are being added to and submit final readings to the Engineer for records. This Contractor shall adjust equipment, instruments, gages, meters etc., as required to test and adjust these systems.
B. Check test and adjust the mechanisms of all electrical equipment as required for optimum performance.
C. Perform tests for insulation resistance in accordance with the requirements of the National Electrical Code and insure that all circuits are free from short circuits.
D. Keep a calibrated voltmeter and ammeter available at all times and provide service for test readings when and as required up until the project is accepted by the Owner.

1.20 AS-BUILT DRAWINGS
A. Show on blue line prints in red ink all changes from original plans made during the installation. Return two (2) sets of red marked drawings, specifications and addenda, as set forth in the General Conditions, to the Architect upon completion of the Project.

1.21 FINAL INSPECTION
A. Final inspection will be made upon written request from the General Contractor after the project is completed; in accordance with the Supplementary General Conditions.
B. Furnish a workman familiar with this project to accompany the Engineer on final inspection and have available ladders, drop cords, and other equipment as required to gain access to any portion of this system.
C. This Contractor and principal subcontractors shall be represented at the inspection by a person of authority responsible to demonstrate to the Engineer that the work conforms to the intent of the plans and specifications.
D. Extra inspections made necessary by the Electrical Contractor's failure to comply with the conditions as set forth above shall be charged to the contractor for the inspector's time both on the job and spent in travel between the office and the project site.

1.22 GUARANTEE
A. Guarantee all work, material and equipment for a period of one year after date of substantial completion.
B. During the year guarantee period the Electrical Contractor shall be responsible for any defects which develop in the electrical systems. Upon notification of a defect by the General Contractor, the Electrical Contractor shall make immediate effort to correct it and shall notify the Architect when this work is completed.
C. Repairs and/or replacements shall be made with no cost to Owner.
D. Provide as part of the work of this contract, in addition to the first year's guarantee on equipment and materials, the following routine maintenance and inspection. (The one year time period will not start until each item is completed in accordance with plans and specifications and accepted by the Owner). Correct and adjust all emergency systems. This service to be provided throughout the guarantee period.

END OF SECTION 260500

SECTION 261000 - BASIC MATERIALS

1.1 CONDUIT
A. Materials:
1. Rigid conduit shall be standard size, hot dip galvanized conduit as manufactured by the Republic, Allied Tube, LTV, or equal. Rigid steel conduits and intermediate metal conduits shall be provided with threaded fittings and couplings.
2. EMT tubing shall be Allied, Republic, LTV, or equal with U.L. approved National Electric Code type fittings. Indenter type fittings shall not be used.
3. All conduit exposed to physical abuse (i.e. industrial locations), installed in wet locations, in slabs, below grade or exposed exterior to the building, shall be rigid steel or intermediate metal conduit (IMC).
4. EMT conduit may be used where code permits except as outlined above.
5. A separate ground conductor sized per N.E.C. Section 250.122 shall be installed in all conduits containing phase conductor(s).
6. Liquid-tight flexible metal conduit: Flexible galvanized steel tubing covered with extruded liquid-tight jacket of polyvinyl chloride (PVC). Provide conduit with a continuous copper bonding conductor spiral between the convolutions. Provide steel or malleable iron fittings. Connectors shall have insulated throats.
B. Bushings And Locknuts:
1. Bushings for terminating conduits smaller than 1-1/4-inches are to have flared bottom and ribbed sides, with smooth upper edges to prevent injury to cable insulation.
2. Install insulated type bushings for terminating conduits 1-1/4-inches and larger. Bushings are to have flared bottom and ribbed sides. Upper edge to have phenolic insulating ring molded into bushing.
3. Where required, bushings of standard or insulated type shall have screw type grounding terminal.
C. Conduit Installation:
1. All conduit work shall be installed concealed in walls, floor and roof construction or concealed within furred spaces or above ceilings. In equipment or mechanical rooms exposed work shall include feeders and connections to equipment unless noted otherwise.
2. All exposed conduits (where approved by the Engineer) shall be routed parallel or perpendicular to building elements.
3. Conduit shall be installed to the requirements of the structure and to requirements of all the other work on the project. Conduit shall be installed to clear all openings, depressions, pipes, ducts, reinforcing steel, etc. Conduit set in forms for concrete structure shall be installed in a manner that installation will not affect the strength of the structure as determined by the Structural Engineer. Maximum size of conduit in concrete slab is 1-1/4-inches trade size.
4. Conduit shall be installed continuous between connections to outlets, boxes and cabinets with a minimum possible number of bends and not more than the equivalent of 4-90 degree bends between connections. Bends shall be smooth and even and shall be made without flattening conduit or flaking enamel. Radius of bends shall be as long as possible and never shorter than the corresponding trade elbow. Long radius elbows shall be used where necessary.
5. Conduits shall be securely fastened in place with approved straps, hangers, and supports as required. See Specification Section entitled SUPPORTING DEVICES for conduit support requirements.
6. Conduit shall be reamed before installation and all conduit shall be thoroughly cleaned before installation and kept clean after installation. Openings and boxes shall be plugged or covered as required to keep conduit clean during construction and all conduit shall be fished clear of obstructions before the pulling of wires. All conduit shall be as sized above and shall not be smaller than code requirements.
7. All work shall be protected against damage during construction and any work damaged or moved out of line after roughing-in shall be repaired and reset to the approval of the Architect without additional cost to the Owner.
8. Conduit terminations at panelboards, switchboards, motor control equipment, junction boxes, etc., shall be aligned and installed true and plumb. Wood or steel bucks or templates shall be used where required.
9. Install sleeves and sleeve seals at exterior floor, exterior wall, and roof conduit penetrations and completely seal clearances around the conduit and sleeve and make watertight.
10. Rooftop raceways or cables shall be supported up off the surface of the roof with a polymeric rooftop support equal to Caddy Pyramid series. Supports shall be non-penetrating and shall be designed to prevent damage to the roofing materials. Wood supports are not allowed.
11. Where conduits cross construction expansion joints, contractor shall provide Appleton XJ expansion couplings or equal with copper bonding jumpers.
12. Use flexible metal conduit (Type FMC) for connections to motors and other electrical equipment subject to movement, vibration, misalignment, cramped quarters, or noise transmission. Provide liquid-tight flexible metal conduit Type (LFMC) for installation in exterior locations, kitchens, moisture or humidity laden atmosphere, corrosive atmosphere, water or spray wash-down operations, etc.

