Collin County Purchasing

2021-351

Construction, HVAC Replacement, 900 Park Blvd. Building

Issue Date: 9/28/2021
Questions Deadline: 10/14/2021 05:00 PM (CT)
Response Deadline: 10/21/2021 02:00 PM (CT)

Collin County Purchasing

Contact Information

Contact: JD Griffin, CPPB Senior Buyer
Address: Purchasing
Admin. Building
Ste. 3160
2300 Bloomdale Rd.
Ste. 3160
McKinney, TX 75071
Phone: (972) 548-4116
Fax: (972) 548-4694
Email: jgriffin@co.collin.tx.us

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DIVISION 26 – ELECTRICAL

09/10/21

END OF SECTION

SECTION 001116 - ADVERTISEMENT FOR BIDS

BY ORDER OF the Collin County Commissioners Court, Collin County, Texas, bids will be received electronically through Collin County eBid located at https://collincountytx.ionwave.net. Bidders are encouraged to submit bids electronically by utilizing Collin County eBid. However, you may submit a sealed hard copy paper bid to the Office of the Collin County Purchasing Agent. All bids, both electronic or hard copy paper form must be submitted as stated below:

SUBMIT BIDS HARD COPY PAPER BIDS TO:

Office of the Purchasing Agent
Collin County Adminstration Building
2300 Bloomdale Road, Suite 3160
McKinney, Texas 75071

****NOTE:**
All Correspondence must include suite number to assist in proper delivery.**

SUBMIT NO LATER THAN:

2:00 P.M., Thursday, October 21, 2021

MARK ENVELOPE:

IFB 2021-351
Project: Construction, HVAC Replacement, 900 Park Blvd. Building

ALL BIDS MUST BE RECEIVED IN THE OFFICE OF THE PURCHASING AGENT BEFORE OPENING DATE AND TIME

SCOPE OF WORK INCLUDES all materials, labor, equipment and services to produce or be incorporated in such construction. Contract will be a general contract for the replacement of fifteen (15) HVAC split systems at building 900 in Plano Texas. At Building 900 there are (15) DX cooling/electric heat indoor units with associated roof mounted units to be replaced with DX cooling/electric heat indoor units with associated roof mounted units. Included in scope of work is connecting new equipment to existing HVAC control network, connecting to existing wall mounted sensors, and associated electrical/mechanical work as indicated in the construction documents. Payment for the contract work shall be made pursuant to the terms of the Contract Documents.

The opinion of probable construction cost for this contract is $300,000.

Collin County uses Collin County eBid for the notification and dissemination of all solicitations for commodities and services. The receipt of solicitations through any other company may result in your receipt of incomplete specifications and/or addenda which could ultimately render your bid non-compliant. Collin County accepts no responsibility for the receipt and/or notification of solicitations through any other company.

COLLIN COUNTY APPRECIATES your time and effort in preparing a bid. Hard copy paper bid must be in a separate sealed envelope, manually signed in ink by a person having the authority to bind the firm in a contract and marked clearly on the outside as outlined above. Please note that all bids must be received at the designated location by the deadline shown. Bids received after deadline shall be considered void and unacceptable. Collin County is not responsible for lateness of mail, carrier, etc. and time/date stamp clock in the Collin County Purchasing Department shall be the official

time of receipt. All bid forms provided in this Invitation for Bid must be completed prior to submission. Failure to complete the forms shall render your bid null and void. We would appreciate you indicating on your "NO BID" response any requirements of this bid request which may have influenced your decision to "NO BID".

BIDS WILL BE publicly opened in the Office of the Purchasing Agent, 2300 Bloomdale Rd, Suite 3160, McKinney, TX 75071, at the date and time indicated above.

No oral, telegraphic, telephonic or facsimile bids will be considered. IFB's, RFP's, RFQ's and RFI's may be submitted in electronic format via Collin County eBid at https://collincountytx.ionwave.net

A PRE-BID CONFERENCE will be held by Collin County at the Collin County 900 Building, 900 E. Park Blvd., Plano, TX 75074 (meet at South end of building) on **Tuesday, October 12, 2021 at 10:00 AM** in order for bidders to ask questions regarding the proposed work. It is the bidder's responsibility to review the site and documents to gain a full understanding of the requirements of the bid.

BID SECURITY: All Bidders must submit, prior to the bid opening time, a Certified Check, Cashier's Check or acceptable Bid Bond payable without recourse to Collin County in the amount of not less than five percent (5%) of the total bid plus alternates as submitted.

1. Bid Bond, certified check or Cashier's Check may be mailed or hand delivered to the Office of the Collin County Purchasing Agent, Collin County Administration Building, 2300 Bloomdale Road, Ste 3160, McKinney, TX 75071 and shall be delivered in an envelope, marked plainly on the outside with the Bid Name and Number.
2. Bidders submitting a bid via Collin County eBid shall upload a Bid Bond at https://collincountytx.ionwave.net

Regardless of delivery method, all Bid Bonds shall be received prior to the bid opening time to be considered. **Failure to submit a copy of bid security prior to bid opening shall be cause for rejection of bid**.

The original Bid Bond shall be received in the Collin County Purchasing Department **no later than** close of business on the third working day after the bid opening. **Late receipt of or failure to submit original Bid Bond shall be cause for rejection of bid.**

BONDS: Contractor must furnish a performance bond, payment bond and one (1) year maintenance bond within ten (10) consecutive calendar days following award of contract. The bonds shall be issued by a corporate surety in accordance with all Texas Law, including but not limited to, Chapter 2253 of the Texas Government Code and Chapter 3503 of the Texas Insurance Code, for public works projects.

SECTION 002113 - INSTRUCTIONS TO BIDDERS

PART 1 - GENERAL REQUIREMENTS

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Specification Sections, apply to this Section.

1.2 DEFINITIONS

A. All definitions set forth in the General Conditions of the Contract for Construction or in other Contract Documents are applicable to these Bidding Documents.

B. Bidding Documents include the Advertisement or Invitation for Bids, Instructions to Bidders, the bid form, other sample bidding and contract forms and the proposed Contract Documents including any Addenda issued prior to receipt of bids.

C. Addenda are written or graphic instruments issued prior to the opening of the Bidding Documents, which modify or interpret the Bidding Documents, including Drawings and Specifications, by additions, deletions, clarifications or corrections. Addenda will become part of the Contract Documents when the Construction Contract is executed.

D. MD Engineering, L.P., L.L.P. will be hereafter referred to in the Project Manual as "Engineer" and all correspondence shall be addressed to: Michael Smith, P.E., MD Engineering, 1255 W. 15th St., Ste. 300, Plano, TX 75075.

E. "Bill Burke" will be hereinafter referred to in this Project Manual as "Project Manager".

F. "Collin County" will be hereafter referred to in this Project Manual as "Owner".

G. A Bid is a complete and properly signed submittal to do the Work for designated portion thereof for the sums stipulated therein, submitted in accordance with the Bidding Documents.

H. The Base Bid is the sum stated in the Bid for which the Bidder offers to perform the Work described in the Bidding Documents as the base, to which work may be added or from which work may be deleted for sums stated in Alternate Bids.

I. An Alternate Bid (or Alternate) is an amount stated in the Bid to be added to or deducted from the amount of the Base Bid in the corresponding change in the Work, as described in the Bidding Documents or in the proposed Contract Documents.

J. A Unit Price is an amount stated in the Bid as a price per unit of measurement for materials or service as described in the Bidding Documents or in the proposed Contract Documents.

K. A Bidder is a person or entity who submits a Bid.

L. A Sub-Bidder is a person or entity who submits a bid to a Bidder for materials or labor for a portion of the work.

M. A Contractor is a person or entity who is determined to be the lowest responsible and responsive bidder to whom Owner (on the basis of Owner's evaluation as hereinafter provided) makes an award.

N. The Bid Requirements and Other General Conditions, as provided under the Division of the North Central Texas Council of Governments Standard Specifications for Public Works Construction will be applicable to this project, unless noted otherwise in the Contract Documents

1.3 EXAMINATION OF DOCUMENTS AND SITE

A. Each bidder, by making his/her Bid, represents that he/she has read and understands the Bidding Documents.

B. Each Bidder, by making his/her Bid, represents that he/she has visited the site, performed investigations and verifications as he/she deems necessary, and familiarized himself/herself with the local conditions under which the Work is to be performed and will be responsible for any and all errors in his/her bid resulting from his/her failure to do so.

C. The location and elevations of the various utilities and pipe work included within the scope of the work are offered as a general guide only, without guarantee as to accuracy. The Contractor shall verify and investigate to his/her own satisfaction the location and elevation of all utilities, pipe work, and the like and shall adequately inform himself/herself of their relation to the work before submitting a bid.

D. Before submitting a bid each bidder will, at bidder's own expense, make or obtain any additional examinations, investigations, explorations, tests and studies and obtain any additional information (surface, subsurface, and underground facilities) at or contiguous to the site, or otherwise which may affect cost, progress, performance or furnishing of the work and which bidder deems necessary to determine its bid for performing and furnishing the work in accordance with the time, price and other terms and conditions of the Contract Documents. Bidder will rely solely on its own site investigation and assumes the risk of any site conditions not discovered that may result in additional costs and all errors in the bid.

E. On request in advance, Owner will provide each bidder access to the site to conduct explorations and tests as each bidder deems necessary for submission of a bid. Bidder shall fill all holes, clean up and restore the site to its former condition upon completion of such explorations.

F. The lands upon which the work is to be performed, right-of way and easement for access thereto and other lands designated for use by Contractor in performing the work are identified in the Contract Documents.

G. Each bidder by making his/her bid represents that his/her bid is based upon the materials, systems, and equipment required by the Bidding Documents without exception.

1.4 BIDDING DOCUMENTS

A. Complete sets of Bidding Documents shall be used in preparing bids; neither County, nor Engineer assume any responsibility for errors or misinterpretations resulting from use of incomplete sets of Bidding Documents.

B. County or the Engineer, in making copies of the Bidding Documents available on the above terms, do so only for the purpose of obtaining Bids on the Work and do not confer a license or grant for any other use.

1.5 BIDDING PROCEDURES

A. All bids shall be prepared on the forms provided by the Engineer and submitted in accordance with the Instruction to Bidders. The Engineer or owner will furnish bidders with

bid forms which will provide for the following bid items. Bidders shall provide all requested information. Prices bid/proposed shall *only* be considered if they are provided in the appropriate space(s) on the Collin County bid form(s). For consideration, any additions or deductions to the bid/proposal prices offered must be shown under the exceptions section of the bid/proposal in the case of electronic submittal, ONLY in the case of a hard copy submittal will an additional attachment be allowed. Extraneous numbers, prices, comments, etc. or bidder/offeror generated documents appearing elsewhere on the bid or as an additional attachment shall be deemed to have no effect on the prices offered in the designated locations.

1. A single contract price for each bid item as detailed and described in these specifications.
2. Acknowledgment of Addenda.
3. Number of consecutive calendar days to complete project.
4. Alternate bids.
5. Unit prices.

B. A bid (electronic or hard copy) is invalid if it has not been deposited at the designed location prior to the time and date for receipt of bids indicated in the Advertisement or Invitation For Bid, or prior to any extension thereof issued to the bidders. Bids received in County Purchasing Department after submission deadline shall be returned unopened and will be considered void and unacceptable. Owner is not responsible for lateness of mail, carrier, etc. and time/date stamp clock in County Purchasing Department shall be the official time of receipt.

C. Unless otherwise provided in any supplement to these Instructions to Bidders, no bidder shall modify, withdraw or cancel his/her bid or any part thereof for ninety (90) consecutive calendar days after the time designated for the receipt of bids in the Advertisement or Invitation For Bid.

D. Bids shall not contain any recapitulation of the Work to be done.

E. The Bidder shall make no additional stipulations on the Bid Form nor limit or qualify his/her bid in any other manner. Bids so qualified will be subject to disqualification.

F. Collin County is by statute exempt from the State Sales Tax and Federal Excise Tax; therefore, the prices submitted shall not include taxes.

1.6 DISCREPANCIES AND AMBIGUITIES

Any interpretations, corrections and/or changes to an Invitation For Bid and related Specifications or extensions to the opening/receipt date will be made by addenda to the respective document by the Collin County Purchasing Department. Questions and/or clarification requests must be submitted no later than seven (7) days prior to the opening/receipt date. Those received at a later date may not be addressed prior to the public opening. Sole authority to authorize addenda shall be vested in Collin County Purchasing Agent as entrusted by the Collin County Commissioners Court. Addenda may be transmitted electronically via Collin County eBid, by facsimile, E-mail transmission or mailed via the US Postal Service.

1.6.1 Addenda will be transmitted to all that are known to have received a copy of the IFB and related Specifications. However, it shall be the sole responsibility of the Bidder to verify issuance/non-issuance of addenda and to check all avenues of document availability (i.e. Collin County eBid at https://collincountytx.ionwave.net; telephoning Purchasing

Department directly, etc.) prior to opening/receipt date and time to insure Bidder's receipt of any addenda issued. Bidder shall acknowledge receipt of all addenda.

1.7 SUBSTITUTIONS

A. Each bidder represents that his/her bid is based upon the materials and equipment described in the Bidding Documents.

B. No substitution will be considered unless written request has been submitted to the Engineer for approval at least ten (10) consecutive calendar days prior to the date for receipt of bids. Submit substitution request forms to jgriffin@co.collin.tx.us.

C. If the Engineer and Owner approves a proposed substitution, such approval will be set forth in an Addendum.

1.8 QUALIFICATION OF BIDDERS

A. Within seven (7) consecutive calendar days following bid opening, the apparent low bidder shall submit with a properly executed Contractor's Qualification Statement as evidence to establish bidder's financial responsibility, experience and possession of such equipment as may be needed to prosecute the work in an expeditious, safe and satisfactory manner. This Statement shall include:

1. List of current projects.
2. List of projects completed within the past five years.
3. Experience of key individuals of the organization.
4. Trade and Bank references.
5. A recent financial statement to confirm that the bidder has suitable financial status to meet obligations incidental to performing the work. Audited financial statements are not mandatory. Unaudited financial statements will be accepted. If bidder's firm does, however, have audited statements, please include a copy with your bid.
6. A statement of cost for each major item of Work included in the Bid.
7. A designation of the Work to be performed by the Bidder with his/her own forces.
8. A list of names of the Subcontractors or other persons or organizations (including those who are to furnish materials or equipment fabricated to a special design) proposed for each portion of the Work. The Bidder will be required to establish to the satisfaction of the Engineer and Owner the reliability and responsibility of the proposed Subcontractors. Prior to the award of the Contract, the Engineer will notify the Bidder in writing if either the County or the Engineer, after due investigation, has reasonable and substantial objection to any person or organization on such lists. If Owner or Engineer has a reasonable and substantial objection to any person or organization on such list, and refuses in writing to accept such person or organization, the Bidder may, at his/her option, withdraw his/her Bid without forfeiture of Bid Security or provide an acceptable substitute. Subcontractors and other persons and organizations proposed by the Bidder and accepted by Owner and Engineer must be used on the Work for which they were proposed and accepted, and shall not be changed except with the written approval of Owner and the Engineer.

B. Bidders may be disqualified and their bids not considered for any of the following specific reasons:

1. Reason for believing collusion exists among bidders.
2. The bidder being interested in any litigation against Owner.
3. The bidder being in arrears on any existing contract or having defaulted on a previous contract.

4. Lack of competency as revealed by the financial statement, experience and equipment, questionnaires, or qualification statement.
5. Uncompleted work which in the judgment of Owner will prevent or hinder the prompt completion of additional work if awarded.

C. Minimum Standards For Responsible Prospective Bidders: A prospective Bidder must meet the following minimum requirements:

1. have adequate financial resources, or the ability to obtain such resources as required;

2. be able to comply with the required or proposed delivery/ completion schedule;

3. have a satisfactory record of performance;

4. have a satisfactory record of integrity and ethics; and

5. be otherwise qualified and eligible to receive an award.

Collin County may request representation and other information sufficient to determine Bidder's ability to meet these minimum standards listed above.

D. In determining to whom to award the contract, the Owner may consider;

1. the purchase price;

2. the reputation of the bidder/contractor/vendor and of the bidder/contractor/vendor's goods or services;

3. the quality of the bidder/contractor/vendor's goods or services;

4. the extent to which the goods or services meet the Owner's needs;

5. the bidder/contractor/vendor's past relationship with the Owner;

6. the total long-term cost to the Owner to acquire the bidder/contractor/vendor's goods or services; and

7. any other relevant factors specifically listed in the Instruction to Bidders..

1.9 PREPARATION OF BID

A. Bidder shall submit his/her bid on the forms furnished by the Engineer. All blank spaces in forms shall be correctly filled in and the bidder shall state the prices, written in words and in figures. Where there is discrepancy between the price written in words and the price written in figures, the price written in words shall govern. If bid is submitted by an individual, his/her name must be signed by him/her or his/her duly authorized agency. If the bid is submitted by a firm, association or partnership, the name and address of each member must be given, and the bid must be signed by an official or duly authorized agent. Powers of attorney authorizing agents or others to sign bids must be properly certified and must be in writing and submitted with the bid.

B. Bidder shall bear any/all costs associated with it's preparation of any bid, proposal or submittal.

C. Public Information Act: Collin County is governed by the Texas Public Information Act, Chapter 552 of the Texas Government Code. All information submitted by prospective bidders during the bidding process is subject to release under the Act.

D. The Bidder shall comply with Commissioners Court Order No. 2004-167-03-11, County Logo Policy.

1.10 BID SECURITY

A. Each bid must be accompanied by Bid Security (in accordance with instructions set forth in section 001116-Advertisement For Bids) made payable to Owner in an amount of five percent (5%) of the bidder's maximum bid price and in the form of a Cashier's Check or a Bid Bond, duly executed by bidder as principal and having as surety thereon, a corporate surety authorized and admitted to do business in the State of Texas and licensed to issue such bond, as a guarantee that the bidder will enter into a Contract and execute required Performance, Payment, and two (2) year Maintenance Bonds within ten (10) consecutive calendar days of Collin County Commissioners Court award of Contract.

B. The Bid Security of the contractor will be retained until such bidder has executed the Contract Agreement and furnished the required Contract Security, whereupon, the Bid Security will be returned. If the contractor fails to execute and deliver the Agreement and furnish the required Contract Security within ten (10) consecutive calendar days of Collin County Commissioners Court award of Contract, Owner may annul the award of contract and the Bid Security of that bidder will be forfeited. The Bid Security of the other bidders whom Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of the seventh (7th) consecutive calendar day after the effective date of the Agreement or the ninety-fifth (95th) consecutive calendar day after the bid opening, whereupon, the Bid Security furnished by such bidders will be returned. Bid Security with bids which are not competitive will be returned within seven (7) consecutive calendar days after the contract award.

C. Should the bidder to whom the Contract is awarded refuse or neglect to execute and file the contract and bonds within ten (10) consecutive calendar days of Collin County Commissioners Court award of Contract, Owner may annul award of Contract and the Bid Security filed with the bid shall become the property of Owner, not as a penalty, but as liquidated damages. Owner reserves the right to award canceled Contract to next responsible, lowest and best bidder as it deems to be in the best interest of the County.

D. Owner will have the right to retain the bid security of all bidders until either:

1. the Contract has been executed and the bonds have been furnished, or
2. the specified time has elapsed so that bids may be withdrawn, or
3. all bids have been rejected.

1.11 PERFORMANCE BOND, LABOR & MATERIAL PAYMENT BOND, MAINTENANCE BOND

A. The Contractor shall post with Owner, not later than ten (10) consecutive calendar days of Collin County Commissioners Court award of Contract, a Performance Bond in the amount of one hundred percent (100%) of the total contract price in such form as is satisfactory to Owner, in compliance with Chapter 2253 of the Texas Government Code and all other applicable Texas Law, and on the form specified in the Contract Documents. This bond shall be executed by a corporate surety company duly authorized and admitted to do business in the State of Texas and licensed to issue such a bond in the State of Texas. The Contractor shall notify its corporate surety of any Contract changes.

B. The Contractor shall post with Owner, not later than ten (10) consecutive calendar days of Collin County Commissioners Court award of Contract, a Payment Bond in the amount of one hundred percent (100%) of the total contract price in such form as is satisfactory to

Owner, in compliance with Chapter 2253 of the Texas Government Code and all other applicable Texas Law, and on the form specified in the Contract Documents. This bond shall be executed by a corporate surety company duly authorized and admitted to do business in the State of Texas and licensed to issue such a bond in the State of Texas. The Contractor shall notify its corporate surety of any Contract changes.

C. The Contractor shall post with Owner, not later than ten (10) consecutive calendar days of Collin County Commissioners Court award of Contract, a one (1) year Maintenance Bond in the amount of ten percent (10%) of the total contract price in such form as is satisfactory to Owner, in compliance with Chapter 2253 of the Texas Government Code and all other applicable Texas Law, and on the form specified in the Contract Documents. This bond shall be executed by a corporate surety company duly authorized and admitted to do business in the State of Texas and licensed to issue such a bond in the State of Texas. The Contractor shall notify its corporate surety of any Contract changes.

D. The Contractor must demonstrate to Owner that it can secure the required performance and payment bonds, issued by a corporate surety company authorized and admitted to do business in the State of Texas and licensed to issue such a bond in the State of Texas. Contractor must also demonstrate that the bond is not in excess of ten percent (10%) of the corporate surety company's capital and surplus. To the extent the amount of the bond exceeds ten percent (10%) of the corporate surety company's capital and surplus, such bond will not be accepted unless bidder provides written certification that the corporate surety company has reinsured the portion of the risk that exceeds ten percent (10%) of the corporate surety company's capital and surplus with one or more insurers who are duly authorized, accredited or trusted to do business in the State of Texas. The amount reinsured by any reinsurer must not exceed ten percent (10%) of the reinsurer's capital and surplus.