1.2 WIRES AND CABLES
A. Southwire, General Cable, Allied or equal code gauge wire, finished with fadeless color solution for National Electric Code system of color coding and bearing Underwriter's label. Wires shall be soft annealed stranded copper with properties conforming to the National Electric Code requirements. No. 8 gauge and larger shall be stranded. No. 10 gauge and smaller shall be solid.
B. Wire smaller than No. 12 gauge shall not be used unless specifically called for.
C. All feeder conductors shall be the same size and type and be continuous from overcurrent device to panel.
D. Wires for general use within the building shall be Type THWN, XHHW, or combination THHN/THWN except where called for on the drawings. Type THW may be used for #6 AWG and larger sizes. All conductor sizes must be as specified on drawings regardless of insulation type. Wires for other than general use shall be as hereinafter specified for specific services.
E. A ground wire sized per N.E.C. Section 250.122 shall be installed in each conduit containing phase conductors.
F. All control wiring shall be copper, solid or stranded, #14 ga. or larger depending upon current requirements. Insulation Type for 90 degree C. Where stranded conductors are used provide with spade type insulated copper terminals.
G. See riser diagrams and/or other sections of the Specifications for types and ratings for sound, fire alarm, control and other special cables.
H. All conductors shall be identified at all termination points and in all pull and junction boxes by the following method of color coding. Means of identification shall be permanently posted at each branch circuit panel with a nameplate identifying color coding where more than one nominal voltage system is in the same building.

208Y/120 volt system:	480Y/277 volt system:
• Phase A - Black	Phase A - Brown
• Phase B - Red	Phase B - Orange
• Phase C - Blue	Phase C - Yellow
• Neutral - White	Neutral - Gray
• Ground - Green	Ground - Green

I. All conductors size #8 Awg and smaller shall have colored insulation. Where conductors with black insulation are used for the larger wire sizes (#6 Awg and larger) color coding shall be provided with two layers-one half lapped of No. 35 colored Scotch Vinyl electrical tape. Where any conductor is or can be supplied from an emergency system the Contractor shall mark each conductor with an additional two layers-one half lapped of Purple colored Scotch Vinyl Electrical tape.
J. Individual neutrals shall be provided for each circuit. Multi-wire branch circuits (i.e. Two or more phases sharing a neutral conductor) shall not be allowed, unless specifically noted or shown on the plans. Where multi-wire branch circuits are shown or noted on the plans, provide a disconnecting means that will simultaneously disconnect all phase conductors at the panel where the branch circuit originates.

1.3 FIRE BARRIER PENETRATION SEALS
A. Manufacturer: Subject to compliance with requirements, provide fire barrier penetration seals shall be equal to Electro Products Div./3M.
B. Provide seals for any opening through fire-rated walls, floors or ceilings used as passage for components such as conduits or cables.
1. Cracks, Voids or Holes Up to 4-inches Diameter: Use putty or caulking, one-piece intumescent elastomer, non-corrosive to metal, compatible with synthetic cable jackets, and capable of expanding 10 times when exposed to flame or heat, UL-listed.
2. Openings 4-inches or Greater and Conduit Sleeves Thru Floors at Telephone Terminal Boards: Use sealing system capable of passing 3-hour fire test in accordance with ASTM E-814, consisting of wall wrap or liner, partitions, and end caps capable of expanding when exposed to temperatures of 250 to 350 degrees F (121 to 177°C), UL-listed. 3M's "Sealbags" manufactured by P-W Industries will be acceptable.
C. Execution: Fill entire opening with sealing compound. Adhere to manufacturer's installation instructions. All fire barrier seals shall meet the rating of the wall.

1.4 WIRE CONNECTIONS
A. All wires shall be run in conduit, shall be continuous between outlets and boxes (with no splices or taps in conduits). Splices and taps for #6 and larger conductors shall be with block type with insulating jacket or split bolt connectors, covered and completely insulated with a minimum of three half-lapped layers of Scotch No. 33+ (105°C) plastic electrical tape or by approved insulated fastener. All splices and taps having irregular surfaces shall be properly padded with Scotchfil putty before application of insulating plastic tape. Scotchlok electrical pre-insulated spring pressure connectors or equal may be used for up to #8 conductors. Connectors shall be installed so that all wires are properly insulated.

1.5 PULL AND JUNCTION BOXES
A. Pull and junction boxes shall be code gauge steel boxes with hinged, bolted or screwed covers. Boxes shall be flush or surface mounted as shown or required.
B. Junction and pull box shall be installed where shown on drawings and additional boxes shall be installed if required for pulling of wire provided location and installation is approved by the Architect. All boxes shall be code construction with screw type cover and shall be installed in accessible locations.

1.6 OUTLET BOXES
A. All electrical service outlets, including plug receptacles, lamp receptacles, lighting fixtures and switches shall be provided with Steel City, Appleton, or RACO 4-inches square, code gauge steel knockout boxes, galvanized and of required depth for service and appliances. Boxes installed in plaster finish shall have code gauge galvanized raised covers set to plaster ground with outside edge flush with plaster finish. Covers shall be selected with proper openings for devices installed in box. Boxes installed in concrete and boxes larger than 2 gang may be masonry type boxes. All outlet boxes in walls, partitions, and ceilings shall be flush mounted unless specifically noted otherwise on the drawings, or as approved by the Engineer.
B. Sectional boxes shall not be used except where directed and approved by the Architect for installation in unplastered tile walls and provided conduit connections are installed concealed in walls.
C. Where lighting fixtures and appliance outlets are to be mounted on concrete or on plaster finish on concrete, outlet boxes shall be installed in forms of exact dimensions from bench marks, columns, walls or floors. Where lighting fixtures and appliances outlets are to be mounted on masonry walls and/or plastered furring or other Finish, outlet boxes shall be roughed in to general location before installation of walls and furring and shall be reset to exact dimensions before walls and furring are constructed. All outlet boxes shall be set true to horizontal and vertical lines parallel to walls, floors and ceilings and true to finish lines. All boxes shall be secured to ceilings or walls so all installation are solidly mounted. Boxes mounted to wall studs shall be secured to a horizontal box mounting bracket equal to B-Line Series #BB2 or #BB26. Metal stud clips with farside box supports are not acceptable.
D. Furnish and install plaster rings for all boxes installed in plastered ceilings and walls. Verify construction with general construction plans.
E. Boxes for exterior exposed work (where approved by the Engineer) shall be Appleton or Crouse-Hinds Type FS or FSC for shallow devices and Type FD or FDC for deep devices. Boxes for ceiling mounted light fixtures shall have approved no-bolt fixture studs. Boxes used as junction boxes shall have beveled edge flat steel blank cover.
F. Where outlet boxes are mounted exposed in unfinished areas, (where approved by the Engineer) surface mounted boxes shall be 4-inches square, have rounded corners and 1/2 inch raised steel cover plates.
G. Location of outlets on small drawings is approximate and exact dimensions for location of outlets shall be as taken from large scale plans and details on drawings or as directed by the Architect/Engineer. Outlets shall be located generally from column centers and finished wall lines or to center or joints of wall panels. Ceiling outlets shall be installed at elevation of suspended ceilings and connected to outlets in ceiling or slab above. Where necessary to fit and center with panel or ceilings and wall spaces, the Contractor must at his own expense shift the lighting outlets or other outlets as required by the Architect.
H. Boxes for switches at or near doors shall be installed on the side opposite the hinge. Verify door swing direction prior to rough-in.
I. To prevent sound from traveling through walls, electrical devices from different rooms shall not be mounted in the same stud place. Through-wall boxes shall not be used. In fire rated walls or partitions, outlet boxes on opposite sides of walls or partitions shall be separated by a horizontal distance of 24-inches. Outlet boxes larger than 4-inches square shall not be installed in fire rated walls or partitions. Verify location of fire rated walls or partitions with Architectural drawings prior to rough-in.
J. It shall be the duty of this Contractor to examine the plaster, painting, and other finishes before making his installation to make sure that these accessories, when installed, will fit and cover properly and leave no open or unfinished surface showing. He shall refuse to complete his installation where faulty work on the part of others is found, and he shall promptly report the trouble to the Architect.

1.7 RECEPTACLES
A. Convenience duplex receptacles shall be grounded twin outlet receptacle rated 20 amperes at 125 volts.
B. Where receptacles are indicated on the drawings as "WP" (weatherproof), provide weather resistant GFCI grounded duplex receptacle with "In-Use" extra-duty metallic weatherproof cover. Hubbell #WP26E or equal by Taymac or Red Dot.
C. Receptacle body shall be formed of high-impact thermoplastic or urea with nylon face and receptacle contacts shall be Bronze. Certification that receptacle meets or exceeds N.E.M.A. Standards shall be submitted to the Engineer for approval.
D. All 120V and 250V receptacles rated 50A or less located at exterior locations per NFPA 70 and as located on the plans shall be ground fault circuit interrupters (GFCI) for personnel protection (Class A) with 5ma trip. Feed through GFCI receptacles or GFCI breakers may be used to protect other receptacles in the same room and on the same circuit if wired per the manufacturer's recommendations. Prior to final inspection, perform ground fault test on each protected receptacle and submit list of all receptacles tested with results to the Engineer. Label receptacles that are GFCI protected by another feed through GFCI receptacle or by GFCI breaker "GFCI protected". Where receptacles aren't readily accessible, then GFCI protection shall be provided integral with the associated circuit breaker.
E. LIST OF ACCEPTABLE RECEPTACLE MANUFACTURERS:

Mfgr.	GFCI WR Duplex:
P&S	2097TRWR
Hubbell	GFWRST20
Levition	G5362-WT
Bryant	---
Cooper	---

F. Install receptacles to clear all cabinets, equipment, etc.
G. Color of receptacles as selected by the Architect. Verify colors prior to ordering.
H. Provide tamper resistant receptacles for all 15A and 20A nonlocking type receptacles rated 125V and 250V as required per N.E.C. Section 406.12.

1.9 SUPPORTING DEVICES
A. Conduits shall be supported at intervals not greater than 10 ft., within 3 ft. of any bend and every outlet or junction box. This shall apply on vertical runs as well as horizontal runs.
B. All supports for conduits shall be independent from other trades unless noted otherwise on drawings or written approval by the Engineer. Contractor shall work with other trades where a common support structure is provided and has been approved by Engineer.
C. Plastic or wood anchors of any type shall not be used.
D. Multiple Runs
1. Where a number of conduits are to be run exposed and parallel, one with another, they shall be grouped and supported by trapeze hangers.
2. Hanger rods shall be fastened to structural steel members with suitable beam clamps or to concrete inserts set flush with surface. A reinforcing rod shall be installed through the openings provided in the concrete inserts.
3. Inserts shall be Grinnell Fixture 282, Code Devices, Inc., No. 1 or equal.
4. Beam clamps or clips shall be suitable for structural members and conditions.
5. Rods shall be steel 3/8-inches dia. minimum or approved by the Engineer.
6. Trapeze hangers shall be Unistrut P-1000 Series or equal.
7. Each conduit shall be clamped to the trapeze hanger with conduit clamps. Clamps for rigid conduit shall be Unistrut No. P-1111 through P-1124 or equal. Clamps for electrical metallic tubing shall be Unistrut No. P-1426 through P-1431 or equal.
E. Single Runs
1. Where conduits are run individually, they shall be supported by approved pipe straps, or clips secured by adequate means. The use of perforated strap will not be permitted.
2. Conduits installed exposed on the surface in damp locations or in refrigerated areas shall be provided with clamp backs under each conduit clamp to prevent accumulation of moisture around the conduits.
3. Conduits installed in open web joists shall be supported with manufactured support clips approved for the purpose. Wire wrapped around conduits will not be approved for conduit support. Conduit will not be supported from ceiling suspension wires, except that flexible connections to light fixtures in suspended ceilings may be supported from ceiling support wires with approved bat-wing clips if the ceiling installer verifies that the hangers are designed to support the additional load.