E. The Contractor must file with the performance bond and payment bond, all documents and information necessary to establish that the agent signing the bond is authorized to write the bond in the amount requested, and if applicable, that reinsurance requirements, have been met, including limits and ratings or other evidence of company solvency.

F. If the corporate surety company on any bond furnished by Contractor to Owner is declared bankrupt or becomes insolvent or such corporate surety company's right to do business in the State of Texas is revoked, the Contractor shall within five (5) consecutive calendar days thereafter substitute another bond and corporate surety company, both of which shall be acceptable to Owner.

1.12 FILING BID

A. All Bids, proposals, or submittals submitted in hard copy paper form shall be submitted in a sealed envelope, plainly marked on the outside with the Invitation for Bid (IFB) number and name. A hard copy paper form bid, proposal, or submittal shall be manually signed in ink by a person having the authority to bind the firm in a contract. Submittals, bids or proposals shall be mailed or hand delivered to the Collin County Purchasing Department.

B. No oral, telegraphic or telephonic submittals will be accepted. Bids, proposals, or submittals may be submitted in electronic format via Collin County eBid at https://collincountytx.ionwave.net.

C. All Bids, submittals or proposals submitted electronically via Collin County eBid at https://collincountytx.ionwave.net shall remain locked until official date and time of opening as stated in the Special Terms and Conditions of the IFB.

D. For hard copy paper form bids, proposals, or submittals, any alterations made prior to opening date and time must be initialed by the signer of the bid, proposal, or submittal,

guaranteeing authenticity. Bids, proposals, or submittals cannot be altered or amended after submission deadline.

E. No bid, proposal, or submittal will be considered unless it is filed with the Owner Purchasing Department within the time limit for receiving bids as stated in the Advertisement for Bids or IFB. Each hard copy paper bid shall be in a sealed envelope plainly marked with the word "BID", and the name and bid number of the project as designated in the Advertisement for Bids or IFB.

1.13 MODIFICATION AND WITHDRAWAL OF BID

A. No bid, proposal, or submittal may be withdrawn or modified after the bid opening except where the award of the contract has been delayed beyond ninety (90) consecutive calendar days after date of bid opening or as per Texas Local Government Code, Title 8, Chapter 262, Subchapter C., Section 262.0305. Modifications after Award.

1.14 IRREGULAR BID

A. It is understood that Collin County, Texas reserves the right to accept or reject any and/or all Bids, proposals, or submittals for any or all products and/or services covered in an Invitation For Bid (IFB) and to waive informalities or defects in submittals or to accept such submittals as it shall deem to be in the best interest of Collin County.

1.15 REJECTION OF BID

A. The bidder acknowledges the right of Owner to reject any or all bids and to waive any informality or irregularity in any bid received. In addition, the bidder recognizes the right of Owner to reject a bid if the bidder failed to furnish any required Bid Security, or to submit the data required by the Bidding Documents, or if the bid is in any way incomplete or irregular.

1.16 METHOD OF AWARD

A. In evaluating bids, Owner will consider whether or not the bids comply with the prescribed requirements, base prices, any alternates, unit pricing, completion time, bidder's qualifications, bidder's proposed subcontractors, suppliers, etc., and other data as may be requested in the Bid Documents.

B. Owner may conduct such investigations as Owner deems necessary to assist in the evaluation of any bid and to establish the responsibility, qualifications and financial ability of bidder, proposed subcontractors, suppliers and other persons and organizations to perform and furnish the Work in accordance with the Bidding Documents to Owner's satisfaction within the prescribed time.

C. If the contract is to be awarded, it will be awarded to the lowest and best responsible bidder whose evaluation, by Owner, indicates to be in the best interests of the project. If no alternates are selected by Owner, the Owner may award the contract to a responsible bidder who submits the lowest and best bid.

D. Evaluation of Alternates - Any and/or all or none of the alternates may be considered in evaluation. Owner may award Contract on base bid plus any and/or all or none of the alternates.

E. Owner anticipates award within ninety (90) consecutive calendar days after bid opening.

F. The bid, when properly accepted by the County, shall constitute a Contract equally binding between the contractor and Owner. No different or additional terms will become part of this Contract with the exception of a written Change Order, signed by both parties.

G. No oral statement of any person shall modify or otherwise change, or affect the terms, conditions or specifications stated in the resulting contract. All change orders to the contract will be made in writing by Collin County Purchasing Agent.

1.17 EXECUTION OF CONTRACT

A. The person or persons, partnership, company, firm, association or corporation to whom a contract is awarded shall within ten (10) consecutive calendar days after such award, sign the necessary contract agreements and submit the required bonds entering into the required Contract with Owner. No contract shall be binding on Owner until it has been executed by Owner or his/her duly authorized representative, and delivered to the Contractor.

1.18 FAILURE TO EXECUTE CONTRACT

A. The failure of the Bidder to execute the required bonds or to sign the required Contract within ten (10) consecutive calendar days after the Contract is awarded, shall be considered by Owner as abandonment of his/her Bid, and Owner may annul the award, at the Owner's sole discretion.

1.19 PURCHASE ORDER

A. A purchase order(s) shall be generated by Owner to the contractor. The purchase order number **must** appear on all itemized invoices. Collin County will not be responsible for any orders placed or delivered without a valid purchase order number.

1.20 NOTICE TO PROCEED

A. Upon the execution and delivery of Bonds, Executed Contract by Contractor, progress schedule, proof of insurance, and all other documents required prior to commencing work herein, Owner will issue a written Notice to Proceed to the Contractor requesting that he/she proceed with construction, and the Contractor shall commence work within ten (10) consecutive calendar days after the date of Notice to Proceed.

1.21 PAYMENT PROCEDURES

A. Contractor shall submit Applications for Payment in accordance with the Contract, and payments shall be made in accordance with the Contract Documents.

C. Final Payment: Upon final completion and acceptance of the work, Owner shall pay the remainder of the contract price as recommended by Engineer, in accordance with Texas Government Code, Title 10, Subtitle F., Chapter 2251. Contractor(s) is required to pay subcontractors within ten (10) days after the contractor has received payment from the County.

D. The Contractor understands, acknowledges and agrees that if the Contractor subcontracts with a third party for services and/or material, the primary Contractor (awardee) accepts responsibility for full and prompt payment to the third party. Any dispute between the primary Contractor and the third party, including any payment dispute, will be promptly remedied by the Contractor. Failure to promptly render a remedy or to make prompt payment to the third party (subcontractor) may result in the withholding of funds from the primary Contractor by Collin County for any payments owed to the third party.

1.22 AFFIDAVIT OF BILLS PAID

A. Prior to final acceptance of this project by Owner, the Contractor shall execute an affidavit that all bills for labor, materials, and incidentals incurred in the project construction have been paid in full, and that there are no claims pending.

1.23 EXEMPTION FROM STATE OF TEXAS AND LOCAL SALES TAX ON MATERIALS

A. Owner qualifies for exemption from State and Local Sales Tax pursuant to the provisions of Chapter 151, Section 151.309 of the Texas Limited Sales, Excise and Use Tax Act. The Contractor performing this Contract may purchase all materials, supplies, equipment consumed in the performance of this Contract by issuing to his/her suppliers an exemption certificate in lieu of the tax. .

1.24 CONFLICT OF INTEREST

A. No public official shall have interest, direct or indirect, in this contract, in accordance with Texas Local Government Code Title 5, Subtitle C, Chapter 171.

1.25 ETHICS

A. The bidder/contractor shall comply with Commissioners Court Order No. 96-680-10-28, Establishment of Guidelines & Restrictions Regarding The Acceptance of Gifts by County Officials & County employees.

1.26 BID COMPLIANCE

A. Bid must comply with all federal, state, county and local laws concerning this type of project and the fulfillment of all ADA (Americans With Disabilities Act) requirements.

B. Design, strength, quality of materials and workmanship must conform to the highest standards of manufacturing and engineering practice.

C. All products must be new and unused, unless otherwise specified, in first-class condition and of current manufacture.

1.27 DRUG FREE

A. All bidders shall provide any and all notices as may be required under the Drug-Free Work Place Act of 1988, 41 U.S.C. 701, and Collin County Commissioners Court Order No. 90-455-06-11, to its employees and all sub-contractors to insure that Owner maintains a drug-free work place. The use, possession or being under the influence of drugs and/or alcohol while working on this bid project or while on County property is prohibited and may result in removal of an individual from the project and/or immediate termination of contract. The County reserves the right to review drug testing records of any personnel involved in this bid project. The County may require, at contractor's expense, drug testing of contractor's personnel if no drug testing records exists or if such test results are older than six (6) months.

B. Substances and cut-off levels are as follows:

SUBSTANCE	MAXIMUM LEVEL
Amphetamines	1000 NG/ML
Barbiturates	300 NG/ML

Benzodiazepines	300 NG/ML
Cocaine Metabolite	300 NG/ML
Opiates	300 NG/ML
Phencyclidine (PCP)	25 NG/ML
THC (Marijuana) Metaboline	100 NG/ML
Methadone, Urinary	300 NG/ML
Methaquaone, Urine	300 NG/ML
Propoxyphene	300 NG/ML

1.28 INDEMNIFICATION

A. To the fullest extent permitted by law, the CONTRACTOR and his sureties shall indemnify, defend and hold harmless the OWNER and all of its, past, present and future, officers, agents and employees from all suits, cause of action, claims, liabilities, losses, fines, penalties, liens, demands, obligations, actions, proceedings, of any kind, character, name and description brought or arising, on account of any injuries or damages received or sustained by any person, destruction or damage to any property on account of, in whole or part, the operations of the CONTRACTOR, his agents, employees or subcontractors; or on account of any negligent act or fault of the CONTRACTOR, his agents, employees or subcontractors in the execution of said Contract; failing to comply with any law, ordinance, regulation, rule or order of any governmental or regulatory body including those dealing with health, safety, welfare or the environment; on account of the failure of the CONTRACTOR to provide the necessary barricades, warning lights or signs; and shall be required to pay any judgment, with cost, which may be obtained against the OWNER growing out of such injury or damage. In no event shall OWNER be liable to CONTRACTOR for indirect or consequential damages or loss of income or profit irrespective of the cause, fault or reason for same. CONTRACTOR'S duty to indemnify herein shall not be limited by any limitation on the type or amount of damages payable by or for CONTRACTOR or any Subcontractor under workman's compensation acts, disability benefit acts or any other employee benefit acts.

In addition, the CONTRACTOR likewise covenants and agrees to, and does hereby, indemnify and hold harmless the OWNER from and against any and all injuries, loss or damages to property of the OWNER during the performance of any of the terms and conditions of this Contract, arising out of or in connection with or resulting from, in whole or in part, any and all alleged acts or omissions of officers, agents, servants, employees, contractors, subcontractors, licenses or invitees of the CONTRACTOR.

The rights and responsibilities provided in this indemnification provision shall survive the termination or completion of this Contract.

1.29 CONSTRUCTION SCHEDULE

A. The time for completion is set forth herein and will be included in the Contract. All work shall be completed within the consecutive calendar day count shown in the Contractor's bid. The calendar day count shall commence ten (10) consecutive calendar days after the date of the Notice to Proceed.

B. Prior to the issuance of the Notice to Proceed by Owner, the Contractor shall submit a detailed progress and schedule chart to Owner for review. This chart will be used to assure completion of the job within the number of consecutive calendar days stated in bid documents.

1.30 DELAYS AND EXTENSIONS OF TIME

A. If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Engineer, or of an employee of either, or of a separate contractor employed by the Owner, or by changes ordered in the Work, or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control, or by delay authorized by the Owner pending mediation and arbitration, or by other causes which the Engineer determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Engineer may determine.

B. If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time and could not have been reasonably anticipated, and that the weather conditions had an adverse effect on the scheduled construction.

C. Contractor's sole remedy for any delays in the project, which are not the fault of the Contractor, shall be an equitable extension of time to perform the work, required by the Contract. In no event shall the Contractor be entitled tom make a claim for delay, impact or acceleration damages against the Owner.

1.31 DAMAGES

A. Should the contractor fail to complete the project within the specified completion schedule the sum of $200.00 per calendar day will be deducted from the moneys due the contractor for the work. This sum shall not be considered as a penalty, but rather as reasonable liquidated damages, since it would be impracticable or extremely difficult to fix the actual damages. An extension of time may be allowed for delays beyond the control of the contractor at the discretion of Owner.

1.32 TERMINATION

This contract shall remain in effect until any of the following occurs:

A. completion of project;
B. acceptance of work ordered; or
C. termination by either party pursuant to the terms of the Contract with a thirty (30) days written notice prior to cancellation that must state therein the reasons for such cancellation.
D. Breach of the contract by the Contractor for failure
    1. to meet completion schedules, or
    2. otherwise perform in accordance with these specifications.

Breach of contract or default authorizes the County to purchase elsewhere and charge the full increase in cost and handling to the defaulting Contractor.

1.33 PATENTS - COPYRIGHTS

A. The contractor agrees to protect Owner from any claims involving infringements of patents and/or copyrights. In no event shall Owner be liable to a contractor for any/all suits arising on the grounds of patent(s) or copyright(s) infringement.

1.34 VENUE; GOVERNING LAW

A. This contract will be governed by the laws of the State of Texas. Should any portion of this contract be in conflict with the laws of the State of Texas, the State laws shall invalidate only that portion. The remaining portion of the contract shall remain in effect. This contract is performable in Collin County, Texas.

1.35 ASSIGNMENT

A. The contractor shall not sell, assign, transfer or convey this contract, in whole or in part, without the prior written approval from Collin County Commissioners Court.

1.36 SILENCE OF SPECIFICATION

A. The apparent silence of any part of the specification as to any detail or to the apparent omission from it of a detailed description concerning any point, shall be regarded as meaning that only the best commercial practices are to prevail. All interpretations of the specification shall be made on the basis of this statement.

1.37 PROVISION CONCERNING ESCALATOR CLAUSES

A. Bid(s) containing any condition which provides for changes in the stated bid prices due to increase or decrease in the costs of materials, labor, or other items required for this project, will be rejected and returned to the bidder without being considered.

1.38 ESTIMATES OF QUANTITIES

A. The quantities listed in the Bid Form will be considered as approximate and will be used for the comparison of bids. Payments will be made to the Contractor only for the actual quantities of work performed or materials furnished in accordance with the contract. The quantity of work to be done and the materials may be increased or decreased as provided for in the Contract Documents.

1.39 TREE PROTECTION OUTSIDE LIMITS OF WORK

A. The Contractor will be required to obtain written authorization from Owner for the removal of any tree three inches (3”) in diameter or greater for any area outside the limits of the street right-of-way or slope easement. It is the intent of Owner to preserve as much as possible the natural condition of the floodplains.

1.40 EXCAVATION/TRENCH SAFETY

A. TRENCH SAFETY

The CONTRACTOR shall be responsible for complying with state laws and federal regulations relating to trench safety, including those which may be enacted during the performance under this contract. The CONTRACTOR shall be responsible for selecting an appropriate method of providing trench safety after due consideration of the job conditions, location of utilities, pavement conditions and other relevant factors. Slope-back methods which may result in unnecessary displacement of utilities and/or destruction of pavement may not be used without permission from the OWNER. The CONTRACTOR shall be responsible for providing to the OWNER an acceptable trench safety plan signed and sealed by a Professional Engineer qualified to do such work and registered in Texas. Devices used to provide trench safety such as trench shields and shoring systems will be likewise certified by professional Engineers registered in the State of Texas or by a professional Engineer registered in the state of manufacture of the shield.

B. PAYMENT FOR TRENCH SAFETY

Payment for trench safety shall be by the lineal feet of trench exceeding a depth of five (5) ft. Excavation for slope-back methods shall be subsidiary to the trench safety pay item including replacement and recompaction. Excess excavation for other trench safety methods is also subsidiary to the trench safety pay item. Costs relating to the preparation of the trench safety plan including geotechnical investigation, testing and report preparation fees are all subsidiary to the pay item for trench safety. Should trench safety measures be required during contract performance where no pay item has been provided, then the CONTRACTOR shall immediately notify the OWNER and, if directed to do so, provide trench safety under the provisions of the contract. Should the OWNER fail to authorize the work, then the CONTRACTOR shall proceed under the provisions of the Contract. Trench safety requirements are mandatory and may not be waived.

C. PAYMENT FOR SPECIAL SHORING

Payment for special shoring, if any, shall be based on the square feet of shoring used.

D. The Contractor must be made aware that on construction projects in which trench excavation will exceed a depth of five feet (5'), the uniform set of general conditions must require that the bid documents and the contract include detailed plans and specifications for adequate safety systems that meet Occupational Safety and Health Administration standards that will be in effect during the period of construction of the project. The Contractor shall provide a separate pay item for trench excavation safety in accordance with the Texas Health & Safety Code Chapter 756. The Contractor shall verify that these plans and specifications include a pay item for these same trench excavation safety systems, in accordance with Texas Government Code, Title 10, Section 2166.303, Uniform Trench Safety Conditions. The contractor shall insure that drainage from adjacent properties is not blocked by his/her excavations. Measurement and payment for excavation/trench safety systems will not be made directly, but considered subsidiary to the work.

E. The Contractor shall be responsible for obtaining and paying for all surveys and testing, including geotechnical surveys and testing, necessary to insure it can comply with all laws regarding adequate trench excavation safety.

1.41 CONSTRUCTION STAKING

A. Engineer will provide the Contractor with primary horizontal and vertical control to consist of one construction baseline and two benchmarks.

B. The Contractor shall take all necessary precautions to preserve any and/or all markings and staking. Payment for costs of restaking shall be the responsibility of the Contractor.

1.42 PERMITS

A. Contractor shall be responsible for obtaining all necessary permits.

1.43 MATERIALS TESTING

A. Owner will be responsible for all materials testing.

1.44 WAGE SCALE

A. In accordance with Texas Government Code, Title 10, Section 2258, Prevailing Wage Rates, the general prevailing wage rate has been determined for this locality for the craft or type of

workman needed to execute work of a similar character of the project listed herein. The Contractor shall pay the prevailing wage rate in this locality to all his/her employees and subcontractors performing work on this project, and in no event shall the Contractor pay less than the rate shown in the following schedule.

"General Decision Number: TX20210239 07/02/2021

Superseded General Decision Number: TX20200239

State: Texas

Construction Type: Building

County: Collin County in Texas.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Note: Under Executive Order (EO) 13658, an hourly minimum wage of $10.95 for calendar year 2021 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least $10.95 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for
all hours spent performing on the contract in calendar year 2021. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate,if it is higher than the conformed wage rate). The EO minimum wage rate
will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/01/2021
1	03/12/2021
2	07/02/2021

ASBE0021-011 08/01/2017

	Rates	Fringes
ASBESTOS WORKER/HEAT & FROST INSULATOR (Duct, Pipe and Mechanical System Insulation)....$	25.87	7.23

BOIL0074-003 01/01/2017

	Rates	Fringes
BOILERMAKER	$ 28.00	22.35

CARP1421-002 04/01/2016

	Rates	Fringes
MILLWRIGHT	$ 26.60	8.65

ELEV0021-006 01/01/2021

	Rates	Fringes
ELEVATOR MECHANIC	$ 44.02	36.365

FOOTNOTES:

A. 6% under 5 years based on regular hourly rate for all hours worked. 8% over 5 years based on regular hourly rate for all hours worked.

B. New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, Christmas Day, and Veterans Day.

ENGI0178-005 06/01/2020

	Rates	Fringes
POWER EQUIPMENT OPERATOR		
(1) Tower Crane	$ 32.85	13.10
(2) Cranes with Pile Driving or Caisson Attachment and Hydraulic Crane 60 tons and above	$ 28.75	10.60
(3) Hydraulic cranes 59 Tons and under	$ 32.35	13.10

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* IRON0263-005 06/01/2020

	Rates	Fringes
IRONWORKER (ORNAMENTAL AND STRUCTURAL)	$ 25.14	7.43

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* PLUM0100-005 05/01/2021

	Rates	Fringes

HVAC MECHANIC (HVAC Unit
Installation Only).....$ 33.88 13.07
PIPEFITTER (Excludes HVAC
Pipe Installation).....$ 33.88 13.07

SUTX2014-015 07/21/2014

Rates Fringes

BRICKLAYER.....$ 21.06 0.00

CARPENTER, Excludes Drywall
Hanging, Form Work, and Metal
Stud Installation.....$ 15.78 0.00

CAULKER.....$ 15.16 0.00

CEMENT MASON/CONCRETE FINISHER...$ 13.04 0.00

DRYWALL HANGER AND METAL STUD
INSTALLER.....$ 13.00 0.00

ELECTRICIAN (Alarm
Installation Only).....$ 20.93 3.86

ELECTRICIAN (Communication
Technician Only).....$ 15.35 1.39

ELECTRICIAN (Low Voltage
Wiring Only).....$ 17.04 1.39

ELECTRICIAN, Excludes Low
Voltage Wiring and
Installation of Alarms/Sound
and Communication Systems.....$ 20.01 2.69

FORM WORKER.....$ 11.89 0.00

GLAZIER.....$ 16.46 3.94

HIGHWAY/PARKING LOT STRIPING:
Operator (Striping Machine).....$ 10.04 2.31

INSTALLER - SIDING
(METAL/ALUMINUM/VINYL).....$ 14.74 0.00

INSTALLER - SIGN.....$ 15.50 0.00

INSULATOR - BATT.....$ 13.00 0.00

IRONWORKER, REINFORCING.....$ 12.29 0.00

LABORER: Common or General.....$ 10.52 0.00

LABORER: Mason Tender - Brick...$ 10.54 0.00

LABORER: Mason Tender - Cement/Concrete.....$ 10.93 0.00

LABORER: Pipelayer.....$ 13.00 0.35

LABORER: Plaster Tender.....$ 12.22 0.00

LABORER: Roof Tearoff.....$ 11.28 0.00

LABORER: Landscape and Irrigation.....$ 10.55 0.00

LATHER.....$ 16.00 0.00

OPERATOR: Backhoe/Excavator/Trackhoe.....$ 12.83 0.00

OPERATOR: Bobcat/Skid Steer/Skid Loader.....$ 13.93 0.00

OPERATOR: Bulldozer.....$ 18.29 1.31

OPERATOR: Drill.....$ 15.69 0.50

OPERATOR: Forklift.....$ 13.21 0.81

OPERATOR: Grader/Blade.....$ 13.03 0.00

OPERATOR: Loader.....$ 13.46 0.85

OPERATOR: Mechanic.....$ 17.52 3.33

OPERATOR: Paver (Asphalt, Aggregate, and Concrete).....$ 18.44 0.00

OPERATOR: Roller.....$ 15.04 0.00

PAINTER (Brush, Roller and Spray), Excludes Drywall Finishing/Taping.....$ 13.35 5.10

PAINTER: Drywall
Finishing/Taping Only.....$ 14.24 3.83

PIPEFITTER (HVAC Pipe
Installation Only).....$ 20.45 4.00

PLASTERER.....$ 16.58 0.00

PLUMBER, Excludes HVAC Pipe
Installation.....$ 22.46 4.06

ROOFER.....$ 17.19 0.00

SHEET METAL WORKER (HVAC Duct
Installation Only).....$ 21.13 4.79

SHEET METAL WORKER, Excludes
HVAC Duct Installation.....$ 24.88 5.97

SPRINKLER FITTER (Fire
Sprinklers).....$ 37.50 0.00

TILE FINISHER.....$ 11.22 0.00

TILE SETTER.....$ 14.25 0.00

TRUCK DRIVER: 1/Single Axle
Truck.....$ 16.00 0.81

TRUCK DRIVER: Dump Truck.....$ 12.39 1.18

TRUCK DRIVER: Flatbed Truck.....$ 19.65 8.57

TRUCK DRIVER: Semi-Trailer
Truck.....$ 12.50 0.00

TRUCK DRIVER: Water Truck.....$ 12.00 4.11

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year.

Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the
most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION"

B. Except for work on legal holidays, the "General Prevailing Rate of Per Diem Wage" for the various crafts or type of workers or mechanics is the product of (a) the number of hours worked per day, except for overtime hours, times (b) the above respective rate per hour.

C. For legal holidays, the "General Prevailing Rate of Per Diem Wage" for the various crafts or type of workers or mechanics is the product of (a) one and one-half times the above respective rate per hour, times (b) the number of hours worked on the legal holiday.

D. For overtime work, the "General Prevailing Rate of Per Diem Wage" for the various crafts or type of workers or mechanics is the product of (a) one and one-half times the above respective rate per hour, times (b) the number of hours worked on overtime.

E. Under the provisions of Texas Government Code, Title 10, Section 2258, Prevailing Wage Rates, the contractor or subcontractor of the contractor shall forfeit as a penalty to the entity on whose behalf the contract is made or awarded, sixty dollars ($60.00) for each calendar day, or portion thereof, that the worker is paid less than the wage rates stipulated in the contract.

F. If the construction project involves the expenditure of Federal funds in excess of $2,000, the minimum wages to be paid various classes of laborers and mechanics will be based upon the wages that will be determined by the Secretary of Labor to be prevailing for the corresponding classes of laborers and mechanics employed on the project of a character similar to the contract work.

1.45 Collin County Purchasing Department shall serve as Contract Administrator or shall supervise agents designated by Collin County.

1.46 All warranties shall be stated as required in the Uniform Commercial Code.

1.47 The Contractor and Collin County agree that both parties have all rights, duties, and remedies available as stated in the Uniform Commercial Code.

1.48 Contractor shall not fraudulently advertise, publish or otherwise make reference to the existence of a contract between Collin County and Contractor for purposes of solicitation. As exception, Contractor may refer to Collin County as an evaluating reference for purposes of establishing a contract with other entities.

1.49 Contractor shall provide Collin County with diagnostic access tools at no additional cost to Collin County, for all Electrical and Mechanical systems, components, etc., procured through this contract.

1.50 CRIMINAL HISTORY BACKGROUND CHECK: If required, ALL individuals may be subject to a criminal history background check performed by Collin County prior to access being granted to Collin County facilities. Upon request, Vendor/Contractor/Provider shall provide list of individuals to the Collin County Purchasing Department within five (5) working days.

1.51 Vendors/Contractors/Providers must be in compliance with the Immigration and Reform Act of 1986 and all employees specific to this solicitation must be legally eligible to work in the United States of America.

1.52 CERTIFICATION OF ELIGIBILITY: This provision applies if the anticipated Contract exceeds $100,000.00 and as it relates to the expenditure of federal grant funds. By submitting a bid or proposal in response to this solicitation, the Bidder/Quoter/Offeror certifies that at the time of submission, he/she is not on the Federal Government's list of suspended, ineligible, or debarred contractors. In the event of placement on the list between the time of bid/proposal submission and time of award, the Bidder/Quoter/Offeror will notify the Collin County Purchasing Agent. Failure to do so may result in terminating this contract for default.

1.53 NOTICE TO CONTRACTORS: The Collin County Detention Facility houses persons who have been charged with and/or convicted of serious criminal offenses. When entering the Detention Facility, you could: (1) hear obscene or graphic language; (2) view partially clothed male inmates; (3) be subjected to verbal abuse or taunting; (4) risk physical altercations or physical contact, which could be minimal or possibly serious; (5) be exposed to communicable or infectious diseases; (6) be temporarily detained or prevented from immediately leaving the Detention Facility in the case of an emergency or "lockdown; and (7) subjected to a search of your person or property. While the Collin County Sheriff's Office takes every reasonable precaution to protect the safety of visitors to the Detention Facility, because of the inherently dangerous nature of a Detention Facility and the type of the persons incarcerated therein, please be advised that the possibility of such situations exist and you should carefully consider such risks when entering the Detention Facility. By entering the Collin County Detention Facility, you acknowledge that you are aware of such potential risks and willingly and knowingly choose to enter the Collin County Detention Facility.

1.54 Contractors doing business with OWNER agree to comply with Federal Executive Order 13465 E-Verify. It is OWNER's intention and duty to comply and support the Immigration and Nationality Act (INA) which includes provisions addressing employment eligibility, employment verification and non-discrimination. According to the INA, contractors/employers may hire only persons who may legally work in the United States. Subsequently, contractors and subcontractors doing business with OWNER must confirm their enrollment in the E-Verify system which verifies employment eligibility through completion and checking of I-9 forms. OWNER reserves the right to audit contractors' process to verify enrollment compliance.

1.55 INSURANCE REQUIREMENTS

A. CONTRACTOR'S INSURANCE

1. 1. Before commencing work, the CONTRACTOR shall be required, to furnish the Collin County Purchasing Agent with certified copies of all insurance certificate(s) required by Texas Law, and the coverages required herein, indicating the coverage is to remain in force throughout the term of this Contract. CONTRACTOR shall also be required to furnish the Collin County Purchasing Agent with certified copies of subcontractor's insurance certificates required by the Texas Department of Insurance, Division of Workers' Compensation, section 406.096(b), and coverages required herein in section 4.2.

Without limiting any of the other obligations or liabilities of the CONTRACTOR, during the term of the Contract the CONTRACTOR and each subcontractor, at their own expense, shall purchase and maintain the herein stipulated minimum insurance with companies duly approved to do business in the State of Texas and satisfactory to the OWNER. Certificates of each policy for the CONTRACTOR and each subcontractor shall be delivered to the OWNER before any work is started, along with a written statement from the issuing company stating that said policy shall not be canceled, nonrenewed or materially changed without 30 days advance written notice being given to the OWNER.

2. In addition to any coverage required by Texas Law, the CONTRACTOR shall provide the following coverages at not less than the specified amounts:

B. Workers Compensation insurance required by Texas Law at statutory limits, including employer's liability coverage of not less than $1,000,000. In addition to these, the CONTRACTOR must comply with all the requirements of the Texas Department of Insurance, Division of Workers' Compensation; (Note: If you have questions concerning these requirements, you are instructed to contact the DWC.)

1. By signing this contract or providing or causing to be provided a certificate of coverage, the CONTRACTOR is representing to the OWNER that all employees of the CONTRACTOR and its subcontractors who will provide services on the Project will be covered by workers compensation coverage for the duration of the Project, that the coverage will be based on proper reporting of classification codes and payroll amounts, and that all coverage agreements will be filed with the appropriate insurance carrier or, in the case of a self-insured, with the commission's Division of Self-Insurance Regulation. Providing false or misleading information may subject the CONTRACTOR to administrative penalties, criminal penalties, civil penalties, or other civil actions.

2. The CONTRACTOR'S failure to comply with any of these provisions is a breach of Contract by the Contractor which entitles the OWNER to declare the Contract void if the CONTRACTOR does not remedy the breach within ten (10) days after receipt of notice of breach from the OWNER.

C. Broad form commercial general liability insurance, including independent contractor's liability, completed operations and contractual liability, written on an occurrence form, covering, but not limited to, the liability assumed under the indemnification provisions of this contract, fully insuring CONTRACTOR'S and its subcontractors liability for injury to or death of OWNER'S employees and third parties, extended to include personal injury liability coverage with damage to property, with minimum limits as set forth below:
General Aggregate $2,000,000
Products — Components/Operations Aggregate $2,000,000
Personal and Advertising Injury $ 1,000,000
Each Occurrence $ 1,000,000

1. The policy shall include coverage extended to apply to completed operations, asbestos hazards (if this project involves work with asbestos) and XCU (explosion, collapse and underground) hazards. The completed operations coverage must be maintained for a minimum of one year after final completion and acceptance of the work, with evidence of same filed with OWNER.

D. Comprehensive automobile and truck liability insurance, covering owned, hired and non-owned vehicles, with a combined bodily injury and property damage minimum limit of $1,000,000 per occurrence; or separate limits of $1,000,000 for bodily injury (per person), $1,000,000 for bodily injury (per accident) and $1,000,000 for property damage. Such insurance shall include coverage for loading and unloading hazards.

E. OWNER'S PROTECTIVE LIABILITY INSURANCE

CONTRACTOR shall obtain, pay for and maintain at all times during the prosecution of the work under this contract an OWNER'S protective liability insurance policy naming the OWNER as insured for property damage and bodily injury, which may arise in the prosecution of the Work or CONTRACTOR'S operations under this Contract. Coverage shall be on an "occurrence" basis, and the policy shall be issued by the same insurance company that carries the CONTRACTOR'S liability insurance with a combined bodily injury and property damage minimum limit of $1,000,000 per occurrence and $1,000,000 aggregate.

F. "UMBRELLA" LIABILITY INSURANCE

CONTRACTOR shall obtain, pay for and maintain umbrella liability insurance during the contract term, insuring CONTRACTOR for an amount of not less than $1,000,000 per occurrence combined limit for bodily injury and property damage that follows from and applies in excess of the primary liability coverages required hereinabove. The policy shall provide "drop down" coverage where underlying primary insurance coverage limits are insufficient or exhausted. OWNER shall be named as an additional insured.

G. RAILROAD PROTECTIVE INSURANCE

When required in the Special Provisions, CONTRACTOR shall obtain, maintain and present evidence of railroad protective insurance (RPI). The policy shall be in the name of the railroad company having jurisdiction over the right-of-way involved. The minimum limit of coverage shall meet the specifications provided by the railroad company. The OWNER shall specify the amount of RPI necessary.

H. POLICY ENDORSEMENTS AND SPECIAL CONDITIONS

1. Each insurance policy to be furnished by CONTRACTOR shall include the following conditions by endorsement to the policy:

(a) each policy shall name the OWNER as an additional insured as to all applicable coverage;

(b) each policy shall require that 30 days prior to the cancellation, nonrenewal or any material change in coverage, a notice thereof shall be given to OWNER by certified mail;

(c) the term "OWNER" shall include all past, present or future, authorities, boards, bureaus, commissions, divisions, departments and offices of the OWNER and individual members, elected official, officers, employees and agents thereof in their official capacities and/or while acting on behalf of the OWNER;
(d) the policy phrase "other insurance" shall not apply to the OWNER where the OWNER is an additional insured on the policy;
(e) all provisions of the contract concerning liability, duty and standard of care together with the indemnification provision, shall be underwritten by contractual liability coverage sufficient to include such obligations within applicable policies;
(f) each policy shall contain a waiver of subrogation in favor of OWNER, and its, past, present and future, officials, employees, and volunteers; and, (g) each certificate of insurance shall reference the Project and Contract number, contain all the endorsement required herein, and require a notice to the OWNER of cancellation.

2. Insurance furnished by the CONTRACTOR shall be in accordance with the following requirements:
(a) any policy submitted shall not be subject to limitations, conditions or restrictions deemed inconsistent with the intent of the insurance requirements to be fulfilled by the CONTRACTOR. The OWNER'S decision thereon shall be final;
(b) all policies are to be written through companies duly licensed to transact that class of insurance in the State of Texas with a financial ratings of A+ VII or better as assigned by BEST Rating Company or equivalent; and
(c) All liability policies required herein shall be written with an "occurrence" basis coverage trigger.

3. CONTRACTOR agrees to the following:
(a) CONTRACTOR hereby waives subrogation rights for loss or damage to the extent same are covered by insurance. Insurers shall have no right of recovery or subrogation against the OWNER, it being the intention that the insurance policies shall protect all parties to the Contract and be primary coverage for all losses covered by the policies;
(b) Companies issuing the insurance policies and CONTRACTOR shall have no recourse against the OWNER for payment of any premiums or assessments for any deductibles, as all such premiums and deductibles are the sole responsibility and risk of the CONTRACTOR;
(c) Approval, disapproval or failure to act by the OWNER regarding any insurance supplied by the CONTRACTOR (or any subcontractors) shall not relieve the CONTRACTOR of full responsibility or liability for damages and accidents as set forth in the Contract Documents. Neither shall the bankruptcy, insolvency or denial of liability by the insurance company exonerate the CONTRACTOR from liability; and
(d) No special payments shall be made for any insurance that the CONTRACTOR and subcontractors are required to carry; all are included in the Contract Price and the Contract unit prices. Any of such insurance

policies required under this section may be written in combination with any of the others, where legally permitted, but none of the specified limits may be lowered thereby.

1.56 Vendors/Contractors/Providers must be in compliance with the provisions of Section 2252.152 and Section 2252.153 of the Texas Government Code which states, in part, contracts with companies engaged in business with Iran, Sudan, or Foreign Terrorist Organizations are prohibited. A governmental entity may not enter into a contract with a company that is listed on the Comptroller of the State of Texas website identified under Section 806.051, Section 807.051 or Section 2253.253 which do business with Iran, Sudan or any Foreign Terrorist Organization. This Act is effective September 1, 2017.

1.57 Force Majeure: No party shall be liable or responsible to the other party, nor be deemed to have defaulted under or breached this Agreement, for any failure or delay in fulfilling or performing any term of this Agreement, when and to the extent such failure or delay is caused by or results from acts beyond the affected party's reasonable control, including, without limitation: acts of God; flood, fire or explosion; war, invasion, riot or other civil unrest; actions, embargoes or blockades in effect on or after the date of this Agreement; or national or regional emergency (each of the foregoing, a "Force Majeure Event"). A party whose performance is affected by a Force Majeure Event shall give notice to the other party, stating the period of time the occurrence is expected to continue and shall use diligent efforts to end the failure or delay and minimize the effects of such Force Majeure Event.

Section 004100-Bid Form

Collin County Purchasing

2021-351

Construction, HVAC Replacement, 900 Park Blvd. Building

Issue Date: 9/28/2021
Questions Deadline: 10/14/2021 05:00 PM (CT)
Response Deadline: 10/21/2021 02:00 PM (CT)

Collin County Purchasing

Contact Information

Contact: JD Griffin, CPPB Senior Buyer
Address: Purchasing
Admin. Building
Ste. 3160
2300 Bloomdale Rd.
Ste. 3160
McKinney, TX 75071
Phone: (972) 548-4116
Fax: (972) 548-4694
Email: jgriffin@co.collin.tx.us

Event Information

Number:	2021-351
Title:	Construction, HVAC Replacement, 900 Park Blvd. Building
Type:	Invitation for Bid - Construction
Issue Date:	9/28/2021
Question Deadline:	10/14/2021 05:00 PM (CT)
Response Deadline:	10/21/2021 02:00 PM (CT)
Notes:	Please log in to view bid documents.

Ship To Information

Address: 900 Building
900 E. Park Blvd.
Plano, TX 75074

Billing Information

Address: Auditor
Admin. Building
Ste. 3100
2300 Bloomdale Rd.
Ste. 3100
McKinney, TX 75071

Bid Activities

Pre-Bid Conference 10/12/2021 10:00:00 AM (CT)

A PRE-BID CONFERENCE will be held by Collin County at the Collin County 900 Building, 900 E. Park Blvd., Plano, TX 75074 (meet at South end of building) on Tuesday, October 12, 2021 at 10:00 AM in order for bidders to ask questions regarding the proposed work. It is the bidder's responsibility to review the site and documents to gain a full understanding of the requirements of the bid.

Bid Attachments

LEGAL NOTICE_2021-351.doc Download

Legal Notice

CC HVAC Replacement_900 Bldg_Project Manual.pdf View Online

Project Manual

CCHVAC Replacement_900 Bldg_ Drawings.pdf View Online

Drawings

211350 - 2016 Ashrae - COMCheck - Mechanical.pdf View Online

Mechanical Compliance Certificate

Requested Attachments

Bid Bond

(Attachment required)

Bid Bond
BID SECURITY: All Bidders must submit, prior to the bid opening time, a Certified Check, Cashier's Check or acceptable Bid Bond payable without recourse to Collin County in the amount of not less than five percent (5%) of the total bid plus alternates as submitted. 1. Bid Bond, certified check or Cashier's Check may be mailed or hand delivered to the Office of the Collin County Purchasing Agent, Collin County Administration Building, 2300 Bloomdale Road, Ste 3160, McKinney, TX 75071 and shall be delivered in an envelope, marked plainly on the outside with the Bid Name and Number. 2. Bidders submitting a bid via Collin County eBid shall upload a Bid Bond at https://collincountytx.ionwave.net Regardless of delivery method, all Bid Bonds shall be received prior to the bid opening time to be considered. Failure to submit a copy of bid security prior to bid opening shall be cause for rejection of bid. The original Bid Bond shall be received in the Collin County Purchasing Department no later than close of business on the third working day after the bid opening. Late receipt of or failure to submit original Bid Bond shall be cause for rejection of bid.

W-9

(Attachment required)

Conflict of Interest Questionnaire

Bid Attributes

1 **eBid Notice**

Collin County exclusively uses IonWave Technologies, Inc. (Collin County eBid) for the notification and dissemination of all solicitations. The receipt of solicitations through any other means may result in your receipt of incomplete specifications and/or addendums which could ultimately render your bid/proposal non-compliant. Collin County accepts no responsibility for the receipt and/or notification of solicitations through any other means. Please initial.

(Required: Maximum 1000 characters allowed)

2 **Contact Information**

List the contact name, email address and phone number of the main person(s) Collin County should contact in reference to this solicitation. Contact(s) shall be duly authorized by the company, corporation, firm, partnership or individual to respond to any questions, clarification, and or offers in response to this solicitation.

(Required: Maximum 4000 characters allowed)

3 **Calendar Days Bid**

Please state the consecutive calendar days bid from notice to proceed through completion of project.

(Required: Numbers only)

4 Exceptions

Do you take exception to the specifications? If so, by separate attachment, please state your exceptions.

☐ Yes ☐ No

(Required: Check only one)

5 Bonding Requirement Acknowledgement

I understand that the bonding requirements of this solicitation are required and are included in the submitted pricing. A bond certificate (payment, performance, and/or maintenance) as stated in the specification document shall be submitted to the Purchasing department if I am awarded all or a portion of the resulting contract. Please initial.

(Required: Maximum 1000 characters allowed)

6 Insurance Acknowledgement – Construction/Public Works

I understand that the insurance requirements of this solicitation are required and are included in the submitted pricing. The Contractor shall furnish certificates of insurance for both the Contractor and any subcontractor to the Purchasing department if awarded all or a portion of the resulting contract. Please initial.

(Required: Maximum 1000 characters allowed)

7 Subcontractors

State the business name of all subcontractors and the type of work they will be performing under this contract. If you are fully qualified to self-perform the entire contract, please respond with "Not Applicable-Self Perform".

(Required: Maximum 4000 characters allowed)

8 Reference No. 1

List a company or governmental agency, other than Collin County, where these same/like products/services, as stated herein, have been provided. Texas references preferred. Include the following: Company/Entity, Contact, Address, City/State/Zip, Phone, and E-Mail.

(Required: Maximum 4000 characters allowed)

9 **Reference No. 2**

List a company or governmental agency, other than Collin County, where these same/like products/services, as stated herein, have been provided. Texas references preferred. Include the following: Company/Entity, Contact, Address, City/State/Zip, Phone, and E-Mail.

(Required: Maximum 4000 characters allowed)

10 **Reference No. 3**

List a company or governmental agency, other than Collin County, where these same/like products/services, as stated herein, have been provided. Texas references preferred. Include the following: Company/Entity, Contact, Address, City/State/Zip, Phone, and E-Mail.

(Required: Maximum 4000 characters allowed)

11 **Preferential Treatment**

The County of Collin, as a governmental agency of the State of Texas, may not award a contract to a nonresident bidder unless the nonresident's bid is lower than the lowest bid submitted by a responsible Texas resident bidder by the same amount that a Texas resident bidder would be required to underbid a nonresident bidder to obtain a comparable contract in the state in which the nonresident's principal place of business is located (Government Code, Title 10, V.T.C.A., Chapter 2252, Subchapter A).

1. Is your principal place of business in the State of Texas?
2. If your principal place of business is not in Texas, in which State is your principal place of business?
3. If your principal place of business is not in Texas, does your state favor resident bidders (bidders in your state) by some dollar increment or percentage?
4. If your state favors resident bidders, state by what dollar amount or percentage.