1.15 COLOR CODING OF BOXES, CONDUIT, AND RACEWAYS
A. All boxes, conduit, and raceways, shall be color coded as follows:
a. Other Systems:
1. Fire Alarm - Red
2. Building Automation and Controls - Blue

END OF SECTION 261000

SECTION 264000 - SERVICE AND DISTRIBUTION

1.1 GROUNDING
A. All conductors, motor frames, etc., that require grounding shall be grounded in accordance with the requirements of the National Electrical Code, local power company and local electrical codes. All ground connections to ground rods shall be with Cadweld connections. Provide additional ground rods as required to achieve a resistance of 25 ohms or less per N.E.C. Section 250.53, at the request of the Engineer provide a copy of the test results. Multiple ground rods (when required) shall not be less than 6 feet apart. Bond all conductive piping systems in the building to the electrical system ground. Bonding connections shall be made as close as practical to the water pipe ground or service equipment ground bus.

1.3 DISCONNECT SWITCHES
A. The Contractor shall furnish and install Eaton, Square D by Schneider Electric, General Electric or Siemens Infrastructure and Cities (Siemens IC), externally operated, heavy duty, horsepower rated disconnect switches at all points indicated on the drawings or required by code. All disconnect switches shall be fused except for disconnect switches that have individual fuse protection at the point where the circuit receives its supply. Provide disconnect switches with fuse clips, Class "J" or Class "L". Provide dead front type on all exterior disconnects on grade when required by local code.
B. The enclosure shall have the proper NEMA rating for the environment.

1.4 FUSES
A. Cartridge type fuses of proper size and type as required shall be furnished and installed for all switches throughout. Furnish NEMA 1 enclosure for storing all spare fuses located adjacent to main service equipment.
B. Approved Manufacturers: Bussmann, Littelfuse, Mersen.
C. Fuse Classifications:
1. 600 amps and less 600 volts and less: Class J
2. Class R fuses will not be accepted.
D. Fuses for motor and mechanical equipment shall be sized per nameplate data and the N.E.C.. Fuse manufacturer must list in shop drawings specifically which fuse to install for each motor and starter required to provide Type '2' no damage protection. The Contractor must provide and install the selected fuse and switch.
E. Fuses installed on project shall be by one manufacturer only. (Do not intermix manufacturers.).

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● 02/09/2026

REVISED DATE:
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Shawnee Heights High School HVAC Equipment Upgrade

Client/Architect
4201 SE Shawnee Heights Rd, Tecumseh, KS 66542

SHEET CONTENTS:
● ELECTRICAL SPECIFICATIONS

HTK PROJECT NUMBER:
● Project Number

SHEET NUMBER:
E-002

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DIVISION 28 - ELECTRONIC SAFETY AND SECURITY

SECTION 283111 - FIRE ALARM SYSTEM

1.1 FIRE ALARM SYSTEM (DESIGN/BUILD)

A. The Fire Alarm System shall be designed and installed by the Design/Build Contractor. It shall consist of a complete manual and automatic fire alarm system including the furnishing, installation, and connection of a solid-state, low voltage, modular, hardwire, supervised fire alarm system to form a complete coordinated system ready for operation. It shall include, but not be limited to, alarm initiating devices, alarm indicating devices, control panels, auxiliary control devices, annunciators, power supplies, and wiring as shown on the drawings and specified. The setting of all addressable devices shall be performed by the manufacturer.

a. Tie into the existing fire alarm system and provide a complete automatic fire alarm system for new/remodeled tenant spaces. Provide all necessary devices and accessories as required to expand/modify the existing fire alarm system to accommodate the new work. Assume additional power supplies will be required for additional notification devices. All equipment and components shall be new and the same manufacturer of the existing fire alarm system.

B. Fire Alarm systems shall comply with requirements of NFPA 70, 72, (including appendices) 90A, 101 for local building systems except as modified and supplemented by this specification. This is a performance specification. The devices shown on the drawings indicate design intent and shall be the minimum provided. Provide all other devices as required by other governing laws, codes, standards, and local inspectors. Alarm shall achieve minimum of 80db throughout occupiable spaces and meet ADA requirements.

C. Secure all necessary approvals for a complete fire alarm system acceptable to the Fire Rating Bureau and Fire Marshall/District Having Jurisdiction, and in accordance with the standards set forth in these specifications.

D. Provide shop drawings showing equipment and device locations and connecting wiring of entire fire alarm system. Include wiring diagrams, panel layout drawings, and descriptive literature of all components. All equipment and devices shall be listed by the Underwriters Laboratories, Inc. Include full design calculations with shop drawings prepared, reviewed, and sealed by a registered engineer or NICET Class III Certified Technician. Upon completion of project, provide to the Owner as built system plans and 3 sets of system operation and maintenance manuals.

E. Provide the service of a competent, NICET certified, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment to technically supervise and participate during all of the adjustments and tests for the system.

F. Contractor shall furnish and install all wiring, conduit, junction boxes, and outlet boxes required for the installation of a complete system. All wiring shall be installed in metallic conduit, shall be color coded throughout and shall test free and clear of opens, grounds, and shorts between conductors. All wiring shall be in conformance with Article 760 of the National Electric Code.

G. Perform each electrical test and visual and mechanical inspection listed in NFPA 72. Certify compliance with test parameters.

END OF SECTION 283111

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Shawnee Heights High School HVAC Equipment Upgrade

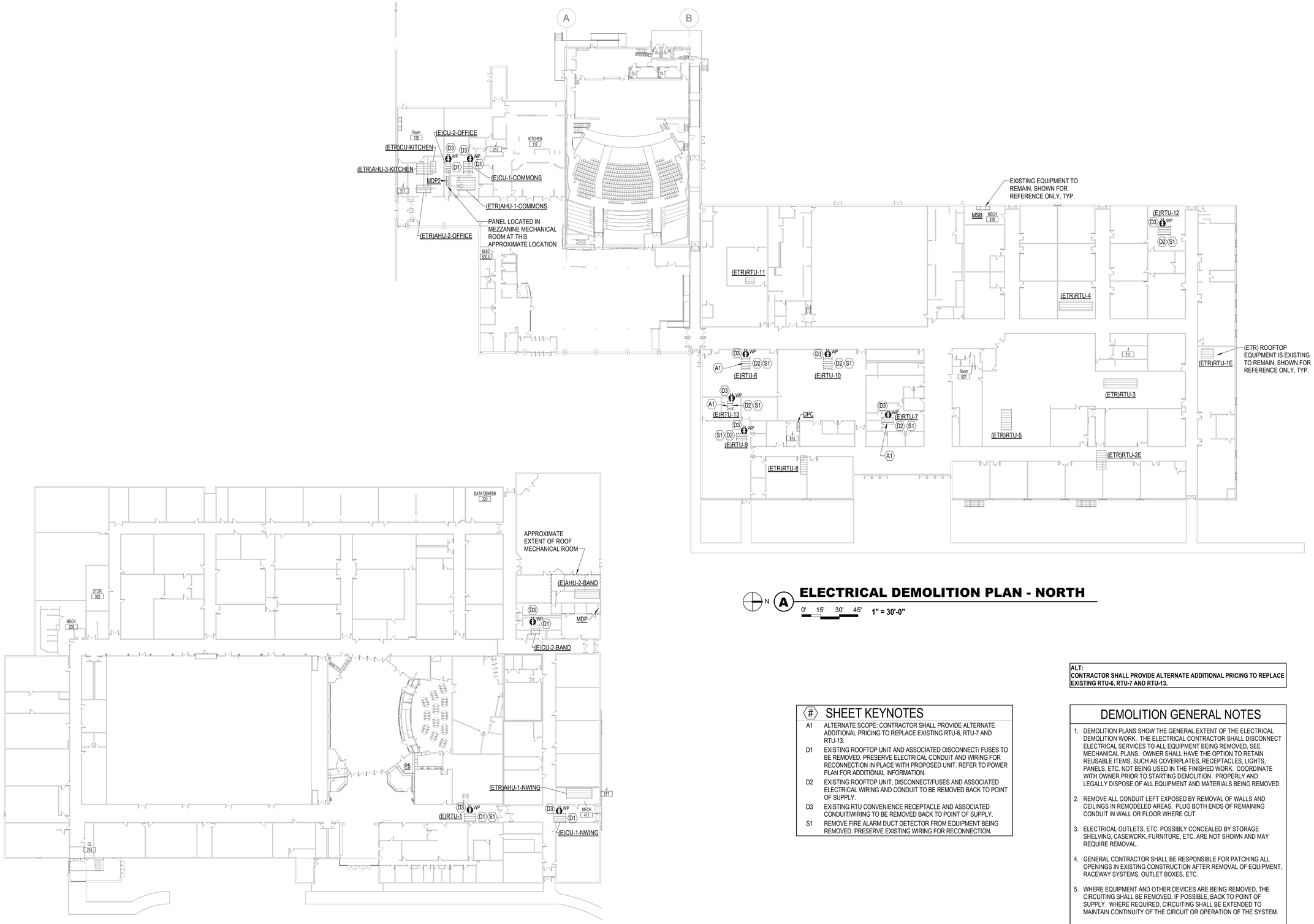
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ELECTRICAL DEMOLITION PLAN - NORTH

N A 0' 15' 30' 45' 1" = 30'-0"

ELECTRICAL DEMOLITION PLAN - SOUTH

N B 0' 15' 30' 45' 1" = 30'-0"

SHEET KEYNOTES

#	
A1	ALTERNATE SCOPE: CONTRACTOR SHALL PROVIDE ALTERNATE ADDITIONAL PRICING TO REPLACE EXISTING RTU-6, RTU-7 AND RTU-13.
D1	EXISTING ROOFTOP UNIT AND ASSOCIATED DISCONNECT/ FUSES TO BE REMOVED. PRESERVE ELECTRICAL CONDUIT AND WIRING FOR RECONNECTION IN PLACE WITH PROPOSED UNIT. REFER TO POWER PLAN FOR ADDITIONAL INFORMATION.
D2	EXISTING ROOFTOP UNIT, DISCONNECT/FUSES AND ASSOCIATED ELECTRICAL WIRING AND CONDUIT TO BE REMOVED BACK TO POINT OF SUPPLY.
D3	EXISTING RTU CONVENIENCE RECEPTACLE AND ASSOCIATED CONDUIT/WIRING TO BE REMOVED BACK TO POINT OF SUPPLY.
S1	REMOVE FIRE ALARM DUCT DETECTOR FROM EQUIPMENT BEING REMOVED. PRESERVE EXISTING WIRING FOR RECONNECTION.

ALT:
CONTRACTOR SHALL PROVIDE ALTERNATE ADDITIONAL PRICING TO REPLACE EXISTING RTU-6, RTU-7 AND RTU-13.