(Required: Maximum 4000 characters allowed)

12 **Debarment Certification**

I certify that neither my company nor an owner or principal of my company has been debarred, suspended or otherwise made ineligible for participation in Federal Assistance programs under Executive Order 12549, “Debarment and Suspension,” as described in the Federal Register and Rules and Regulations. Please initial.

(Required: Maximum 1000 characters allowed)

13 **Immigration and Reform Act**

I declare and affirm that my company is in compliance with the Immigration and Reform Act of 1986 and all employees are legally eligible to work in the United States of America. I further understand and acknowledge that any non-compliance with the Immigration and Reform Act of 1986 at any time during the term of this contract will render the contract voidable by Collin County. Please initial.

(Required: Maximum 1000 characters allowed)

14 **Disclosure of Certain Relationships**

Chapter 176 of the Texas Local Government Code requires that any vendor considering doing business with a local government entity disclose the vendor's affiliation or business relationship that might cause a conflict of interest with a local government entity. Subchapter 6 of the code requires a vendor to file a conflict of interest questionnaire (CIQ) if a conflict exists. By law this questionnaire must be filed with the records administrator of Collin County no later than the 7th business day after the date the vendor becomes aware of an event that requires the statement to be filed. A vendor commits an offense if the vendor knowingly violates the code. An offense under this section is a misdemeanor. By submitting a response to this request, the vendor represents that it is in compliance with the requirements of Chapter 176 of the Texas Local Government Code. Please send completed forms to the Collin County County Clerk's Office located at 2300 Bloomdale Rd., Suite 2104, McKinney, TX 75071. Please initial.

(Required: Maximum 1000 characters allowed)

15 **Anti-Collusion Statement**

Bidder certifies that its Bid/Proposal is made without prior understanding, agreement, or connection with any corporation, firm, or person submitting a Bid/Proposal for the same materials, services, supplies, or equipment and is in all respects fair and without collusion or fraud. No premiums, rebates or gratuities permitted; either with, prior to, or after any delivery of material or provision of services. Any such violation may result in Agreement cancellation, return of materials or discontinuation of services and the possible removal from bidders list. Please initial.

(Required: Maximum 1000 characters allowed)

16 **Disclosure of Interested Parties**

Section 2252.908 of the Texas Government Code requires a business entity entering into certain contracts with a governmental entity to file with the governmental entity a disclosure of interested parties at the time the business entity submits the signed contract to the governmental entity. Section 2252.908 requires the disclosure form (Form 1295) to be signed by the authorized agent of the contracting business entity, acknowledging that the disclosure is made under oath and under penalty of perjury. Section 2252.908 applies only to a contract that requires an action or vote by the governing body of the governmental entity before the contract may be signed or has a value of at least $1 million. Section 2252.908 provides definitions of certain terms occurring in the section. Section 2252.908 applies only to a contract entered into on or after January 1, 2016. Please initial.

(Required: Maximum 1000 characters allowed)

17 **Critical Infrastructure Affirmation**

Pursuant to section 2274.0102 of the Texas Government Code, Respondent certifies that neither it nor its parent company, nor any affiliate of Respondent or its parent company, is: (1) majority owned or controlled by citizens or governmental entities of China, Iran, North Korea, Russia, or any other country designated by the Governor under Government Code Section 2274.0103, or (2) headquartered in any of those countries. Please initial.

_____

_____

_____

(Required: Maximum 1000 characters allowed)

18 **Energy Company Boycotts**

Pursuant to Section 2274.002 of the Texas Government Code, should the contract have a value of $100,000 or more and the company employs 10 or more full-time employees, Respondent represents and warrants that: (1) it does not, and will not for the duration of the contract, boycott energy companies, and (2) will not boycott energy companies during the term of the contract. If circumstances relevant to this provision change during the course of the contract, Respondent shall promptly notify Agency. Please initial.

_____

_____

_____

(Required: Maximum 1000 characters allowed)

19 **Firearm Entities and Trade Associations Discrimination**

Pursuant to section 2274.002 of the Texas Government Code, should the contract have a value of $100,000 or more and the company employs 10 or more full-time employees, Respondent verifies that: (1) it does not have a practice, policy, guidance, or directive that discriminates against a firearm entity or firearm trade association and (2) will not discriminate during the term of the contract against a firearm entity or firearm trade association. If circumstances relevant to this provision change during the course of the contract, Respondent shall promptly notify Agency. Please initial.

_____

_____

_____

(Required: Maximum 1000 characters allowed)

20 **Notification Survey**

In order to better serve our offerors, the Collin County Purchasing Department is conducting the following survey. We appreciate your time and effort expended to submit your bid. Should you have any questions or require more information please call (972) 548-4165. How did you receive notice of this request?

☐ Plano Star Courier ☐ Plan Room ☐ Collin County eBid Notification ☐ Collin County Website

☐ Other

(Required: Check only one)

21 **Bid Bond Acknowledgement**

I understand that accompanying this bid, is a certified check, cashier's check or Bid Bond in the amount of five percent (5%) of the total amount bid. Bidders submitting a bid via Collin County eBid shall upload a Bid Bond at https://collincountytx.ionwave.net. Regardless of delivery method, all Bid Bonds shall be received prior to the bid opening time to be considered.
I understand that the original Bid Bond shall be received in the Collin County Purchasing Department no later than close of business on the third working day after the bid opening. **Late receipt of original Bid Bond shall be cause for rejection of bid.** Please initial.

_____

_____

_____

_____

_____

_____

(Required: Maximum 4000 characters allowed)

22 **Construction Acknowledgement**

Bidder, declares that the only person or parties interested in this bid are those principals named herein, that his/her bid is made without collusion with any other person, firm or corporation, that he/she has carefully examined the Contract Documents including the Advertisement for Bids, Instruction to Bidders, Construction Agreement, Specifications and the Drawings, therein referred to and has carefully examined the locations, conditions and classes of materials for the proposed work, and agrees that he/she will provide all the necessary labor, machinery, tools, equipment, apparatus and other items incidental to construction and will do all the work and furnish all the materials called for in the Contract Documents in the manner prescribed therein. Bidder hereby declares that he/she has visited the site of the Work and has carefully examined the Contract Documents pertaining to the Work covered by the above Bid, and he/she further agrees to commence work within ten (10) consecutive calendar days after date of written Notice to Proceed and to substantially complete the work on which he/she has bid within the number of days specified subject to such extensions of time allowed by Specifications. Bidder certifies that the bid prices contained in this bid have been carefully checked and are submitted as correct and final. The prices have been shown in words and figures for each item listed in this bid and it is understood that in the event of a discrepancy, the words shall govern. Please initial.

_____

_____

_____

(Required: Maximum 1000 characters allowed)

Bid Lines

1 **Package Header**

Bid Grand Total

Quantity: 1 UOM: lump sum Total: $

Item Notes: Total Material Cost (Line 1.1) and Total Labor Cost (Line 1.2) must add up to the Bid Grand Total

Supplier Notes: _____

_____

☐ No bid

☐ Alternate specification *(Attach separate sheet)*

☐ Additional notes *(Attach separate sheet)*

Package Items

1.1 Total Materials Cost Incorporated in Project
(Response required)

Quantity: 1 UOM: lump sum Price: $ Total: $

Supplier Notes: _____

_____

☐ No bid

☐ Additional notes
(Attach separate sheet)

1.2 Total Labor Cost Incorporated in Project
(Response required)

Quantity: 1 UOM: lump sum Price: $ Total: $

Supplier Notes: _____

_____

☐ No bid

☐ Additional notes
(Attach separate sheet)

Supplier Information

Company Name:

Contact Name:

Address:

Phone:

Fax:

Email:

Supplier Notes

The undersigned hereby certifies the foregoing bid submitted by the company listed below hereinafter called “bidder” is the duly authorized agent of said company and the person signing said bid has been duly authorized to execute same. Bidder affirms that they are duly authorized to execute this contract; this company; corporation, firm, partnership or individual has not prepared this bid in collusion with any other bidder or other person or persons engaged in the same line of business; and that the contents of this bid as to prices, terms and conditions of said bid have not been communicated by the undersigned nor by any employee or agent to any other person engaged in this type of business prior to the official opening of this bid.

Print Name

Signature

004313 BID BOND

STATE OF TEXAS §
COUNTY OF COLLIN §

KNOW ALL MEN BY THESE PRESENTS:

THAT _____, a corporation organized and existing under the laws of the State of _____, and fully authorized to transact business in the State of Texas, whose address is_____ of the City of _____ County of _____, and State of _____,(hereinafter referred to as "Principal"), and _____ _____ (hereinafter referred to as "Surety", a corporation organized under the laws of the State of_____ and authorized under the laws of the State of Texas to act as surety on bonds for principals, are held and firmly bound unto _____(hereinafter referred to as "Owner") and unto all persons, firms and corporations who may furnish materials for or perform labor upon the buildings, structures or improvements referred to in the attached Contract, , in the penal sum of _____ Dollars ($_____) in lawful money of the United States, for the payment whereof, the said Principal and Surety bind themselves, and their heirs, administrators, executors, successors, and assigns, jointly and severally, firmly by these presents:

SIGNED, SEALED and **DATED** this _____ day of _____202_____.

WHEREAS, the Principal is herewith submitting its proposal for IFB 2021-351, Construction, HVAC Replacement, 900 Park Blvd. Building

The condition of the above obligations are such that if the aforesaid Principal shall be awarded the Contract, the said Principal will, within the time required, enter into a Contract and give Bonds, if required, for the faithful performance of the Contract and the prompt payment for labor and materials in the prosecution thereof, then this obligation shall be null and void; otherwise the Principal and Surety will pay unto the OWNER the full penal sum hereof, as liquidated damages, it being difficult and impractical to determine accurately the actual amount of damages occurring to OWNER by reason of Principal's failure to execute said Contract and Bonds.

PROVIDED FURTHER, that if any legal action be filed on this Bond, venue shall lie in _____ County, Texas.

The Resident Agent of the Surety for delivery of notice and service of process is:
Name: _____
Address: _____
Phone Number: _____

WITNESS

_____

PRINCIPAL

_____
Printed/Typed Name_____
Title:_____
Company:_____
_____
Address:_____
_____

WITNESS

_____

SURETY

_____
Printed/Typed Name _____
Title: _____
Company: _____
_____
Address: _____
_____

NOTE: CERTIFIED COPY OF POWER-OF-ATTORNEY SHOULD BE ATTACHED HERETO.

Revised 11/2008

SECTION 00 43 25 - PRODUCT SUBSTITUTION REQUEST FORM

(Must be submitted a minimum of 10 days before the bid date)

Bidder: _____ Project No: **IFB 2021-351**

Project: **Construction, HVAC Replacement, 900 Park Blvd. Building**

Section: _____ Article/ Paragraph: _____

Proposed Substitution: _____

Manufacturer: _____ Address: _____

Telephone: _____ Proposed Model No.: _____

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its installation.

The undersigned warrants and represents:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by substitution.

Submitted By: _____ Signed:_____

Firm: _____ Address: _____

Phone: _____ _____

REVIEW & ACTION (Initial)

_____Substitution approved - Make submittals in accordance with Project Manual requirements.
_____Substitution approved as noted - Make submittals in accordance with Project Manual requirements.
_____Substitution rejected - Use specified materials.
_____Substitution Request received too late - Use specified materials.

Signature: _____ Date: _____

Supporting Data Attached: ____Drawings ____Product Data ____Samples ____Tests ____Reports ____Other

---

END OF REQUEST FORM

SECTION 004547-CONFLICT OF INTEREST
INFORMATION REGARDING
CONFLICT OF INTEREST QUESTIONNAIRE

During the 79th Legislative Session, House Bill 914 was signed into law effective September 1, 2015, which added Chapter 176 to the Texas Local Government Code. Recent changes have been made to Chapter 176 pursuant to HB23, which passed the 84th Legislative Session. Chapter 176 mandates the *public disclosure of certain information concerning persons doing business or seeking to do business with Collin County, including family, business, and financial relationships such persons may have with Collin County officers or employees involved in the planning, recommending, selecting and contracting of a vendor for this procurement.*

For a copy of Form CIQ and CIS:

http://www.ethics.state.tx.us/filinginfo/conflict_forms.htm

The vendor acknowledges by doing business or seeking to do business with Collin County that he/she has been notified of the requirements under Chapter 176 of the Texas Local Government Code and that he/she is solely responsible for complying with the terms and conditions therein. Furthermore, any individual or business entity seeking to do business with Collin County who does not comply with this practice may risk award consideration of any County contract.

For a listing of current Collin County Officers:
http://www.collincountytx.gov/government/Pages/officials.aspx

At the time of this solicitation being released, the following are known to be involved in the planning, recommending, selecting, and/or contracting for the attached procurement:

Department:
Bill Burke - Director of Building Projects
David Dooley - Building Projects Coordinator

Purchasing:
Michelle Charnoski, NIGP-CPP, CPPB – Purchasing Agent
Marci Chrismon – Assistant Purchasing Agent
J. D. Griffin, CPPB – Senior Buyer

Commissioners Court:
Chris Hill – County Judge
Susan Fletcher – Commissioner Precinct No. 1
Cheryl Williams – Commissioner Precinct No. 2
Darrell Hale – Commissioner Precinct No. 3
Duncan Webb – Commissioner Precinct No. 4

Advisors:
MD Engineering, L.P., L.L.P.
1255 W. 15th St., Ste. 300
Plano, TX 75075

CONFLICT OF INTEREST QUESTIONNAIRE

FORM CIQ

For vendor doing business with local governmental entity

This questionnaire reflects changes made to the law by H.B. 23, 84th Leg., Regular Session.

This questionnaire is being filed in accordance with Chapter 176, Local Government Code, by a vendor who has a business relationship as defined by Section 176.001(1-a) with a local governmental entity and the vendor meets requirements under Section 176.006(a).

By law this questionnaire must be filed with the records administrator of the local governmental entity not later than the 7th business day after the date the vendor becomes aware of facts that require the statement to be filed. *See* Section 176.006(a-1), Local Government Code.

A vendor commits an offense if the vendor knowingly violates Section 176.006, Local Government Code. An offense under this section is a misdemeanor.

OFFICE USE ONLY

Date Received

1 **Name of vendor who has a business relationship with local governmental entity.**

2 ☐ **Check this box if you are filing an update to a previously filed questionnaire.** (The law requires that you file an updated completed questionnaire with the appropriate filing authority not later than the 7th business day after the date on which you became aware that the originally filed questionnaire was incomplete or inaccurate.)

3 **Name of local government officer about whom the information is being disclosed.**

_____

Name of Officer

4 **Describe each employment or other business relationship with the local government officer, or a family member of the officer, as described by Section 176.003(a)(2)(A). Also describe any family relationship with the local government officer. Complete subparts A and B for each employment or business relationship described. Attach additional pages to this Form CIQ as necessary.**

A. Is the local government officer or a family member of the officer receiving or likely to receive taxable income, other than investment income, from the vendor?

☐ Yes ☐ No

B. Is the vendor receiving or likely to receive taxable income, other than investment income, from or at the direction of the local government officer or a family member of the officer AND the taxable income is not received from the local governmental entity?

☐ Yes ☐ No

5 **Describe each employment or business relationship that the vendor named in Section 1 maintains with a corporation or other business entity with respect to which the local government officer serves as an officer or director, or holds an ownership interest of one percent or more.**

6 ☐ Check this box if the vendor has given the local government officer or a family member of the officer one or more gifts as described in Section 176.003(a)(2)(B), excluding gifts described in Section 176.003(a-1).

7

_____ _____

Signature of vendor doing business with the governmental entity Date

CONFLICT OF INTEREST QUESTIONNAIRE
For vendor doing business with local governmental entity

A complete copy of Chapter 176 of the Local Government Code may be found at http://www.statutes.legis.state.tx.us/Docs/LG/htm/LG.176.htm. For easy reference, below are some of the sections cited on this form.

Local Government Code § 176.001(1-a): "Business relationship" means a connection between two or more parties based on commercial activity of one of the parties. The term does not include a connection based on:

(A) a transaction that is subject to rate or fee regulation by a federal, state, or local governmental entity or an agency of a federal, state, or local governmental entity;

(B) a transaction conducted at a price and subject to terms available to the public; or

(C) a purchase or lease of goods or services from a person that is chartered by a state or federal agency and that is subject to regular examination by, and reporting to, that agency.

Local Government Code § 176.003(a)(2)(A) and (B):

(a) A local government officer shall file a conflicts disclosure statement with respect to a vendor if:

***

(2) the vendor:

(A) has an employment or other business relationship with the local government officer or a family member of the officer that results in the officer or family member receiving taxable income, other than investment income, that exceeds $2,500 during the 12-month period preceding the date that the officer becomes aware that

(i) a contract between the local governmental entity and vendor has been executed; or

(ii) the local governmental entity is considering entering into a contract with the vendor;

(B) has given to the local government officer or a family member of the officer one or more gifts that have an aggregate value of more than $100 in the 12-month period preceding the date the officer becomes aware that:

(i) a contract between the local governmental entity and vendor has been executed; or

(ii) the local governmental entity is considering entering into a contract with the vendor.

Local Government Code § 176.006(a) and (a-1)

(a) A vendor shall file a completed conflict of interest questionnaire if the vendor has a business relationship with a local governmental entity and:

(1) has an employment or other business relationship with a local government officer of that local governmental entity, or a family member of the officer, described by Section 176.003(a)(2)(A);

(2) has given a local government officer of that local governmental entity, or a family member of the officer, one or more gifts with the aggregate value specified by Section 176.003(a)(2)(B), excluding any gift described by Section 176.003(a-1); or

(3) has a family relationship with a local government officer of that local governmental entity.

(a-1) The completed conflict of interest questionnaire must be filed with the appropriate records administrator not later than the seventh business day after the later of:

(1) the date that the vendor:

(A) begins discussions or negotiations to enter into a contract with the local governmental entity; or

(B) submits to the local governmental entity an application, response to a request for proposals or bids, correspondence, or another writing related to a potential contract with the local governmental entity; or

(2) the date the vendor becomes aware:

(A) of an employment or other business relationship with a local government officer, or a family member of the officer, described by Subsection (a);

(B) that the vendor has given one or more gifts described by Subsection (a); or

(C) of a family relationship with a local government officer.

005213 CONSTRUCTION AGREEMENT

THIS CONSTRUCTION AGREEMENT is made and entered into by and between _____, a _____ corporation (hereinafter referred to as "Contractor"), and COLLIN COUNTY, TEXAS, a political subdivision of the State of Texas (hereinafter referred to as "County" or "OWNER"), to be effective from and after the date hereinafter provided.

For and in consideration of the covenants and agreements contained herein, and for the mutual benefits to be obtained hereby, the parties hereto agree as follows:

CONTRACT SUM

The County shall pay the Contractor in current funds for the performance of the work, subject to additions and deductions by Change orders as provided in the Contract Documents. The contract sum shall be the amount of _____ ($_____) .

EFFECTIVE DATE

This Construction Agreement, having been previously approved by the Commissioners Court of Collin County, Texas, shall be effective upon the date of delivery and execution by Contractor, provided the County executes the same within five (5) consecutive calendar days after said delivery and execution by Contractor.

I. CONTRACT GENERAL PROVISIONS

1.1 DEFINITIONS

Words which have well-known technical or construction industry meanings shall have their commonly understood meanings in the Contract Documents, unless a different meaning is stated in the Contract Documents. The following words and expressions, or pronouns used in their place, shall wherever they appear in this contract be construed as follows, unless a different meaning is clear from the context:

Addendum, Bulletin or Letter of Clarification: Any additional contract provisions, or change, revisions or clarification of the Contract Documents issued in writing by the OWNER, to prospective bidders prior to the receipt of bids.

Contract or Contract Documents: The written agreement covering the performance of the work. The Contract and Contract Documents include this written Construction Agreement between OWNER and CONTRACTOR, Advertisement for Bids, Instructions to Bidders, Requests for Proposal, all Addenda, the Specifications, including the general and supplemental special and technical conditions, Drawings, provisions, plans or working drawings — and any supplemental changes or agreements pertaining to the Work or materials therefor; and bonds and any additional documents incorporated by reference in the above.

CONTRACTOR: The person, persons, partnership, firm, corporation, association or organization, or any combination thereof, entering into the contract for the execution of the work, acting directly or through a duly authorized representative.

Other CONTRACTORS: Any contractor, other than the CONTRACTOR or his subcontractors, who has a direct contact with the OWNER for work on or adjacent to the site of the work.

Contract Work or Work: Everything expressly or impliedly required to be furnished and done by the CONTRACTOR by the Contract Documents.

Engineer: The term "Engineer" means the Engineer or his duly authorized representative. The Engineer shall be understood to be the Engineer of the OWNER, and nothing contained in the Contract Documents shall create any contractual or agency relationship between the Engineer and the CONTRACTOR.

Extra Work: Work other than that which is expressly or impliedly required by the Contract Documents at the time of the execution of the contract.

Change Order: A written order to the CONTRACTOR authorizing and directing an addition, deletion or revision in the work within the general scope of the Contract Documents, or authorizing an adjustment in the Contract Price or the Contract time.

Contract Price: The total amount of money payable to the CONTRACTOR under the terms and conditions of the Contract Documents. When used in such context, it may also mean the unit price of an item of work under the Contract terms.

OWNER'S Representative: The Engineer or other duly authorized assistant, agent, engineer, inspector or superintendent acting within the scope of their particular duties.

Drawings or Contract Drawings: Those drawings that are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, including but not limited to, the plans, elevations, sections, details, schedules, diagrams, any bulletin, or any detailed drawing furnished by the OWNER, pertaining or supplemental thereto.

Specifications: Those portions of the Contract Documents that specify the requirements for materials, equipment, systems, standards and workmanship for performance of the Work, and related services.

Inspector: Any representative of the OWNER designated to inspect the work.

Materialman or Supplier: Any subcontractor contracting with the CONTRACTOR, or any of his subcontractors, to fabricate or deliver or who actually

fabricates or delivers materials, supplies or equipment to be consumed or incorporated into the Work.

Notice: Written notice effective the date of the postmark thereon, or if hand delivered, effective the date of hand delivery.

OWNER: COLLIN COUNTY, TEXAS, a political subdivision of the State of Texas. The term OWNER means the OWNER or its authorized representative.

Payment Bond: A bond in the amount of the Contract executed by a corporate surety in accordance with all Texas Law, including but not limited to, Chapter 2253 of the Texas Government Code and Chapter 3503 of the Texas Insurance Code, for public works projects as security furnished by the CONTRACTOR and his sureties soley for the protection of payment bond beneficiaries supplying labor and materials in the prosecution of the Contract Work.

Performance Bond: A bond in the amount of the Contract executed by a corporate surety in accordance with all Texas Law, including but not limited to, Chapter 2253 of the Texas Government Code and Chapter 3503 of the Texas Insurance Code, for public works projects as security furnished by the CONTRACTOR and his sureties soley for the protection of the Owner, conditioned on the faithful performance of the Contract Work in accordance with the plans, specification, and Contract Documents.

Maintenance Bond: A bond executed by a corporate surety for 10% of the Contract Price that complies with all Texas Laws, including but not limited to, Chapter 3503 of the Texas Insurance Code, guaranteeing the prompt, full and faithful performance of the general guaranty and warranty contained in the Contract Documents, and Texas Law.

Project: The total construction of the work described in the Contract Documents performed by the Contractor, Other Contractor or the Owner in whole or part.

Proposal: The written statement or statements duly submitted to the OWNER by the person, persons, partnership, company, firm, association or corporation proposing to do the Work contemplated, including the approved form on which the formal bids for the Work are to be proposed.

Plan, or Plans: The plans are the drawings or reproductions therefrom made by the Owner or Owner's Representative and approved by the Owner showing the dimensions, location, design and position of the various elements of the Project and Work, including plans, elevations, sections, details, schedules, diagrams, working drawings, preliminary drawings, and such supplemental drawings as the Owner may issue to clarify other drawings or for the purpose of showing changes in the Contract Work authorized by the Owner, or for showing details not shown therein.

Special Provisions or Conditions: The special clauses of the Contract, or Contract Documents, setting forth conditions or requirements peculiar to the specific Project involved, supplementing the standard or general specifications and taking precedence over any conditions or requirements of the standard or general specifications with which they are in conflict.

Specifications or Contract Specifications: All of the general, special and technical conditions or provisions, and all addendum or supplements thereto consiting of written requirements for materials, equipment, systems, standards and performance of the work.

Site: The area upon or in which the CONTRACTOR'S operations are carried on, and such other areas adjacent thereto as may be designated as such by the OWNER.

Subcontractors: Any persons, firm or corporation, other than employees of the CONTRACTOR, who or which contracts with the CONTRACTOR to furnish, or who actually furnishes, labor and/or materials and equipment at or about the site.

Sureties: The corporate bodies which are bound by such bonds as are required with and for the CONTRACTOR. The sureties engaged to be responsible for the entire and satisfactory fulfillment of the Contract and for any and all requirements as set out in the specifications, Contract or plans.

The Work: All work including the furnishing of all labor, materials, tools, equipment, required submittals and incidentals to be performed by the CONTRACTOR under the terms of the Contract.

Directed, Required, Approved and Words of Like Import: Whenever they apply to the Work or its performance, the words "directed," "required," "permitted," "ordered," "designated," "established," "prescribed" and words of like import used in the Contract, specifications or upon the drawings shall imply the direction, requirement, permission, order, designation or prescription of the OWNER; and "approved," "acceptable," "satisfactory" and words of like import shall mean approved by, acceptable to or satisfactory to the OWNER.

Equal: Materials, articles or methods which are of equal or higher quality than those specified or shown on the drawings and as further defined in the "or equal" clause. Substitution of Materials shall be determined by the Engineer at his or her discretion, and approved by the Owner.

Working Time, Completion Time or Contract Time: The time set forth in the Contract for the performance and completion of the Work contracted for. The time may be expressed as calendar days, working days or a specific date.

Calendar Day or Days: Any successive days of the week or month, no days being excepted.

Working Day: A working day is defined as a calendar day not including Saturdays, Sundays or those legal holidays as specified in the list prepared by the OWNER for contract purposes. Nothing in this definition shall be construed as prohibiting the CONTRACTOR from working on Saturdays if he so desires, however permission of the OWNER shall be necessary if the CONTRACTOR chooses to work on Saturday. Work on Sundays shall not be permitted without the written permission of the OWNER. If Saturday or Sunday work is permitted, working time shall be charged on the same basis as week days. Where the working time is expressed as calendar days or a specific date, the concept of working days shall no longer be relevant to the contract.

CONTRACT DOCUMENTS

1.2 The parties agree that the Contract Documents shall consist of the following documents in addition to any other documents referenced or incorporated herein:

A. This written Construction Agreement, including any changes or modifications;

B. All addenda including the following listed and numbered addenda:
Addendum No. 1 dated _____ Received _____
Addendum No. 2 dated _____ Received _____

C. Advertisement for Bids, Instructions to Bidder, the Invitation to Bid and Bid Form;

D. The Special/Supplemental Conditions;

E. The Specifications and the Project Drawings (if any);

F. The Construction Details shown on plans;

G. The Standard Specifications and Standard Drawings from the Public Works Construction Standards-North Central Texas Council of Governments, 2004 edition and all subsequent addendums;

H. The Performance Bond in the sum of ONE HUNDRED PERCENT (100%) of the total Contract Price;

I. The Payment Bond in the sum of ONE HUNDRED PERCENT (100%) of the total Contract Price; and,

J. The One-Year Maintenance Bond in the sum of TEN PERCENT (10%) of the total Contract Price.

1.2.1 PRIORITY OF THE CONTRACT DOCUMENTS

These Contract Documents (A through J above) form the Construction Agreement and are a part of this Construction Agreement as if fully set forth herein. In the event of an inconsistency in any of the provisions of the Contract Documents, the inconsistency shall be resolved by giving precedence to the Contract Documents in the order in which they are listed above.

1.2.2 THE CONTRACT

The Contract Documents form the Contract. The Contract represents the entire integrated agreement between the OWNER and the CONTRACTOR and supercedes all prior negotiations, and representations by either party.

1.3 CORRELATION AND INTENT OF DOCUMENTS

The Contract Documents are complementary and what is called for by any one shall be as binding as if called for by all. The intent of the documents, unless otherwise specifically provided, is to produce complete and finished work, which the CONTRACTOR undertakes to do in full compliance with the Contract Documents. It is not intended to mention every item of work in the specifications which can be adequately shown on the drawings nor to show on the drawings all items of work described or required by the specifications. All materials or labor for work shown on the drawings or reasonably inferable therefrom as being necessary to produce a finished job shall be provided by the CONTRACTOR whether or not same is expressly covered in the specifications. No verbal conversation, understanding or agreement with any officer or employee or agent of the OWNER, either before or after the execution of the Contract, shall affect or modify any of the terms, conditions or obligations contained in the Contract Documents.

1.3.1 CONTRACT DRAWINGS AND SPECIFICATIONS

The OWNER shall furnish the CONTRACTOR one copy of the Contract Drawings and any supplemental drawings and specifications reasonably necessary for the proper execution of the work. At least one copy of all drawings and specifications shall be accessible at all times to the OWNER at the job site.

1.3.2 SUPPLEMENTAL DRAWINGS AND SPECIFICATIONS

In order to carry out the intent of the Contract Documents and to assist the CONTRACTOR in performing its work, the OWNER, after the execution of the Contract, may, by supplemental drawings, specifications or otherwise, furnish additional information or instructions as may be necessary for construction purposes.

All such supplemental drawings, specifications or instructions are intended to be consistent with the Contract Documents and reasonably inferable therefrom. Therefore, no extra costs shall be allowed by the OWNER on a claim that particular supplemental drawings, specifications or instructions differ from the requirements of the Contract Documents, incurring extra costs, unless the CONTRACTOR has first brought the matter, in writing, to the OWNER'S attention for adjustment before proceeding with the work covered by such.

If the OWNER decides that there is no departure from the requirements of the Contract Documents, the CONTRACTOR shall then proceed with the work as shown, specified or directed. If the OWNER shall decide that Extra Work is involved, he shall so modify the supplemental drawings, specifications or instructions to eliminate the Extra Work, or cause a written Change Order to be issued in accordance with the Contract Documents.

1.3.3 ERRORS AND CORRECTIONS IN DRAWINGS AND SPECIFICATIONS

The CONTRACTOR shall not take advantage of any apparent errors, omissions or discrepancies in the drawings or specifications; and the Engineer shall be permitted to make such corrections or interpretations as may be necessary for the fulfillment of the intent of the Contract Documents. In case of any errors, omissions or discrepancies in the drawings or specifications, the CONTRACTOR shall promptly submit the matter to the OWNER or OWNER'S Representative in writting who, in turn, shall promptly make a determination and issue the necessary instructions in writing. Any adjustment by the CONTRACTOR without this determination and instructions shall be at the CONTRACTOR'S own risk and expense. The Work is to be made complete as intended by the Contract Documents.

1.3.4 EXISTING STRUCTURES

The plans show the general locations of some known surface and subsurface structures. The locations of many gas mains, water mains, conduits, sewers, other utilities, etc., however, are unknown, and the OWNER assumes no responsibility for failure to show any or all of these structures on the plans or to show them in their exact locations. It is mutually agreed that such failure shall not be considered sufficient basis for claims for additional compensation for Extra Work or for increasing the pay quantities in any manner whatsoever. The CONTRACTOR shall be soley responsible for locating all gas mains, water mains, conduits, sewers, other utilities etc., so as to perform the Work without damaging the same.

II. THE WORK

2.1 SCOPE OF WORK

Contractor shall provide all labor, supervision, materials, and equipment necessary to perform all work required by the Contract Documents in connection with **IFB 2021-351, Construction, HVAC Replacement, 900 Park Blvd. Building.**

2.2 CHANGE OR MODIFICATION OF CONTRACT

2.2.1 ALTERATION OF PLANS AND SPECIFICATIONS

The OWNER reserves the right to make such changes in the plans and specifications and in the character of the work as may be necessary or desirable to insure completion in the most satisfactory manner, provided such changes do not materially alter the original plans and specifications or change the general nature of the Work as a whole. Such changes shall not be considered as waiving or invalidating any condition or provision of the Contract or bonds. Such changes shall be issued by the Engineer.

2.2.2 INCREASED OR DECREASED QUANTITIES OF WORK

The OWNER reserves the right and may from time to time, by written order, and without notice to any surety, make changes in the quantity or time of performance of the Work, as may be considered necessary or desirable and such changes shall not be considered as waiving or invalidating any conditions or provisions of the Contract or bonds. The CONTRACTOR shall perform all the Contract Work in strict compliance with the Contract Documents, and shall not make any changes to the Work without prior written authorization from the OWNER, in the form of a written Change Order. If such changes increase or decrease either the cost or the time necessary for the performance of the Work, then the parties will mutually agree upon an equitable adjustment to the price or time to perform the Work pursuant to the terms of the Contract.

2.2.3 EXTRA WORK/CHANGE ORDERS

When any work is necessary to the proper completion of the Project and for which no prices are provided for in the Bid or Proposal and Contract, the CONTRACTOR shall do such work, but only when and as ordered in writing by the OWNER. The OWNER may order changes in the Work without invalidating Contract. Payment for Extra Work shall be made as provided herein. Contractor agrees that overhead and profit for Extra Work shall not exceed 10% of the total cost of the Extra Work. The Contractor shall not be entitled to any additional funds for any work or Extra Work performed on the Project, unless a Change Order is issued and signed by the Owner. The CONTRACTOR shall perform the work as altered, whether increased or decreased, and no allowances shall be made for anticipated profits. Nothing in this section shall give rise to any claims for any delay or acceleration damages, and the CONTRACTORS sole remedy for any delays in the Project shall remain an equitiable extention of time as provided for in the Contract Documents. CONTRACTOR acknowledges and agrees to waive all rights or claims for compensation for any additional or other work not specifically authorized by the OWNER.

2.3 DISPUTED WORK AND CLAIMS FOR ADDITIONAL COMPENSATION

If the CONTRACTOR is of the opinion that (a) the work necessary or required to accomplish the result intended by this Contract, or (b) any work ordered to be done as Contract Work by the OWNER is Extra Work and not Contract Work, or (c) any determination or order of the OWNER violates the terms and provisions of this Contract, the CONTRACTOR shall promptly, either before proceeding with such work or complying with such order or determination, notify the OWNER in writing of his contentions with respect thereto and request a final determination thereof.

Such determination of the OWNER shall be given in writing to the CONTRACTOR. If the OWNER determines that the work in question is Extra Work and not Contract Work, or that the order complained of requires performance by the CONTRACTOR beyond that required by the Contract or violates the terms and provisions of the Contract, thereupon the OWNER shall cause either (a) the issuance of a written Change Order covering the Extra Work as provided herein, or (b) the determination or order complained of to be rescinded or so modified so as to not require performance beyond that required by the terms and provisions of the Contract.

If the OWNER determines that the work in question is Contract Work and not Extra Work, or that the determination or order complained of does not require performance by the CONTRACTOR beyond that required by the Contract or violate the terms and provisions of the Contract, he shall direct the CONTRACTOR to proceed, and the CONTRACTOR must promptly comply. In order to reserve his right to claim compensation for such work resulting from such compliance, however, the CONTRACTOR must, within 20 calendar days after receiving the OWNER'S determination and direction, notify the OWNER in writing that the work is being performed, or that the determination and direction is being complied with, under protest.

If the CONTRACTOR fails to so appeal to the OWNER for a determination or, having so appealed, should the CONTRACTOR thus fail to notify the OWNER in writing of his protest, the CONTRACTOR shall be deemed to have waived any claim for extra compensation or damages therefore. No oral appeals or oral protests, no matter to whom made, shall be deemed even substantial compliance with the provisions of this item.

In addition to the foregoing requirements, the CONTRACTOR shall, upon notice from the OWNER, produce for examination for a minimum period of three (3) years following final payment or termination of contract and audit at the CONTRACTOR'S office, by the representatives of the OWNER, all his books and records showing all of his acts and transactions in connection with contractual performance as well as relating to or arising by reason of the matter in dispute. At

such examination a duly authorized representative of the CONTRACTOR may be present.

Unless the aforesaid requirements and conditions are complied with by the CONTRACTOR, the OWNER shall be released from all claims arising under, relating to or by reason of disputed work or Extra Work. It is further stipulated and agreed that no conduct on the part of the OWNER or any agent or employee of the OWNER shall ever be construed as a waiver of the requirements of this section, when such requirements constitute an absolute condition precedent to any approval of any claim for extra compensation, notwithstanding any other provisions of the Contract Documents; and in any action against the OWNER to recover any sum in excess of the contract amount, the CONTRACTOR must allege and prove strict compliance with the provisions of this section. The CONTRACTOR ASSUMES THE RISK OF NONPAYMENT, for failing to comply with any of the requirements of this section.

III. CONTRACTORS RESPONSIBILITIES

3.1 CONTRACTOR'S REPRESENTATIONS, WARRANTIES AND ASSURANCES.

In consideration of, and to induce the award of this contract to him, the CONTRACTOR represents and warrants: (a) That he is financially solvent, and sufficiently experienced and competent to perform the work; (b) That the facts stated in the proposal and the information given by him pursuant to the bidding documents are true and correct in all respects; (c) That he has read, understood and complied with all the requirements set forth in the bidding documents; (d) That he is familiar with and understands all laws and regulations applicable to the work; and (e) unless otherwise specifically provided for in the Contract Documents, the CONTRACTOR shall do all the Work and shall furnish all the tools, equipment, machinery, materials, labor and appliances, except as herein otherwise specified, necessary or proper for performing and completing the work required by this Contract, in the manner and within the time herein prescribed.

By executing the contract, the CONTRACTOR represents that he has visited the site of Work, has fully familiarized himself with the local and on-site conditions under which the work is to be performed and has correlated his observation with the requirements of the Contract Documents. In addition, the CONTRACTOR represents that he has satisfied himself as to subsurface conditions at the site of the Work. Information, data and representations contained in the Contract Documents pertaining to the conditions at the site, including subsurface conditions, are for information only and are not warranted or represented in any manner to accurately show the conditions at the site of the Work. The CONTRACTOR agrees that he shall make no claims for damages, additional compensation or extension of time against the OWNER because of encountering actual conditions in the course of the Work which vary or differ from conditions

or information contained in the Contract Documents. All risks of differing subsurface conditions shall be borne solely by the CONTRACTOR.

The CONTRACTOR shall carefully study and compare the Contract Documents and shall at once report to the OWNER any error, inconsistency or omission he may discover. The CONTRACTOR shall perform no portion of the Work at any time without Contract Documents or, where required, approved shop drawings, product data or samples for such portion of the work.

3.1.1 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

A. Shop drawings are drawings, diagrams, schedules and other data specially prepared for the work by the CONTRACTOR or any subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

B. Product data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the CONTRACTOR to illustrate a material, product or system for some portion of the work.

C. Samples are physical examples which illustrate materials, equipment or workmanship and establish standards by which the work shall be judged.

D. the CONTRACTOR shall provide, review, approve and submit to the Engineer with reasonable promptness and in such sequence as to cause no delay in the Work or in the work of the OWNER or any separate contractor, all shop drawings, product data and samples required by the Contract Documents. The Work will be performed in accordance with submittals approved by the Engineer. The CONTRACTOR shall not be relieved responsibility for deviations from the requirements of the Contract Documents by errors or ommisions by the OWNER or Engineer in approving Shop Drawings, Product Data, samples or any other submittals.

E. By approving and submitting shop drawings, product data and samples, the CONTRACTOR represents that he has determined and verified all materials, field measurements, and field construction criteria related thereto, or shall do so, and that he has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

F. As the Engineer's review is only for general conformance with the requirements of the Contract Documents, the CONTRACTOR shall not be relieved of responsibility for any deviation from the requirements of the Contract Documents by the Engineer's approval of shop drawings, product

data or samples unless the CONTRACTOR has specifically informed the Engineer in writing of such deviation at the time of submission and the Engineer have given written approval to the specific deviation. The CONTRACTOR shall not be relieved from responsibility for errors or omissions in the shop drawings, product data or samples by the Engineer's approval thereof. The CONTRACTOR shall direct specific attention, in writing or on resubmitted shop drawings, product data or samples, to revisions other than those requested by the Engineer on previous submittals.

G. the CONTRACTOR shall be responsible for delays caused by rejection of the submittal of inadequate or incorrect shop drawings, product data or samples. The CONTRACTOR shall be responsible for seeing that any "approved" copies of shop drawings bearing the approval of the Engineer are allowed on the job site. The CONTRACTOR shall be responsible for providing all copies of approved shop drawings necessary for the construction operations.

H. the CONTRACTOR shall keep adequate records of submittal and approvals so that an accurate up-to-date record file is maintained at the job site at all times.

I. No portion of the work requiring submission of a shop drawing, product data or sample shall be commenced until the submittal has been approved by the Engineer. All such portions of the work shall be in accordance with approved submittals.

3.1.2 SURETY BONDS

With the execution and delivery of the contract, the CONTRACTOR shall furnish and file with the OWNER in the amounts herein required, the surety bonds specified hereunder. Without exception, the OWNER'S bond forms, attached hereto as Section 00610 and 00611 must be used, and exclusive venue for any lawsuit in connection with such bonds shall be specified as the county in which the OWNER'S principal office is located. Such surety bonds shall be in accordance with Texas Law, including but not limited to, the provisions of Chapter 2253 of the Texas Government Code and Chapter 3503 of the Texas Insurance Code. These bonds shall automatically be increased by the amount of any change order or supplemental agreement which increases the contract price with or without notice to the surety, but in no event shall a change which reduces the contract amount reduce the penal amount of such bonds.

A. Performance Bond. A good and sufficient bond in an amount not less than 100 percent (100%) of the total amount of the Contract Price guaranteeing the full and faithful execution of the Work and performance

of the Contract in accordance with the plans, specifications and Contract Documents, including any extensions thereof, for the protection of the OWNER. This bond shall provide for the repair and/or replacement of all defects due to faulty materials and workmanship that appear within a period of one year from the date of completion and acceptance of the improvement by the OWNER or such lesser or greater period as may be designated in the Contract Documents.

B. Payment Bond. A good and sufficient bond in an amount not less than 100 percent (100%) of the total amount of the Contract Price guaranteeing the full and proper protection of all payment bond beneficiaries and claimants supplying labor and material in the prosecution of the work provided for in said Contract and for the use of each claimant.

C. Maintenance Bond. A good and sufficient bond in an amount not less than ten percent (10%) of the total amount of the Contract Price guaranteeing the project against defects.

D. Sureties. No sureties shall be accepted by the OWNER who are now in default or delinquent on any bonds or who are interested in any litigation against the OWNER. All bonds shall be made on forms furnished by the OWNER and shall be executed by not less than one corporate surety authorized to do business in the State of Texas and acceptable to the OWNER. The sureties shall be listed in the most current Federal Register Treasury List. Each bond shall be executed by the CONTRACTOR and surety. Each surety shall designate an agent resident in the OWNER'S jurisdictional area acceptable to the OWNER to whom any requisite notices may be delivered and on whom service of process may be had in matters arising out of such suretyship. The OWNER reserves the right to reject any and all sureties.

E. Additional or Substitute Bonds. If at any time the OWNER is or becomes dissatisfied with any surety, then upon the performance or payment bond, the CONTRACTOR shall, within five days after notice from the OWNER to do so, substitute an acceptable bond (or bonds), or provide an additional bond, in such form and sum and signed by such other surety or sureties as may be satisfactory to the OWNER. The premiums on such bonds shall be paid by the CONTRACTOR without recourse to the OWNER. No further payments under the contract shall be deemed due or payable until the substitute or additional bonds shall have been furnished and accepted by the OWNER.