DEMOLITION GENERAL NOTES

1. DEMOLITION PLANS SHOW THE GENERAL EXTENT OF THE ELECTRICAL DEMOLITION WORK. THE ELECTRICAL CONTRACTOR SHALL DISCONNECT ELECTRICAL SERVICES TO ALL EQUIPMENT BEING REMOVED, SEE MECHANICAL PLANS. OWNER SHALL HAVE THE OPTION TO RETAIN REUSABLE ITEMS, SUCH AS COVERPLATES, RECEPTACLES, LIGHTS, PANELS, ETC. NOT BEING USED IN THE FINISHED WORK. COORDINATE WITH OWNER PRIOR TO STARTING DEMOLITION. PROPERLY AND LEGALLY DISPOSE OF ALL EQUIPMENT AND MATERIALS BEING REMOVED.
2. REMOVE ALL CONDUIT LEFT EXPOSED BY REMOVAL OF WALLS AND CEILINGS IN REMODELED AREAS. PLUG BOTH ENDS OF REMAINING CONDUIT IN WALL OR FLOOR WHERE CUT.
3. ELECTRICAL OUTLETS, ETC. POSSIBLY CONCEALED BY STORAGE SHELVING, CASEWORK, FURNITURE, ETC. ARE NOT SHOWN AND MAY REQUIRE REMOVAL.
4. GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR PATCHING ALL OPENINGS IN EXISTING CONSTRUCTION AFTER REMOVAL OF EQUIPMENT, RACEWAY SYSTEMS, OUTLET BOXES, ETC.
5. WHERE EQUIPMENT AND OTHER DEVICES ARE BEING REMOVED, THE CIRCUITING SHALL BE REMOVED, IF POSSIBLE, BACK TO POINT OF SUPPLY. WHERE REQUIRED, CIRCUITING SHALL BE EXTENDED TO MAINTAIN CONTINUITY OF THE CIRCUIT OR OPERATION OF THE SYSTEM.
6. ALL DEVICES SHOWN DASHED ON THE DEMOLITION PLAN(S) SHALL BE REMOVED, UNLESS NOTED OTHERWISE.
7. PROVIDE MATCHING BLANK COVERPLATES WHERE DEVICES ARE BEING REMOVED FROM FLUSH-MOUNTED OUTLET BOXES IN EXISTING WALLS TO REMAIN.
8. FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS PRIOR TO BEGINNING WORK.

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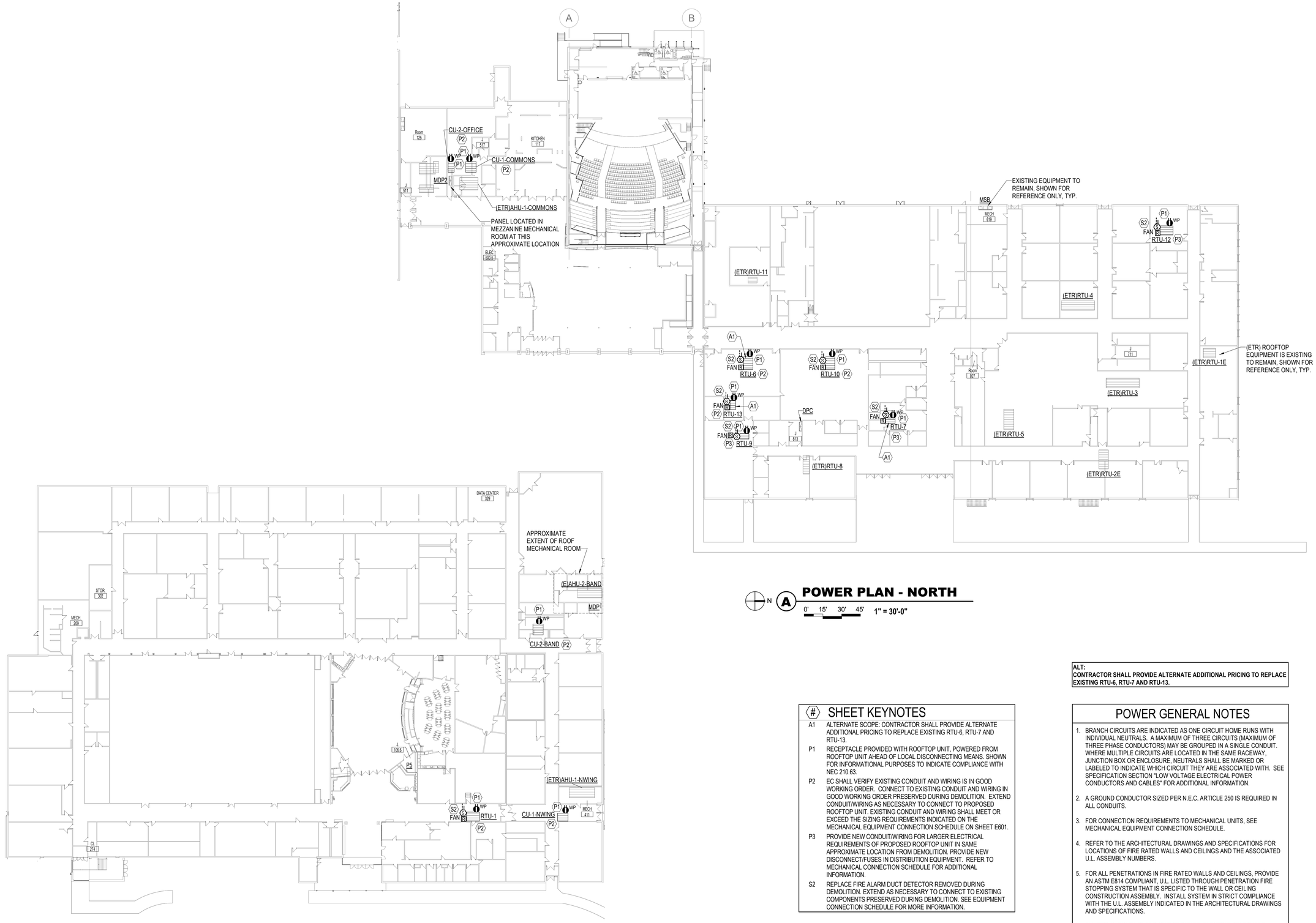
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SHEET CONTENTS:
- ELECTRICAL DEMOLITION PLAN

HTK PROJECT NUMBER:
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E-101

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POWER PLAN - NORTH

N A 0' 15' 30' 45' 1" = 30'-0"

POWER PLAN - SOUTH

N B 0' 15' 30' 45' 1" = 30'-0"

ALT:
CONTRACTOR SHALL PROVIDE ALTERNATE ADDITIONAL PRICING TO REPLACE EXISTING RTU-6, RTU-7 AND RTU-13.

SHEET KEYNOTES

#	
A1	ALTERNATE SCOPE: CONTRACTOR SHALL PROVIDE ALTERNATE ADDITIONAL PRICING TO REPLACE EXISTING RTU-6, RTU-7 AND RTU-13.
P1	RECEPTACLE PROVIDED WITH ROOFTOP UNIT, POWERED FROM ROOFTOP UNIT AHEAD OF LOCAL DISCONNECTING MEANS. SHOWN FOR INFORMATIONAL PURPOSES TO INDICATE COMPLIANCE WITH NEC 210.63.
P2	EC SHALL VERIFY EXISTING CONDUIT AND WIRING IS IN GOOD WORKING ORDER. CONNECT TO EXISTING CONDUIT AND WIRING IN GOOD WORKING ORDER PRESERVED DURING DEMOLITION. EXTEND CONDUIT/WIRING AS NECESSARY TO CONNECT TO PROPOSED ROOFTOP UNIT. EXISTING CONDUIT AND WIRING SHALL MEET OR EXCEED THE SIZING REQUIREMENTS INDICATED ON THE MECHANICAL EQUIPMENT CONNECTION SCHEDULE ON SHEET E601.
P3	PROVIDE NEW CONDUIT/WIRING FOR LARGER ELECTRICAL REQUIREMENTS OF PROPOSED ROOFTOP UNIT IN SAME APPROXIMATE LOCATION FROM DEMOLITION. PROVIDE NEW DISCONNECT/FUSES IN DISTRIBUTION EQUIPMENT. REFER TO MECHANICAL CONNECTION SCHEDULE FOR ADDITIONAL INFORMATION.
S2	REPLACE FIRE ALARM DUCT DETECTOR REMOVED DURING DEMOLITION. EXTEND AS NECESSARY TO CONNECT TO EXISTING COMPONENTS PRESERVED DURING DEMOLITION. SEE EQUIPMENT CONNECTION SCHEDULE FOR MORE INFORMATION.

POWER GENERAL NOTES

1. BRANCH CIRCUITS ARE INDICATED AS ONE CIRCUIT HOME RUNS WITH INDIVIDUAL NEUTRALS. A MAXIMUM OF THREE CIRCUITS (MAXIMUM OF THREE PHASE CONDUCTORS) MAY BE GROUPED IN A SINGLE CONDUIT. WHERE MULTIPLE CIRCUITS ARE LOCATED IN THE SAME RACEWAY, JUNCTION BOX OR ENCLOSURE, NEUTRALS SHALL BE MARKED OR LABELED TO INDICATE WHICH CIRCUIT THEY ARE ASSOCIATED WITH. SEE SPECIFICATION SECTION "LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES" FOR ADDITIONAL INFORMATION.
2. A GROUND CONDUCTOR SIZED PER N.E.C. ARTICLE 250 IS REQUIRED IN ALL CONDUITS.
3. FOR CONNECTION REQUIREMENTS TO MECHANICAL UNITS, SEE MECHANICAL EQUIPMENT CONNECTION SCHEDULE.
4. REFER TO THE ARCHITECTURAL DRAWINGS AND SPECIFICATIONS FOR LOCATIONS OF FIRE RATED WALLS AND CEILINGS AND THE ASSOCIATED U.L. ASSEMBLY NUMBERS.
5. FOR ALL PENETRATIONS IN FIRE RATED WALLS AND CEILINGS, PROVIDE AN ASTM E814 COMPLIANT, U.L. LISTED THROUGH PENETRATION FIRE STOPPING SYSTEM THAT IS SPECIFIC TO THE WALL OR CEILING CONSTRUCTION ASSEMBLY. INSTALL SYSTEM IN STRICT COMPLIANCE WITH THE U.L. ASSEMBLY INDICATED IN THE ARCHITECTURAL DRAWINGS AND SPECIFICATIONS.
6. ALL PIPING, CONDUIT, AND OUTLET BOXES (ELECTRIC, TELEPHONE, COMPUTER, ETC.) IN FIRE RATED WALLS OR CEILINGS SHALL BE CONSTRUCTED OF NON-COMBUSTIBLE MATERIAL.

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DATE:
02/09/2026

REVISED DATE:

Shawnee Heights High School HVAC Equipment Upgrade

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SHEET CONTENTS:
POWER PLAN

HTK PROJECT NUMBER:
Project Number

SHEET NUMBER:
E-131

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① ② ③ EQUIPMENT CONNECTION SCHEDULE