3.1.3 PERMITS AND FEES

The CONTRACTOR shall secure and pay for all building permits and other permits and governmental fees, licenses and inspections necessary

for proper execution and completion of the Work which are normally and legally required for the construction of similar projects in the State of Texas. The CONTRACTOR will give all notices required by laws, ordinances, rules, regulations and lawful orders of authorized public authorities required for the proper and legal performance of the Work.

3.14 CONTRACT DOCUMENTS AT SITE

The CONTRACTOR shall keep and maintain at the Project site one record copy of the Contract Documents, including but not limited to, the Drawings, Specifications, addenda, Change Orders, submittals, Product Data, Samples and other modifications, in good order and marked to show the current construction of the Project. These documents shall be available to the OWNER or Engineer to review at any time and shall be submitted to the OWNER upon completion of the Project, along with a complete set of as built drawings.

3.2 CONTRACTOR'S RESPONSIBILITIES

3.2.1 PERFORMANCE OF THE WORK

In addition to those matters elsewhere expressly made the responsibility of the CONTRACTOR, the CONTRACTOR shall have the full and direct responsibility for the performance and completion of the Work under this Contract and for any act or neglect of the CONTRACTOR, his agents, employees or subcontractors. He shall bear all losses, if any, resulting on account of the amount and character of the Work, or because the conditions under which the work must be done are different from what were estimated or anticipated by him, or because of weather, floods, elements or other causes.

3.2.2 MEANS AND METHODS OF CONSTRUCTION

Unless otherwise expressly provided in the contract drawings, specifications or bulletins, the means and methods of construction shall be such as the CONTRACTOR may choose; subject, however, to the OWNER'S right to prohibit means and methods proposed by the CONTRACTOR which in the OWNER'S judgment:

A. shall constitute a hazard to the Work, or to persons or property, or shall violate express requirements of applicable laws or ordinances; or

B. shall cause unnecessary or unreasonable inconvenience to the public; or

C. shall not produce finished work in accordance with the requirements of the Contract Documents; or

D. shall not assure the Work to be completed within the time allowed by the contract.

The OWNER'S approval of the CONTRACTOR'S means or methods of construction, or the OWNER'S failure to exercise his right to prohibit such means or methods, shall not relieve the CONTRACTOR of his responsibility for the Work or of his obligation to accomplish the result intended by the Contract Documents; nor shall the exercise or non-exercise of such rights to prohibit create a cause of action for damages or provide a basis for any claim by the CONTRACTOR against the OWNER. The CONTRACTOR shall be soley responsible for, the construction means and methods, techniques, sequences, procedures, and for the safety precautions and programs in conection with the Work or the Project.

If the Contract Documents specify any means, methods, techniques, sequences or procedures, the CONTRACTOR shall evaluate said specifications and determine that they are safe for the proper prosecution of the Work. The CONTRACTOR shall be soley responsible for the job site safety of such means, methods, techniques, sequences or procedures. If the CONTRACTOR determines the the specified means, methods, techniques, sequences or procedures may not be safe, the CONTRACTOR shall immediately notify the OWNER and Engineer and shall not proceed without further instructions.

3.2.3 CONSTRUCTION SCHEDULE

The CONTRACTOR, immediately after being awarded the contract, shall prepare and submit for the OWNER, and Engineer's information an estimated progress schedule for the work. The progress schedule shall be related to the entire Project to the extent required by the Contract Documents and shall provide for expeditious and reasonable execution of the work, not to exceed the time limits for completion provided in the Contract Documents. The progress schedule shall be updated as the Work proceeds or the schedule changes and immediately upon request by the OWNER. The CONTRACTOR shall also prepare a schedule of submittals that allows for a reasonable time for the OWNER or Engineer to review the submittals so as not to delay the Project.

3.2.4 TIME OF PERFORMANCE OF THE WORK

The CONTRACTOR shall begin the work to be performed under this Contract not later than 10 days from the date specified in the purchase or work order and shall conduct the work in such a manner and with sufficient equipment, material and labor as is necessary to insure its completion within the working time. It is the intent of this specification to

provide a continuous construction operation without delay except as occasioned by unforeseeable causes beyond the control and without the fault or negligence of the CONTRACTOR, and it shall be the CONTRACTOR's responsibility to execute the work in the most expeditious manner.

Work shall be done only during the regular and commonly accepted and prescribed working hours. No work shall be done on nights, Sundays or regular holidays unless permission is given by the OWNER

Time is of the Essence for the performance of the Work by the CONTRACTOR. CONTRACTOR agrees that the time allotted for the performance of the Work is reasonable.

3.2.5 PERFORMANCE OF EXTRA OR DISPUTED WORK

While the CONTRACTOR or his subcontractor is performing Extra Work in accordance with the OWNER'S written order, the cost of which is to be determined on a time and material basis, or is performing disputed work or complying with a determination or order under protest, the CONTRACTOR shall, on the Monday following the performance of the work, furnish the OWNER'S representative at the site with three copies of verified statements showing:

A. the name, address and telephone number of each workman employed on such Extra Work or engaged in complying with such determination or order, the character of Extra Work each is doing and the wages paid to him, including the rate and amount of payroll taxes, contributions for insurance, and federal social security; and

B. the nature, cost and quantity of any materials, plant equipment or construction equipment furnished or used in connection with the performance of such Extra Work or in complying with such determination or order, and from whom purchased or rented, along with copies of invoices for such materials, plant equipment or construction equipment.

The CONTRACTOR and his subcontractors, when required by the OWNER, must also produce for inspection for a minimum period of three (3) years following final payment or termination of contract, produce for examination and audit by designated OWNER representatives, any and all of his books, vouchers, records, daily job diaries and reports, canceled checks, etc. showing the nature and quantity of labor, materials and equipment actually used in the performance of the Extra Work; the amounts expended therefore; and the costs incurred for insurance premiums and other items of expense directly chargeable to such Extra

Work. The CONTRACTOR must permit the OWNER'S representatives to make extracts therefrom or copies thereof as may be desired.

Failure of the CONTRACTOR to comply strictly with the requirements of this section shall constitute a waiver of any claim for extra compensation on account of the performance of such Extra Work.

3.3 QUALITY OF WORK

3.3.1 INSPECTION AND TESTS

The CONTRACTOR shall furnish the OWNER with every reasonable accommodation and opportunity to ascertain whether or not the work performed is in accordance with the requirements and intent of the plans and specifications. Any work done or materials used without suitable inspection by the OWNER may be ordered removed and replaced at the CONTRACTOR'S expense. The CONTRACTOR shall not be relieved from his obligations to perform the Work in accordance with the Contract Documents either by the activities or duties of the OWNER in his administration of the contract, or by inspections, tests or approvals required or performed by persons other than the CONTRACTOR.

Unless otherwise provided, the CONTRACTOR shall make arrangements for all tests, inspections and approvals with an independent testing laboratory or entity required by the Contract Documents or by laws, ordinances, rules, regulations or orders of public authorities having jurisdiction over the Work or items to be tested, inspected or approved. If additional testing or inspection is required they shall be performed at the CONTRACTOR'S expense.

3.3.2 REMOVAL OF DEFECTIVE AND UNAUTHORIZED WORK

All work which has been rejected or condemned shall be repaired, or if it cannot be repaired satisfactorily, it shall be removed and replaced at the CONTRACTOR'S expense. Defective materials shall be immediately removed from the site of the work. Work done without line and grade having been given, work done beyond the lines or not in conformity with the grades shown on the plans or as given, save as herein provided, work done without written authority and prior agreement in writing as to process, shall be done at the CONTRACTOR'S risk and shall be considered unauthorized and at the option of the OWNER may be ordered removed at the CONTRACTOR'S expense.

Upon failure of the CONTRACTOR to repair satisfactorily or to remove and replace, if so directed, rejected, unauthorized or condemned work or materials immediately after receiving notice form the OWNER, the

OWNER shall, after giving written notice to the CONTRACTOR, have the authority to cause defective work to be remedied or removed and replaced, or to cause unauthorized work to be removed and to deduct the cost thereof from any monies due or to become due the CONTRACTOR. Alternatively, the OWNER may, at its option, declare the CONTRACTOR in default.

3.3.3 WORKING AREA; COORDINATION WITH OTHER CONTRACTORS; FINAL CLEANUP

The CONTRACTOR shall confine his equipment, storage of materials and construction operations to the area shown on the contract drawings or stated in the specifications, prescribed by ordinance, laws, or permits or as may be directed by the OWNER, and shall not unreasonably encumber the site or public right-of-way with his construction equipment, plant or materials.

Such area shall not be deemed for the exclusive use of the CONTRACTOR. Other contractors of the OWNER may enter upon and use such portions of the area and for such items as determined by the OWNER are necessary for all purposes required by their contracts. The CONTRACTOR shall give to such other contractors all reasonable facilities and assistance to the end that the work on this and other contracts shall not be unduly or unreasonably delayed. Any additional areas desired by the CONTRACTOR for his use shall be provided by him at his own cost and expense.

The CONTRACTOR is responsible for cutting, fitting or patching any parts of the Work where such work is necessary to make the Work complete, for parts to fit together, or for any damage to the Work prior to Final Acceptance.

The CONTRACTOR shall keep the Project and the surrounding area clean and free from the accumulation of waste materials or trash. Upon completion of the work and before final acceptance and final payment shall be made, the CONTRACTOR shall completely clean and remove from the site of the work surplus and discarded materials, temporary structures and debris of every kind. He shall leave the site of the work in a neat and orderly condition equal to that which originally existed, or as called for in the Contract Documents. Surplus and waste materials removed from the site of the work shall be disposed of at locations satisfactory to the OWNER, and at the CONTRACTOR'S sole cost.

3.4 LEGAL RESPONSIBILITIES

3.4.1. PATENTS AND COPYRIGHTS

The CONTRACTOR shall pay all royalties and license fees and shall provide, by suitable legal agreement with the patentee or owner, for the use of any design, device, material or process covered by letters, patent or any copyright. The CONTRACTOR shall indemnify, defend, hold and save the OWNER and its officers, employees and agents harmless from all liability and claims for infringement of any patent or copyright.

In the event that any claims, suit or action at law or in equity of any kind whatsoever is brought against the OWNER, or its officers, employees or agents involving any such patents, copyrights or license rights, then the OWNER shall have the right to and may retain from any money due or to become due to the CONTRACTOR such sum deemed necessary by the OWNER for its protection until such claim or suit shall have been settled and satisfactory evidence to that effect shall have been furnished the OWNER.

3.4.2 INDEMNIFICATION

To the fullest extent permitted by law, the CONTRACTOR and his sureties shall indemnify, defend and hold harmless the OWNER and all of its, past, present and future, officers, agents and employees from all suits, cause of action, claims, liabilities, losses, fines, penalties, liens, demands, obligations, actions, proceedings, of any kind, character, name and description brought or arising, on account of any injuries or damages received or sustained by any person, destruction or damage to any property on account of, in whole or part, the operations of the CONTRACTOR, his agents, employees or subcontractors; or on account of any negligent act or fault of the CONTRACTOR, his agents, employees or subcontractors in the execution of said Contract; failing to comply with any law, ordinance, regulation, rule or order of any governmental or regulatory body including those dealing with health, safety, welfare or the environment; on account of the failure of the CONTRACTOR to provide the necessary barricades, warning lights or signs; and shall be required to pay any judgment, with cost, which may be obtained against the OWNER growing out of such injury or damage. In no event shall OWNER be liable to CONTRACTOR for indirect or consequential damages or loss of income or profit irrespective of the cause, fault or reason for same. CONTRACTOR'S duty to indemnify herein shall not be limited by any limitation on the type or amount of damages payable by or for CONTRACTOR or any Subcontractor under workman's compensation acts, disability benefit acts or any other employee benefit acts.

In addition, the CONTRACTOR likewise covenants and agrees to, and does hereby, indemnify and hold harmless the OWNER from and against

any and all injuries, loss or damages to property of the OWNER during the performance of any of the terms and conditions of this Contract, arising out of or in connection with or resulting from, in whole or in part, any and all alleged acts or omissions of officers, agents, servants, employees, contractors, subcontractors, licenses or invitees of the CONTRACTOR.

The rights and responsibilities provided in this indemnification provision shall survive the termination or completion of this Contract.

3.5 SUPERVISION AND CONSTRUCTION PROCEDURES

3.5.1. SUPERVISION BY CONTRACTOR

The status of the CONTRACTOR is that of an independent CONTRACTOR under Texas law and the work under this Contract shall be under the direct charge and superintendence of the CONTRACTOR. Except where the CONTRACTOR is an individual and gives his personal superintendence to the work, the CONTRACTOR shall provide a competent superintendent or general foreman on the work site at all times during progress with full authority to act for the CONTRACTOR. The CONTRACTOR shall also provide an adequate staff for the coordination and expediting of the Work.

The superintendent and staff shall be satisfactory to the OWNER. The superintendent or general foreman shall not be changed during this Contract except with the written consent of the OWNER or unless the superintendent or general foreman proves unsatisfactory to the CONTRACTOR and ceases to be in his employ.

If the superintendent should be or become unsatisfactory to the OWNER, he shall be replaced by the CONTRACTOR upon written direction of the OWNER, and in such event, the CONTRACTOR shall not be entitled to file a claim for any additional working time or money from the OWNER.

3.5.2 EMPLOYEES

The CONTRACTOR shall employ only competent, efficient workmen and shall not use on the work any unfit person or one not skilled in the work assigned to him and shall at all times maintain good order among its employees. Whenever the OWNER shall inform the CONTRACTOR in writing that, in his opinion, any employee is unfit, unskilled, disobedient, or is disrupting the orderly progress of the work, such employee shall be removed from the work and shall not again be employed on it. Under urgent circumstances, the OWNER may orally require immediate removal of an employee for cause, to be followed by written confirmation.

The CONTRACTOR shall supervise and direct all the work, using his best skill and attention. He shall be solely responsible for all construction means, methods, techniques, sequences, procedures and safety procedures and for coordinating all portions of the Work under the Contract. The CONTRACTOR shall be responsible to the OWNER for the acts and omissions of his employees, subcontractors and their agents, employees and subcontractors performing any of the work under a contract with the CONTRACTOR.

3.5.3 LABOR AND MATERIALS

Unless otherwise provided in the Contract Documents, the CONTRACTOR shall provide and pay for all labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation and other facilities and services necessary for the proper execution and completion of the work, whether temporary or permanent and whether or not incorporated or to be incorporated into the work.

The CONTRACTOR shall at all times enforce strict discipline and good order among his employees and shall not employ on the work site any unfit person or anyone not skilled in the task assigned to him.

The rate of progress shall be such that the whole work shall be performed and the premises cleaned up in accordance with the Contract within the working time established in the Contract, unless an extension of time is made in the manner hereinafter specified.

3.5.4 WAGE SCALE

In accordance with The Texas Government Code, Title 10, Chapter 2258, Prevailing Wage Rates, the general prevailing wage rate has been determined for this locality for the craft or type of workman needed to execute work of a similar character of the project listed herein. The Contractor shall pay the prevailing wage rate in this locality to all his/her employees and subcontractors performing work on this project, and in no event shall the Contractor pay less than the rate shown in the following schedule.

"General Decision Number: TX20210239 07/02/2021

Superseded General Decision Number: TX20200239

State: Texas

Construction Type: Building

County: Collin County in Texas.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Note: Under Executive Order (EO) 13658, an hourly minimum wage of $10.95 for calendar year 2021 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least $10.95 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2021. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate,if it is higher than the conformed wage rate). The EO minimum wage rate
will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/01/2021
1	03/12/2021
2	07/02/2021

ASBE0021-011 08/01/2017

	Rates	Fringes
ASBESTOS WORKER/HEAT & FROST INSULATOR (Duct, Pipe and Mechanical System Insulation)	$ 25.87	7.23

BOIL0074-003 01/01/2017

	Rates	Fringes
BOILERMAKER	$ 28.00	22.35

CARP1421-002 04/01/2016

	Rates	Fringes

MILLWRIGHT.....$ 26.60 8.65

ELEV0021-006 01/01/2021

	Rates	Fringes
ELEVATOR MECHANIC.....	$ 44.02	36.365

FOOTNOTES:

A. 6% under 5 years based on regular hourly rate for all hours worked. 8% over 5 years based on regular hourly rate for all hours worked.

B. New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, Christmas Day, and Veterans Day.

ENGI0178-005 06/01/2020

	Rates	Fringes
POWER EQUIPMENT OPERATOR		
(1) Tower Crane.....	$ 32.85	13.10
(2) Cranes with Pile Driving or Caisson Attachment and Hydraulic Crane 60 tons and above.....	$ 28.75	10.60
(3) Hydraulic cranes 59 Tons and under.....	$ 32.35	13.10

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* IRON0263-005 06/01/2020

	Rates	Fringes
IRONWORKER (ORNAMENTAL AND STRUCTURAL).....	$ 25.14	7.43

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* PLUM0100-005 05/01/2021

	Rates	Fringes
HVAC MECHANIC (HVAC Unit Installation Only).....	$ 33.88	13.07
PIPEFITTER (Excludes HVAC Pipe Installation).....	$ 33.88	13.07

SUTX2014-015 07/21/2014

	Rates	Fringes
BRICKLAYER	$ 21.06	0.00
CARPENTER, Excludes Drywall Hanging, Form Work, and Metal Stud Installation	$ 15.78	0.00
CAULKER	$ 15.16	0.00
CEMENT MASON/CONCRETE FINISHER	$ 13.04	0.00
DRYWALL HANGER AND METAL STUD INSTALLER	$ 13.00	0.00
ELECTRICIAN (Alarm Installation Only)	$ 20.93	3.86
ELECTRICIAN (Communication Technician Only)	$ 15.35	1.39
ELECTRICIAN (Low Voltage Wiring Only)	$ 17.04	1.39
ELECTRICIAN, Excludes Low Voltage Wiring and Installation of Alarms/Sound and Communication Systems	$ 20.01	2.69
FORM WORKER	$ 11.89	0.00
GLAZIER	$ 16.46	3.94
HIGHWAY/PARKING LOT STRIPING: Operator (Striping Machine)	$ 10.04	2.31
INSTALLER - SIDING (METAL/ALUMINUM/VINYL)	$ 14.74	0.00
INSTALLER - SIGN	$ 15.50	0.00
INSULATOR - BATT	$ 13.00	0.00
IRONWORKER, REINFORCING	$ 12.29	0.00

LABORER: Common or General.....$ 10.52 0.00

LABORER: Mason Tender - Brick...$ 10.54 0.00

LABORER: Mason Tender - Cement/Concrete.....$ 10.93 0.00

LABORER: Pipelayer.....$ 13.00 0.35

LABORER: Plaster Tender.....$ 12.22 0.00

LABORER: Roof Tearoff.....$ 11.28 0.00

LABORER: Landscape and Irrigation.....$ 10.55 0.00

LATHER.....$ 16.00 0.00

OPERATOR: Backhoe/Excavator/Trackhoe.....$ 12.83 0.00

OPERATOR: Bobcat/Skid Steer/Skid Loader.....$ 13.93 0.00

OPERATOR: Bulldozer.....$ 18.29 1.31

OPERATOR: Drill.....$ 15.69 0.50

OPERATOR: Forklift.....$ 13.21 0.81

OPERATOR: Grader/Blade.....$ 13.03 0.00

OPERATOR: Loader.....$ 13.46 0.85

OPERATOR: Mechanic.....$ 17.52 3.33

OPERATOR: Paver (Asphalt, Aggregate, and Concrete).....$ 18.44 0.00

OPERATOR: Roller.....$ 15.04 0.00

PAINTER (Brush, Roller and Spray), Excludes Drywall Finishing/Taping.....$ 13.35 5.10

PAINTER: Drywall
Finishing/Taping Only.....$ 14.24 3.83

PIPEFITTER (HVAC Pipe
Installation Only).....$ 20.45 4.00

PLASTERER.....$ 16.58 0.00

PLUMBER, Excludes HVAC Pipe
Installation.....$ 22.46 4.06

ROOFER.....$ 17.19 0.00

SHEET METAL WORKER (HVAC Duct
Installation Only).....$ 21.13 4.79

SHEET METAL WORKER, Excludes
HVAC Duct Installation.....$ 24.88 5.97

SPRINKLER FITTER (Fire
Sprinklers).....$ 37.50 0.00

TILE FINISHER.....$ 11.22 0.00

TILE SETTER.....$ 14.25 0.00

TRUCK DRIVER: 1/Single Axle
Truck.....$ 16.00 0.81

TRUCK DRIVER: Dump Truck.....$ 12.39 1.18

TRUCK DRIVER: Flatbed Truck.....$ 19.65 8.57

TRUCK DRIVER: Semi-Trailer
Truck.....$ 12.50 0.00

TRUCK DRIVER: Water Truck.....$ 12.00 4.11

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded

(and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates.

LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.

Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION"

Except for work on legal holidays, the “General Prevailing Rate of Per Diem Wage” for the various crafts or type of workers or mechanics is the product of (a) the number of hours worked per day, except for overtime hours, times (b) the above respective rate per hour.

For legal holidays, the “General Prevailing Rate of Per Diem Wage” for the various crafts or type of workers or mechanics is the product of (a) one and one-half times the above respective rate per hour, times (b) the number of hours worked on the legal holiday.

For overtime work, the “General Prevailing Rate of Per Diem Wage” for the various crafts or type of workers or mechanics is the product of (a) one and one-half times the above respective rate per hour, times (b) the number of hours worked on overtime.

Under the provisions of Texas Government Code, Title 10, Chapter 2258, Prevailing Wage Rates, the contractor or subcontractor of the contractor shall forfeit as a penalty to the entity on whose behalf the contract is made or awarded, sixty dollars ($60.00) for each calendar day, or portion

thereof, that the worker is paid less than the wage rates stipulated in the contract.