MECHANICAL EQUIPMENT CONNECTIONS

	UNIT DESIG	UNIT VOLTAGE	LOAD H.P.	LOAD FLA	LOAD KVA	PANEL DEVICE CIRCUIT NUMBER	DEVICE AT UNIT BKR. AMPS	DEVICE AT UNIT SW. AMPS	DEVICE AT UNIT FUSE AMPS	DEVICE AT UNIT FUSE SIZE	DEVICE AT UNIT NEMA STARTER SIZE	DEVICE AT UNIT BKR. AMPS	DEVICE AT UNIT SW. AMPS	DEVICE AT UNIT FUSE AMPS	DEVICE AT UNIT NEMA STARTER SIZE	DEVICE AT UNIT OTHER	SPARE POLES	FEEDER DESCRIPTION OR SEE THE FEEDER SCHEDULE	REMARKS OR SEE THE INDICATED NOTES BELOW
	RTU	ROOF TOP UNIT																	
⑤④	01	480/3	10	32.4	26.99	P5:1	70			3		60	50	3		NEMA-3R	1	3 #4 AWG THWN; #8 AWG GRD; 1-1/4"C.	
④	06	480/3	10	32.4	26.99	DPC:		60	60	3		60	50	3		NEMA-3R	1	3 #4 AWG THWN; #10 AWG GRD; 1-1/4"C.	
④	07	480/3	15	25.7	21.36	DPC:		60	60	3		60	40	3		NEMA-3R	1	3 #4 AWG THWN; #10 AWG GRD; 1-1/4"C.	
④	09	480/3	15	25.7	21.36	DPC:		60	60	3		60	40	3		NEMA-3R	1	3 #4 AWG THWN; #10 AWG GRD; 1-1/4"C.	
④	10	480/3	15	41.7	34.66	DPC:		60	60	3		60	60	3		NEMA-3R	1	3 #4 AWG THWN; #10 AWG GRD; 1-1/4"C.	
④	12	480/3	20	48.2	40.07	MSB:	70			3		100	70	3		NEMA-3R	1	3 #4 AWG THWN; #8 AWG GRD; 1-1/4"C.	
④	13	480/3	10	16.5	13.71	DPC:		30	30	3		30	25	3		NEMA-3R	1	3 #10 AWG THWN; #10 AWG GRD; 3/4"C.	
	CU-1	CONDENSING UNIT																	
⑤	COMMONS	480/3	20	112.5	93.53	MDP2:		200	175	3		200	150	3		NEMA-3R	1	3 #2/0 AWG THWN; #6 AWG GRD; 2"C.	
⑤	NWING	480/3	20	95.0	78.98	MDP:	150			3		200	125	3		NEMA-3R	1	3 #1/0 AWG THWN; #6 AWG GRD; 2"C.	
	CU-2	CONDENSING UNIT																	
⑤	BAND	480/3	20	69.4	57.69	MDP:	150			3		100	90	3		NEMA-3R	1	3 #1/0 AWG THWN; #6 AWG GRD; 2"C.	
⑤	OFFICE	480/3	20	42.8	35.58	MDP2:		100	100	3		60	60	3		NEMA-3R	1	3 #1 AWG THWN; #8 AWG GRD; 1-1/2"C.	

① ALL CONNECTIONS AND ELECTRICAL EQUIPMENT LISTED IN SCHEDULE SHALL BE PROVIDED AND INSTALLED BY THE ELECTRICAL CONTRACTOR. FIELD VERIFY CONNECTION REQUIREMENTS AND EQUIPMENT PROVIDED BY OTHERS PRIOR TO ROUGH-IN.

② REFER TO MECHANICAL DRAWINGS AND SPECIFICATIONS FOR THE REQUIREMENTS ASSOCIATED WITH WIRING AND CONNECTIONS OF INTERLOCKING, THERMOSTAT LOCATIONS, EXHAUST FAN CONTROL SWITCHES, AND OTHER CONTROLS OF MECHANICAL EQUIPMENT.

③ SIZE FUSES FOR MOTOR FUSTATS BASED ON 125% OF MANUFACTURER'S NAMEPLATE FULL LOAD AMPERAGE UNLESS OTHERWISE NOTED ON THE DRAWINGS.

④ PROVIDE DUCT MOUNTED SMOKE DETECTORS IN THE SUPPLY/RETURN DUCTS. VERIFY THE REQUIRED QUANTITY OF DUCT SMOKE DETECTORS FOR EACH UNIT WITH THE FINAL INSTALLED DUCTWORK LAYOUT TO MEET NFPA REQUIREMENTS. PROVIDE FAN SHUT DOWN RELAY TO SHUT DOWN MECHANICAL UNIT UPON ANY ALARM AT THE FIRE ALARM CONTROL PANEL. COORDINATE ALL CHANGES WITH THE EXISTING FIRE ALARM SYSTEM.

⑤ EXISTING BREAKER/ FUSED DISCONNECT SWITCH TO BE REUSED. PROVIDE PROPOSED CONDUIT AND WIRING PER THIS SCHEDULE. OVERCURRENT PROTECTION SHALL BE PROVIDED AT THE UNIT TO MATCH THE SIZE INDICATED ON THIS SCHEDULE. CONFIRM WITH FINAL EQUIPMENT SELECTIONS.

1/8"
1/4"
SERVES
RTU-1
BREAKER/SWITCH FOR SWITCHBOARD/DISTRIBUTION PANEL/MOTOR CONTROL CENTER

1/8"
1/4"
1/4"
1/4"
SERVES
RTU #1
FED FROM DP:**
LPJ 200AMP
DISCONNECT SWITCH

TYPICAL RECEPTACLE
THERMAL TRANSFER STYLE LABEL WITH RECEPTACLE PANEL AND CIRCUIT NUMBER
LP1W:6

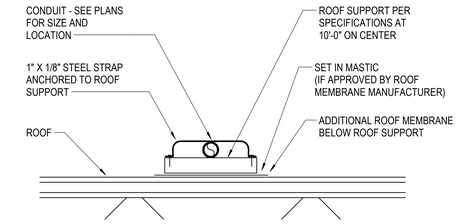
3/8"
1/4"
1/4"
1/4"
1/8"
1/8"
1/8"
PANEL K
FED FROM DP:**
120/208V.,3Ø,4W.
10,000 A.I.C.
PHASE A: BLACK
PHASE B: RED
PHASE C: BLUE
NEUTRAL: WHITE
GROUND: GREEN
ISO.GRD.: GRN/YEL
BRANCH CIRCUIT/DISTRIBUTION PANEL

TYPICAL J-BOX
THERMAL TRANSFER STYLE LABEL INDICATING ALL CIRCUITS OR LOW VOLTAGE SYSTEM WITHIN J-BOX
LP1W:6

NOTE:
SEE SPECIFICATION SECTION 260500 FOR NAMEPLATE COLOR REQUIREMENTS

① TYPICAL NAMEPLATES AND LABELS

NO SCALE



② CONDUIT SUPPORT DETAIL - ROOF

NO SCALE

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SHEET CONTENTS:
- ELECTRICAL SCHEDULES & DETAILS

HTK PROJECT NUMBER:
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