If the construction project involves the expenditure of Federal funds in excess of $2,000, the minimum wages to be paid various classes of laborers and mechanics will be based upon the wages that will be determined by the Secretary of Labor to be prevailing for the corresponding classes of laborers and mechanics employed on the project of a character similar to the Contract Work.

3.5.5 Contractors doing business with OWNER agree to comply with Federal Executive Order 13465 E-Verify. It is OWNER'S intention and duty to comply and support the Immigration and Nationality Act (INA) which includes provisions addressing employment eligibility, employment verification and non-discrimination. According to the INA, contractors/employers may hire only persons who may legally work in the United States. Subsequently, contractors and subcontractors doing business with OWNER must confirm their enrollment in the E-Verify system which verifies employment eligibility through completion and checking of I-9 forms. OWNER reserves the right to audit contractors process to verify enrollment compliance.

3.5.6 COMPLIANCE WITH LAWS

The CONTRACTOR shall fully comply with all local, state and federal laws, including all codes, ordinances and regulations applicable to this Contract and the Work to be done thereunder, which exist or which may be enacted later by governmental bodies having jurisdiction or authority for such enactment.

All work required under this Contract is intended to comply with all requirements of law, regulation, permit or license. If the CONTRACTOR finds that there is a variance, he shall immediately report this to the OWNER for resolution.

3.5.6.1 EQUAL EMPLOYMENT OPPORTUNITY

The CONTRACTOR shall comply with all local, state and federal employment and discrimination laws and shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, age, national origin or any other class protected by law.

3.5.7 RAILWAY CROSSINGS

Where the Work encroaches upon any right-of-way of any railway, the OWNER shall secure the necessary easement for the work. Where railway tracks are to be crossed, the CONTRACTOR shall observe all the regulations and instructions of the railway company as to methods of doing the work or precautions for safety of property and the public. All

negotiations with the railway company, except for right-of-way, shall be made by the CONTRACTOR. The railway company shall be notified by the CONTRACTOR not less than five days prior to commencing the work. The CONTRACTOR shall not be paid separate compensation for such railway crossing but shall receive only the compensation as set out in the proposal.

3.5.8 OTHER CONTRACTORS; OBLIGATION TO COOPERATE

The OWNER reserves the right to perform construction on the Project with its own forces or may award other contracts for additional work on this Project, and the CONTRACTOR shall fully cooperate with such other contractors and shall coordinate and fit his work to be done hereunder to such additional work as may be contracted by the OWNER. The CONTRACTOR shall not commit or permit any act which shall interfere with the performance of work by any other contractor.

Upon receiving written notice from the CONTRACTOR that the OWNER or another contractor is failing to coordinate his work with the Work under this Contract as directed by the OWNER, the OWNER shall promptly investigate the charge and take such necessary action as the situation may require. However, the OWNER shall not be liable to the CONTRACTOR for damages suffered by the CONTRACTOR due to the fault or negligence of another contractor or through failure of another contractor to carry out the directions of the OWNER. Should any interference occur between contractors, the Engineer may furnish the CONTRACTOR with written instructions designating priority of effort, whereupon the CONTRACTOR shall immediately comply with such direction. In such event, the CONTRACTOR shall be entitled to an extension of working time only for unavoidable delays verified by the Engineer; however, no increase in the Contract Price shall be due the CONTRACTOR.

3.5.9 SUBCONTRACTS

The CONTRACTOR shall not make any subcontract for performing any portion of the Work included in the contract without written notice to the OWNER. This contract having been made pursuant to the bid submitted by the CONTRACTOR and in reliance with the CONTRACTOR'S personal qualifications and responsibility, the OWNER reserves the right to withhold approval of any subcontractor which the OWNER may deem would not be in the OWNER'S best interest.

The CONTRACTOR shall, as soon as practicable after signing the Contract, submit a separate written notice to the OWNER identifying each proposed subcontractor. Upon request of the OWNER, the CONTRACTOR shall promptly furnish additional information tending to

establish that any proposed subcontractor has the necessary facilities, skill, integrity, past experience and financial resources to perform the work in accordance with the terms and conditions of this Contract.

If the OWNER determines that any proposed subcontractor is unacceptable, he shall so notify the CONTRACTOR, who may thereupon submit another proposed subcontractor unless the CONTRACTOR decides to do the work himself. Disapproval by the OWNER of any proposed subcontractor shall not provide a basis for any claim by the CONTRACTOR.

If an approved subcontractor fails to properly perform the work undertaken, he shall be removed from the job upon request of the OWNER, following notification to the CONTRACTOR in writing of the request for removal and the reasons therefore.

Each subcontract entered into shall provide that the provisions of this Contract shall apply to such subcontractor and his officers and employees in all respects as if he and they were employees of the CONTRACTOR. The OWNER'S decision not to disapprove of any subcontract shall not relieve the CONTRACTOR of any of his responsibilities, duties and liabilities hereunder. The CONTRACTOR shall be solely responsible for the acts, omissions, negligence or defaults of his subcontractors and of such subcontractor's officers, agents and employees, each of whom shall, for this purpose, be deemed to be the agent or employee of the CONTRACTOR to the extent of his subcontract.

The CONTRACTOR agrees to bind each subcontractor and each subcontractor agrees to be bound by the terms of the Contract Documents insofar as applicable to his work. The CONTRACTOR and each subcontractor jointly and severally agree that nothing in the Contract Documents or otherwise shall create or be deemed to create any rights in favor of a subcontractor against the OWNER; nor shall be deemed or construed to impose upon the OWNER any obligation, liability or duty to a subcontractor; or to create any contractual relation whatsoever between a subcontractor and the OWNER.

The provisions contained herein shall likewise apply to any sub-subcontracts.

3.6 PROTECTION OF WORK AND OF PERSONS AND PROPERTY

3.6.1 PROTECTION OF WORK

During performance and up to date of final acceptance, the CONTRACTOR shall be under the absolute obligation to protect the finished work against any damage, loss or injury. In the event of such damage, loss or injury, the CONTRACTOR shall promptly replace or repair such work, whichever the OWNER shall determine to be preferable. The obligation to deliver finished work in strict accordance with the Contract prior to final acceptance shall be absolute and shall not be affected by the OWNER'S approval of or failure to prohibit means and methods of construction used by the CONTRACTOR. All risk of loss or damage to the work shall be borne solely by the CONTRACTOR until final completion and acceptance of all work by the OWNER, as evidenced by the OWNER'S issuance of a certificate of acceptance.

3.6.2 PROTECTION OF PERSONS AND PROPERTY

The CONTRACTOR shall have the responsibility to provide and maintain all warning devices and take all precautionary measures required by law or otherwise to protect persons and property while said persons or property are approaching, leaving or within the work site or any area adjacent to said work site. No separate compensation shall be paid to the CONTRACTOR for the installation or maintenance of any warning devices, barricades, lights, signs or any other precautionary measures required by law or otherwise for the protection of persons or property.

The CONTRACTOR shall assume all duties owed by the OWNER to the general public in connection with the general public's immediate approach to and travel through the work site and the area adjacent to said work site.

Where the work is carried on in or adjacent to any street, alley, sidewalk, public right-of-way or public place, the CONTRACTOR shall at his own cost and expense provide such flagmen and watchmen and furnish, erect and maintain such warning devices, barricades, lights, signs and other precautionary measures for the protection of persons or property as may be prudent or necessary, or as are required by law. The CONTRACTOR'S responsibility for providing and maintaining flagmen, watchmen, warning devices, barricades, signs and lights and other precautionary measures shall not cease until the project shall have been completed and accepted by the OWNER, and shall cease when the certificate of acceptance is issued by the OWNER pursuant to the Contract Documents.

If the OWNER discovers that the CONTRACTOR has failed to comply with the applicable federal and state law (by failing to furnish the necessary flagmen, warning devices, barricades, lights, signs or other precautionary measures for the protection of persons or property), the OWNER may order the CONTRACTOR to take such additional

precautionary measures as required by law to be taken to protect persons and property.

In addition, the CONTRACTOR shall be held responsible for all damages to the work and other public or private property due to the failure of warning devices, barricades, signs, lights or other precautionary measures in protecting said property; and whenever evidence is found of such damage, the OWNER may order the damaged portion immediately removed and replaced by and at the cost and expense of the CONTRACTOR.

3.6.3 SAFETY; TRENCH SAFETY; UNDERGROUND UTILITY SAFETY; PUBLIC CONVENIENCE AND SAFETY;

The CONTRACTOR shall be responsible for complying with state laws and federal regulations relating to safety, trench safety, and underground utility safety, including those which may be enacted during the performance under this Contract. The CONTRACTOR shall comply with the provisions of the The Standard Specifications and Standard Drawings from the Public Works Construction Standards-North Central Texas Council of Governments, 2004 edition and all subsequent addendums and the Instructions to Bidders regarding trench safety, public convenience and safety, and sanitary provisions. The CONTRACTOR shall be soley responsible for, the construction means and methods, techniques, sequences, or procedures, or for the safety precautions and programs in conection with the Work and the Project.

3.7 MATERIALS AND WORKMANSHIP; WARRANTIES AND GUARANTEES

Unless otherwise expressly provided in the contract drawings or specifications, the work shall be performed in accordance with the best modern practice with materials and workmanship of the highest quality and suitable for their purpose. The OWNER shall judge and determine the CONTRACTOR'S compliance with these requirements.

3.7.1 MATERIALS AND EQUIPMENT

The CONTRACTOR shall be free to secure the approved materials, equipment and articles from sources of his own selection. However, if the OWNER finds that the work shall be delayed or adversely affected in any way because a selected source of supply cannot furnish a uniform product in sufficient quantity and at the time required and a suitable source does exist, or the product is not suitable for the Work, the OWNER shall have the right to require the original source of supply changed by the CONTRACTOR. The CONTRACTOR shall have no claim for extra cost or damage because of this requirement.

The CONTRACTOR warrants to the OWNER that all materials and equipment furnished under this contract shall be new unless otherwise specified in the Contract Documents and that same shall be of good quality and workmanship, free from faults and defects and in conformance with the Contract Documents. All materials and equipment not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective and shall be promptly repaired or replaced by the CONTRACTOR at the CONTRACTOR's sole cost upon demand of the OWNER. If required by the OWNER, the CONTRACTOR shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

3.7.1.1 "OR EQUAL" CLAUSE

A. Whenever a material or article required is specified or shown on the plans, by using the name of a proprietary product or of a particular manufacturer or vendor, any material or article which the Engineer determines shall perform adequately the duties imposed by the general design or which the Engineer deems to be of similar appearance (in cases where appearance is of importance) shall be considered equal and satisfactory, provided the material or article so proposed is of equal substance and function. Authorization for any substitution of materials or articles must be obtained by the CONTRACTOR from the Engineer before proceeding with such substitution.

B. Should an authorized substitution require redesign of a portion of the work or alterations to the plans or specifications in order for the materials or articles which are to be substituted to properly fit or in other ways to be satisfactory, the Engineer shall accomplish such redesigns and alterations. The CONTRACTOR shall bear all reasonable costs associated with redesign and alteration efforts performed by the Engineer.

3.7.2 WORKMANSHIP

The CONTRACTOR shall promptly correct or replace all work rejected by the OWNER as defective or as failing to conform to the Contract Documents whether observed before or after substantial completion and whether or not fabricated, installed or completed. The CONTRACTOR shall bear all costs of correcting such rejected work, including costs incurred for additional services made necessary thereby.

3.8 WARRANTIES

3.8.1 SPECIAL WARRANTY

If within one year after final acceptance of the work by the OWNER, as evidenced by the final certificate of acceptance or within such longer or shorter period of time as may be prescribed by law or by the terms of any other applicable special warranty on designated equipment or portions of work as required by the Contract Documents, any of the work is found to be defective or not in accordance with the Contract Documents, the CONTRACTOR shall correct it promptly after receipt of a written notice from the OWNER to do so. This obligation shall survive termination or completion of the Contract. The OWNER shall give such notice promptly after discovery of the condition.

The CONTRACTOR shall remove from the site all portions of the work which are defective or nonconforming and which have not been corrected unless removal is waived in writing by the OWNER.

3.8.2 SUBCONTRACTORS' AND MANUFACTURERS' WARRANTIES

All subcontractors', manufacturers' and suppliers' warranties and guarantees, express or implied, respecting any part of the work and any materials used therein, shall be obtained and enforced by the CONTRACTOR for the benefit of the OWNER without the necessity of separate transfer or assignment thereof.

3.8.3 CORRECTED WORK WARRANTY

Any work repaired or replaced, pursuant to this section, shall be subject to the provisions of this section to the same extent as work originally performed.

3.8.4 RIGHTS AND REMEDIES

The rights and remedies of the OWNER provided in this section are in addition to, and do not limit, any rights or remedies afforded to the OWNER by law or any other provision of the Contract Documents, or in any way limit the OWNER'S right to recovery of damage due to default under the Contract. No action or inaction by the OWNER shall constitute a waiver of a right or duty afforded it under the Contract.

IV. INSURANCE

4.1 CONTRACTOR'S INSURANCE

Before commencing work, the CONTRACTOR shall be required to furnish the Collin County Purchasing Agent with certified copies of all insurance certificate(s) required by Texas Law, and the coverages required herein, indicating the coverage is to remain in force throughout the term of this Contract. CONTRACTOR shall also be required to furnish the Collin County Purchasing

Agent with certified copies of subcontractor's insurance certificates required by the Texas Department of Insurance, Division of Workers' Compensation, section 406.096(b), and coverages required herein in section 4.2. Without limiting any of the other obligations or liabilities of the CONTRACTOR, during the term of the Contract the CONTRACTOR and each subcontractor at their own expense shall purchase and maintain the herein stipulated minimum insurance with companies duly approved to do business in the State of Texas and satisfactory to the OWNER. Certificates required of each policy for the CONTRACTOR and each subcontractor shall be delivered to the OWNER before any work is started, along with a written statement from the issuing company stating that said policy shall not be canceled, nonrenewed or materially changed without 30 days advance written notice being given to the OWNER.

In addition to any coverage required by Texas Law, the CONTRACTOR shall provide the following coverages at not less than the specified amounts:

4.2 Workers Compensation insurance required by Texas Law at statutory limits, including employer's liability coverage at $1,000,000. In addition to these, the CONTRACTOR and each subcontractor must comply with all the requirements of the Texas Department of Insurance, Division of Workers' Compensation, section 406.096(b); (Note: If you have questions concerning these requirements, you are instructed to contact the DWC.)

By signing this contract or providing or causing to be provided a certificate of coverage, the CONTRACTOR is representing to the OWNER that all employees of the CONTRACTOR and its subcontractors who will provide services on the Project will be covered by workers compensation coverage for the duration of the Project, that the coverage will be based on proper reporting of classification codes and payroll amounts, and that all coverage agreements will be filed with the appropriate insurance carrier or, in the case of a self-insured, with the commission's Division of Self-Insurance Regulation. Providing false or misleading information may subject the CONTRACTOR to administrative penalties, criminal penalties, civil penalties, or other civil actions.

The CONTRACTOR'S failure to comply with any of these provisions is a breach of Contract by the Contractor which entitles the OWNER to declare the Contract void if the CONTRACTOR does not remedy the breach within ten (10) days after receipt of notice of breach from the OWNER.

4.3 Broad form commercial general liability insurance, including independent contractor's liability, completed operations and contractual liability, written on an occurance form, covering, but not limited to, the liability assumed under the indemnification provisions of this contract, fully insuring CONTRACTOR'S liability for injury to or death of OWNER'S employees and third parties, extended to include personal injury liability coverage with damage to property, with minimum limits as set forth below:

General Aggregate $2,000,000
Products — Components/Operations Aggregate $2,000,000
Personal and Advertising Injury $ 1,000,000
Each Occurrence $ 1,000,000

4.3.1 The policy shall include coverage extended to apply to completed operations, asbestos hazards (if this project involves work with asbestos) and XCU (explosion, collapse and underground) hazards. The completed operations coverage must be maintained for a minimum of one year after final completion and acceptance of the work, with evidence of same filed with OWNER.

4.4 Comprehensive automobile and truck liability insurance, covering owned, hired and non-owned vehicles, with a combined bodily injury and property damage minimum limit of $1,000,000 per occurrence; or separate limits of $1,000,000 for bodily injury (per person), $1,000,000 for bodily injury (per accident) and $1,000,000 for property damage. Such insurance shall include coverage for loading and unloading hazards.

4.5 OWNER'S PROTECTIVE LIABILITY INSURANCE

CONTRACTOR shall obtain, pay for and maintain at all times during the prosecution of the work under this contract an OWNER'S protective liability insurance policy naming the OWNER as insured for property damage and bodily injury, which may arise in the prosecution of the Work or CONTRACTOR'S operations under this Contract. Coverage shall be on an "occurrence" basis, and the policy shall be issued by the same insurance company that carries the CONTRACTOR'S liability insurance with a combined bodily injury and property damage minimum limit of $1,000,000 per occurrence and $2,000,000 aggregate.

4.6 "UMBRELLA" LIABILITY INSURANCE

CONTRACTOR shall obtain, pay for and maintain umbrella liability insurance during the contract term, insuring CONTRACTOR for an amount of not less than $1,000,000 per occurrence combined limit for bodily injury and property damage that follows from and applies in excess of the primary liability coverages required hereinabove. The policy shall provide "drop down" coverage where underlying primary insurance coverage limits are insufficient or exhausted. OWNER shall be named as an additional insured.

4.7 RAILROAD PROTECTIVE INSURANCE

When required in the Special Provisions, CONTRACTOR shall obtain, maintain and present evidence of railroad protective insurance (RPI). The policy shall be in the name of the railroad company having jurisdiction over the right-of-way

involved. The minimum limit of coverage shall meet the specifications provided by the railroad company. The OWNER shall specify the amount of RPI necessary.

4.8 POLICY ENDORSEMENTS AND SPECIAL CONDITIONS

All policies to be furnished by CONTRACTOR shall include the following conditions by endorsement to the policy:

A. each policy shall name the OWNER as an additional insured as to all applicable coverage;
B. each policy shall require that 30 days prior to the cancellation, nonrenewal or any material change in coverage, a notice thereof shall be given to OWNER by certified mail;
C. the term "OWNER" shall include all past, present or future, authorities, boards, bureaus, commissions, divisions, departments and offices of the OWNER and individual members, elected official, officers, employees and agents thereof in their official capacities and/or while acting on behalf of the OWNER;
D. the policy phrase "other insurance" shall not apply to the OWNER where the OWNER is an additional insured on the policy;
E. all provisions of the contract concerning liability, duty and standard of care together with the indemnification provision, shall be underwritten by contractual liability coverage sufficient to include such obligations within applicable policies;
F. each policy shall contain a waiver of subrogation in favor of OWNER, and its, past, present and future, officials, employees, and volunteers; and,
G. each certificate of insurance shall reference the Project and Contract number, contain all the endorsement required herein, and require a notice to the OWNER of cancellation.

Insurance furnished by the CONTRACTOR shall be in accordance with the following requirements:

A. any policy submitted shall not be subject to limitations, conditions or restrictions deemed inconsistent with the intent of the insurance requirements to be fulfilled by the CONTRACTOR. The OWNER'S decision thereon shall be final;
B. all policies are to be written through companies duly licensed to transact that class of insurance in the State of Texas with a financial ratings of A-VII or better as assigned by BEST Rating Company or equivalent; and
C. All liability policies required herein shall be written with an "occurrence" basis coverage trigger.

CONTRACTOR agrees to the following:

A. CONTRACTOR hereby waives subrogation rights for loss or damage to the extent same are covered by insurance. Insurers shall have no right of recovery or subrogation against the OWNER, it being the intention that the insurance policies shall protect all parties to the Contract and be primary coverage for all losses covered by the policies;

B. Companies issuing the insurance policies and CONTRACTOR shall have no recourse against the OWNER for payment of any premiums or assessments for any deductibles, as all such premiums and deductibles are the sole responsibility and risk of the CONTRACTOR;

C. Approval, disapproval or failure to act by the OWNER regarding any insurance supplied by the CONTRACTOR (or any subcontractors) shall not relieve the CONTRACTOR of full responsibility or liability for damages and accidents as set forth in the Contract Documents. Neither shall the bankruptcy, insolvency or denial of liability by the insurance company exonerate the CONTRACTOR from liability; and

D. No special payments shall be made for any insurance that the CONTRACTOR and subcontractors are required to carry; all are included in the Contract Price and the Contract unit prices. Any of such insurance policies required under this section may be written in combination with any of the others, where legally permitted, but none of the specified limits may be lowered thereby.

V. OWNERS RIGHTS AND RESPONSIBILITIES

MONTHLY ESTIMATE, PARTIAL PAYMENTS AND FINAL PAYMENTS

5.1 Progress and final payments shall be paid to the Contractor based upon the progress of the Project as indicated by the approved Applications for Payment, certificates of acceptance, or Certificates for Payment, that include an approved Schedule of Values that will be submitted by the CONTRACTOR to the OWNER prior to the commencement of the Work and in accordance with the following:

5.2 MONTHLY ESTIMATES

The CONTRACTOR shall deliver to the OWNER an itemized Application for Payment that shall include the work completed, materials stored at the Project site but not incorporated into the work, materials ready to be installed and stored at another agreed location, and the percentage of Work completed, through the 20th day of each month, on an Application for Payment with a schedule of values previously submitted by the Contractor and approved by the Owner. Prior to release of funds in connection with any Application for Payment, the Owner may request, and the Contractor must provide, properly executed statements of full or partial releases of claims acceptable to Owner in form and content, for all persons or entities supplying labor or materials to the Project.

5.2.1 The Application for Payment is a representation by the CONTRACTOR to the OWNER that the construction has progressed to the point indicated, the quality of the Work covered by the application is in accordance with the

Contract Documents, and the Contractor is entitled to payment in the amount requested.

5.2.2 INSPECTION AND PARTIAL PAYMENTS

Whenever the CONTRACTOR shall submit an Application for Payment to the OWNER for work performed by the CONTRACTOR, the CONTRACTOR shall notify the Engineer that the improvement is ready for inspection. The Engineer shall then make such inspection, and will have the authority to reject work that does not conform to the Contract Documents. If the work is satisfactory and in accordance with the specifications and Contract Documents, the Engineer shall issue a Certificate for Payment.

5.2.3 Within thirty (30) days of the Owner's receipt of a properly submitted and correct Application for Payment, and the issuance of a Certificate for Payment, the Owner shall make payment to the Contractor, in the amount approved by the Owner less 5% retainage. Such payment shall be adjusted for work that is incomplete or not in accordance with the Contract Documents or that is the subject of a separate contract, or subcontract or supplier claim or lien against the Contractor or the payment bonds for the project.

5.2.4 No partial or final payment or the entire use or occupancy of the Project by the OWNER shall be considered acceptance of work that does not strictly comply with the Contract Documents or release the CONTRACTOR of any of his responsibilities under the Contract.

5.2.5 PAYMENT FOR LABOR AND MATERIAL; NO LIENS

The CONTRACTOR for himself or any of his subcontractors shall pay all indebtedness which may become due to any person, firm or corporation having furnished labor, material or both in the performance of this Contract. It shall be the responsibility of each person, firm or corporation claiming to have furnished labor, materials or both, in connection with this Contract, to protect his or its interest in the manner prescribed by applicable laws of the State of Texas, provided, however, that as this Contract provides for a public works project, no lien of any kind shall ever exist or be placed against the Work or any portion thereof, or any public funds or retainage held by the OWNER; and any subcontactor shall look soley to the CONTRACTOR and the payment bond surety, and not the OWNER, for payment of any outstanding amounts due for labor, materials or any other indebtedness in connection with the Work. However, the OWNER may, at any time prior to making final payment, require the CONTRACTOR to furnish a Consent of Surety to any payment due the CONTRACTOR for completed work and may, at the discretion of the

OWNER or the request of the Surety, make the check jointly payable to the CONTRACTOR and the Surety. The Owner shall have no obligation under this Agreement to pay or to be responsible in any way for payment to any Engineer, another design professional, contractor, subcontractor or supplier performing portions of the Work, pursuant to a contract with the Contractor.

5.2.6 PAYMENT WITHHELD

In addition to express provisions elsewhere contained in the contract, the OWNER may withhold from any payment otherwise due the CONTRACTOR such amount as determined necessary to protect the OWNER'S interest, or, if it so elects, may withhold or retain all or a portion of any progress payment or refund payment on account of:

A. unsatisfactory progress of the Work not caused by conditions beyond the CONTRACTOR'S control,
B. defective work not corrected,
C. CONTRACTOR'S failure to carry out instructions or orders of the OWNER or his representative,
D. a reasonable doubt that the Contract can be completed for the balance then unpaid,
E. work or execution thereof not in accordance with the Contract Documents,
F. claim filed by or against the CONTRACTOR or reasonable evidence indicating probable filing of claims,
G. failure of the CONTRACTOR to make payments to subcontractor or for material or labor,
H. damage to another contractor,
I. unsafe working conditions allowed to persist by the CONTRACTOR,
J. failure of the CONTRACTOR to provide work schedules as required by the OWNER,
K. use of subcontractors without the OWNER'S approval or,
L. failure of the CONTRACTOR to keep current as-built record drawings at the job site or to turn same over in completed form to the OWNER.
When the above grounds are removed, payment shall be made for amounts withheld because of them, and OWNER shall never be liable for interest on any delayed or late payment.

5.2.7 PAYMENT FOR EXTRA WORK

The Extra Work done by the CONTRACTOR as authorized and approved by the Engineer shall be paid for in the manner hereinafter described, and the compensation thus provided shall be accepted by the CONTRACTOR as payment in full for all labor, materials, tools, equipment and incidentals

and all superintendents' and timekeepers' services, all insurance, bond and all other overhead expense incurred in the performance of the Extra Work.

Payment for Extra Work shall be made by one of the following methods:

A. Method "A" — by unit prices agreed on in writing by the OWNER and CONTRACTOR before said Extra Work is commenced, subject to all other conditions of the contract.

B. Method "B" — by lump sum price agreed on in writing by the OWNER and the CONTRACTOR before said Extra Work is commenced, subject to all other conditions of the contract.

5.2.8 SUBSTANTIAL COMPLETION

The Project will be considered substantially complete when the OWNER can utilize the Project for its intended purpose and the Work is in conformance with the Contract Documents.

5.3 APPLICATION FOR FINAL PAYMENT.

Upon full performance of all the Contract Work and the full performance of all the provisions of the Contract, the CONTRACTOR shall submit a final application for payment to the OWNER, the CONTRACTOR shall notify the Engineer that the improvement is ready for inspection. All warranties and guaranties required of the CONTRACTOR by the Contract Documents shall be assembled and delivered by the CONTRACTOR to the OWNER as Part of the final Application for Payment. The Contractor will assign to the Owner all manufacturer's warranties relating to materials and labor used in the work and will perform the Work in such a manner as to preserve all such manufacturer's warranties. The CONTRACTOR will deliver a certificate evidencing that insurance and bonds required by the Contract Documents will remain in full force and effect pursuant to the requirements of the Contract. The final Certificate for Payment will not be issued until all such warranties and guaranties have been received and accepted by the Owner, and a Certificate of Acceptance is issued by the Engineer.

5.3.1 FINAL INSPECTION AND ACCEPTANCE

Whenever the improvements provided for by the Contract shall have been completely performed on the part of the CONTRACTOR, the CONTRACTOR shall notify the OWNER, and Engineer that the improvement is ready for final inspection. The Engineer shall then make such final inspection, and if the work is satisfactory and in accordance

with the specifications and Contract Documents, the CONTRACTOR shall be issued a certificate of acceptance.

5.3.2 FINAL PAYMENT

Whenever the improvements provided for by the Contract shall have been completely performed on the part of the CONTRACTOR, as evidenced in the certificate of acceptance, and all required submissions provided to the OWNER, a final estimate showing the value of the work shall be prepared by the Engineer as soon as the necessary measurements and computations can be made. All prior estimates upon which payments have been made are subject or necessary corrections or revisions in the final payment. The amount of this final estimate, less any sums that have been previously paid, or deducted under the provisions of the Contract, shall be paid the CONTRACTOR within 30 days after the final acceptance, provided that the CONTRACTOR has furnished to the OWNER a consent of surety and an affidavit or other satisfactory evidence that all indebtedness connected with the Work and all sums of money due for any labor, materials, apparatus, fixtures or machinery furnished for and used in the performance of the work have been paid or otherwise satisfied, or that the person or persons to whom the same may respectively be due have consented to such final payment.

The acceptance by the CONTRACTOR of the final payment as aforesaid shall operate as and shall be a release to the OWNER from all claims or liabilities under the Contract, including all subcontractor claims, for anything done or furnished or relating to the Work under the Contract or for any act or neglect of said OWNER relating to or connected with the Contract.

All warranties and guarantees shall commence from the date of the certificate of acceptance. No interest shall be due the CONTRACTOR on any partial or final payment or on the retainage.

5.3 MODIFICATIONS TO CONTRACT WORK OR TIME OF PERFORMANCE

5.3.1 OWNER'S RIGHT TO TEMPORARILY SUSPEND WORK

5.3.2 REASONS FOR SUSPENSION

The OWNER shall have the right by written order to temporarily suspend the work, in whole or in part, whenever, in the judgment of the OWNER, such temporary suspension is required:

A. in the interest of the OWNER generally,

B. due to government or judicial controls or orders which make performance of this contract temporarily impossible or illegal,
C. to coordinate the work of separate contractors at the job site,
D. to expedite the completion of a separate contract even though the completion of this particular Contract may be thereby delayed,
E. because of weather conditions unsuitable for performance of the Work, or
F. because the CONTRACTOR is proceeding contrary to contract provisions or has failed to correct conditions considered unsafe for workmen.

The written order of the OWNER to the CONTRACTOR shall state the reasons for suspending the work and the anticipated periods for such suspension. Upon receipt of the OWNER'S written order, the CONTRACTOR shall suspend the work covered by the order and shall take such means and precautions as may be necessary to properly protect the finished and partially finished work, the unused materials and uninstalled equipment, including the providing of suitable drainage about the work and erection of temporary structures where necessary. The CONTRACTOR shall not suspend the Work without written direction from the OWNER and shall proceed with the work promptly when notified by the OWNER to resume operations.

5.3.3 NO ADDITIONAL COMPENSATION

No additional compensation shall be paid to the CONTRACTOR for a temporary suspension of the Work by the OWNER or otherwise where same is caused by the fault of the CONTRACTOR. Where such temporary suspension is not due to the fault of the CONTRACTOR, he shall be entitled to:

A. an equitable extension of working time for the completion of the work, not to exceed the delay caused by such temporary suspension, as determined by the OWNER; and

B. the actual and necessary costs of properly protecting the finished and partially finished work, unused materials and uninstalled equipment during the period of the ordered suspension as determined by the OWNER as being beyond the Contract requirements, such costs, if any, to be determined pursuant to the terms of the Contract; and

C. where the CONTRACTOR elects to move equipment from the job site and then return it to the site when the work is ordered resumed, the actual and necessary costs of these moves, in an

amount determined by the OWNER pursuant to the terms of the Contract.

5.3.4 USE OF COMPLETED PORTIONS OF WORK

The OWNER may, after written notice to the CONTRACTOR, and without incurring any liability for increased compensation to the CONTRACTOR, take over and use any completed portion of the Work prior to the final completion and acceptance of the entire work included in the Contract, and notwithstanding that the time allowed for final completion has not expired. The OWNER and CONTRACTOR agree that occupancy of portions of the Work by the OWNER shall not in any way evidence the substantial completion of the entire work or signify the OWNER's acceptance of the Work.

The CONTRACTOR shall not object to, nor interfere in any way with, such occupancy or use after receipt of the OWNER'S written notice. Immediately prior to such occupancy and use, the OWNER shall inspect such portion of the Work to be taken over and shall furnish the CONTRACTOR a written statement of the work, if any, still to be done on such part. The CONTRACTOR shall promptly thereafter complete such unfinished work to permit occupancy and use on the date specified in the OWNER'S written order, unless the OWNER shall permit specific items of work to be finished after the occupancy and use by the OWNER.

In the event the CONTRACTOR is unreasonably delayed by the OWNER exercising its rights under this section, the CONTRACTOR may submit a request for an extension of time; CONTRACTOR'S sole remedy for an unreasonable delay shall be an extention of time and shall not be entitled to any additional compensation.

5.4 COMMENCMENT; TIME OF COMPLETION; DELAYS; EXTENSION OF TIME; LIQUIDATED DAMAGES

5.4.1 COMMENCEMENT; TIME OF COMPLETION

Contractor shall commence work within ten (10) consecutive calendar days after receiving from County a notice to proceed. Contractor agrees and covenants that the number of consecutive calendar days allowed to complete all work following a notice to proceed shall be as follows:

_____

5.4.2. LIQUIDATED DAMAGES FOR FAILURE TO COMPLETE ON TIME

Time is of the essence in the progress and completion of this Contract. For each calendar day that any Work shall remain uncompleted after the time specified in the proposal and the Contract, or the increased time granted by the OWNER, or as equitably increased by additional work or materials ordered after the Contract is signed, the sum per day given in the following schedule, unless otherwise specified in the special provisions, shall be deducted from the monies due the CONTRACTOR:

Two Hundred and 00/100 Dollars ($200)

The sum of money thus deducted for such delay, failure or noncompletion is not to be considered as a penalty, but shall be deemed, taken and treated as reasonable liquidated damages, per calendar day that the CONTRACTOR shall be in default after the time stipulated in the Contract for completing the Work. The said amounts are fixed and agreed upon by and between OWNER and CONTRACTOR because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages the OWNER in such event would sustain; and said amounts are agreed to be the amount of damages which the OWNER would sustain and which shall be retained from the monies due, or that may become due, the CONTRACTOR under this Contract; and if said monies be insufficient to cover the amount owing, then the CONTRACTOR or his surety shall pay any additional amounts due.

5.4.3 EXTENTIONS OF TIME

The CONTRACTOR shall be entitled to an extension of working time under this Contract only when claim for such extension is submitted to the OWNER in writing by the CONTRACTOR within seven days from and after the time when any alleged cause of delay shall occur, and then only when such time is approved by the OWNER. In adjusting the Contract working time for the completion of the Project, unforeseeable causes beyond the control and without the fault or negligence of the CONTRACTOR, including, acts of God or the public enemy, acts of the OWNER, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, or delays of subcontractors due to such causes beyond their control shall be taken into consideration.

If the satisfactory execution and completion of the Contract should require work and materials in greater amounts or quantities than those set forth in the Contract, requiring more time for completion than the anticipated time, then the contract working time shall be equitably increased, but not more than in the same proportion as the cost of the additional work bears to the cost of the original work contracted for. No allowances shall be made for

delays or suspension of the performance of the Work due to the fault of the CONTRACTOR.

No adjustment to working time shall be made if, concurrently with the equitable cause for delay, there existed a cause for delay due to the fault or negligence of the CONTRACTOR, his agents, employees or subcontractors; and no adjustment shall be made to the Contract Price and the CONTRACTOR shall not be entitled to claim or receive any additional compensation as a result of or arising out of any delay resulting in adjustment to the working time hereunder, including delays caused by the acts or negligence of the OWNER. Notwithstanding any other provision of the Contract Documents, all claims for extension of working time must be submitted in accordance with the provisions of this Contract, and no act of the OWNER shall be deemed a waiver or entitlement of such extension.

5.5 TERMINATION FOR CONVENIENCE OF THE OWNER

5.5.1 NOTICE OF TERMINATION

The performance of the Work under this Contract may be terminated by the OWNER in whole or from time to time in part, in accordance with this section, whenever the OWNER shall determine that such termination is in the best interest of the OWNER. Any such termination shall be effected by mailing a notice of termination to the CONTRACTOR specifying the extent to which performance of work under the Contract is terminated, and the date upon which such termination becomes effective. Receipt of the notice shall be deemed conclusively presumed and established when the letter is placed in the United States Mail by the OWNER. Further, it shall be deemed conclusively presumed and established that such termination is made with just cause as therein stated; and no proof in any claim, demand or suit shall be required of the OWNER regarding such discretionary action.

5.5.2 CONTRACTOR ACTION

After receipt of a notice of termination, and except as otherwise directed by the OWNER or Engineer, the CONTRACTOR shall:

A. stop work under the Contract on the date and to the extent specified in the notice of termination;
B. place no further orders or subcontracts for materials, services or facilities except as may be necessary for completion of such portion the Work under the Contract as is not terminated;
C. terminate all orders and subcontracts to the extent that they relate to the performance of work terminated by the notice of termination;

D. transfer title to the OWNER and deliver in the manner, at the times, and to the extent, if any, directed by the OWNER or Engineer:

1. the fabricated or unfabricated parts, work in process, completed work, supplies and other material produced as a part of, or acquired in connection with the performance of, the work terminated by the notice of termination; and
2. the completed or partially completed plans, drawings, information and other property which, if the Contract had been completed, would have been required to be furnished to the OWNER.

E. complete performance of such part of the work as shall not have been terminated by the notice of termination; and

F. take such action as may be necessary, or as the Engineer may direct, for the protection and preservation of the property related to its Contract which is in the possession of the CONTRACTOR and in which the OWNER has or may acquire an interest.

At a time not later than 30 days after the termination date specified in the notice of termination, the CONTRACTOR may submit to the OWNER a list, certified as to the quantity and quality, of any or all items of termination inventory not previously disposed of, exclusive of items the disposition of which has been directed or authorized by the Engineer. Not later than 15 days thereafter, the OWNER shall accept title to such items and remove them or enter into a storage agreement covering the same, provided that the list submitted shall be subject to verification by the Engineer upon removal of the items, or, if the items are stored, within 45 days from the date of submission of the list, and provided that any necessary adjustments to correct the list as submitted shall be made prior to final settlement.

5.5.3 TERMINATION CLAIM

Within 60 days after notice of termination, the CONTRACTOR shall submit his termination claim to the Engineer and the OWNER in the form and with the certification prescribed herein. Unless one or more extensions in writing are granted by the OWNER upon request of the CONTRACTOR, made in writing within such 60-day period or authorized extension thereof, any and all such claims shall be conclusively deemed waived. The termination claim shall (1) list all Contract Work which the CONTRACTOR has completed but for which the CONTRACTOR asserts it has not been paid, including any retainage; (2) list of all fabricated or unfabricated parts, work in process, completed work, supplies and other material produced as a part of, or acquired in connection with the performance of the Contract and the itemized cost for each such fabricated or unfabricated part, work in process, completed work, supplies and other

material; (3) list all costs and expenses saved as a result of the termination of the Contract. The termination claim must include a copy of all invoices for fabricated or unfabricated parts, supplies and other material produced as a part of, or acquired in connection with the performance of the Contract for which the CONTRACTOR seeks compensation; all invoices for any subcontractors providing services related to the Contract; and (3) evidence of payment of all material suppliers and subcontractors, together with CONTRACOTR's certification that all such-material suppliers and subcontractors have been fully paid together with executed lien releases from each such material supplier and subcontractor. The termination claim may not include any request for payment of Extra Work for which a Change Order has not been issued or for which the CONTRACTOR has not fully and timely complied with the provisions of section 2.3 of this Contract.

5.5.4 AMOUNTS

The CONTRACTOR and OWNER may agree upon the whole or any part of the amount or amounts to be paid to the CONTRACTOR by reason of the total or partial termination of work pursuant hereto, provided that such agreed amount or amounts shall never exceed the total contract price as reduced by the amount of payments otherwise made and as further reduced by the Contract Price of work not terminated. The contract shall be amended accordingly, and the CONTRACTOR shall be paid the agreed amount. No amount shall be due for lost or anticipated profits. Nothing prescribing the amount to be paid to the CONTRACTOR in the event of failure of the CONTRACTOR and the OWNER to agree upon the whole amount to be paid to the CONTRACTOR by reason of the termination of work pursuant to this section, shall be deemed to limit, restrict or otherwise determine or affect the amount or amounts which may be agreed upon to be paid to the CONTRACTOR pursuant to this paragraph.

5.5.5 FAILURE TO AGREE

In the event of the failure of the CONTRACTOR and the OWNER to agree, as provided herein, upon the whole amount to be paid to the CONTRACTOR by reason of the termination of work pursuant to this section, the OWNER shall determine, on the basis of information available to it, the amount, if any, due to the CONTRACTOR by reason of the termination and shall pay to the CONTRACTOR the amounts determined. No amount shall be due for lost or anticipated profits.

5.5.6 DEDUCTIONS

In arriving at the amount due the CONTRACTOR under this section, there shall be deducted (a) all unliquidated advance or other payments on account theretofore made to the CONTRACTOR, applicable to the terminated portion of this contract; (b) any claim which the OWNER may have against the CONTRACTOR in connection with this Contract; and (c) the agreed price for or the proceeds of sale of any materials, supplies or other things kept by the CONTRACTOR or sold, pursuant to the provisions of this clause, and not otherwise recovered by or credited to the OWNER.

5.5.7 ADJUSTMENT

If the termination hereunder be partial prior to the settlement of the terminated portion of this Contract, the CONTRACTOR may file with the Owner a request in writing for an equitable adjustment of the price or prices specified in the Contract relating to the continued portion of the Contract (the portion not terminated by the notice of termination), and such equitable adjustment as may be agreed upon shall be made in such price or prices; nothing contained herein, however, shall limit the right of the OWNER and the CONTRACTOR to agree upon the amount or amounts to be paid to the CONTRACTOR for the completion of the continued portion of the Contract when said contract does not contain an established contract price for such continued portion.

5.5.8 NO LIMITATION OF RIGHTS

Nothing contained in this section shall limit or alter the rights which the OWNER may have for termination of this Contract under any other provision of this Contract or any other right which OWNER may have for default or breach of contract by CONTRACTOR.

5.6 CONTRACTOR DEFAULT: OWNER'S RIGHT TO SUSPEND WORK AND ANNUL CONTRACT

The Work or any portion of the Work under contract shall be suspended immediately on written order of the OWNER declaring the CONTRACTOR to be in default. A copy of such notice shall be served on the CONTRACTOR'S surety. The contract may be annulled by the OWNER for any good cause or causes, among others of which special reference is made to the following:

A. failure of the CONTRACTOR to start the work within 10 days from date specified in the written work order issued by the OWNER to begin the work;

B. evidence that the progress of the work being made by the CONTRACTOR is insufficient to complete the work within the specified working time;

C. failure of the CONTRACTOR to provide sufficient and proper equipment, materials or construction forces for properly executing the Work;

D. evidence that the CONTRACTOR has abandoned the Work or discontinuance of the performance of the Work or any part thereof and failure to resume performance within a reasonable time after notice to do so;

E. evidence that the CONTRACTOR has become insolvent or bankrupt, or otherwise financially unable to carry on the Work;

F. deliberate failure on the part of the CONTRACTOR to observe any requirements of the specifications or to comply with any orders given by the Engineer as provided for in the specifications;

G. failure of the CONTRACTOR to promptly make good any defects in materials or workmanship, or any defects of any nature, the correction of which has been directed in writing by the OWNER;

H. evidence of collusion for the purpose of illegally procuring a contract or perpetrating fraud on the OWNER in the construction of work under contract;

I. repeated violations of safe working procedures;

J. the filing by the CONTRACTOR of litigation against the OWNER prior to final completion of the Work. When the Work is suspended for any of the causes itemized above, or for any other cause or causes, the CONTRACTOR shall discontinue the Work or such part thereof as the OWNER shall designate, whereupon the surety may either at its option assume the Contract or that portion thereof which the OWNER has ordered the CONTRACTOR to discontinue and perform the same or, with the written consent of the OWNER, sublet the same, provided, however, that the surety shall exercise its option within two weeks after the written notice to discontinue the work has been served upon the CONTRACTOR and upon the surety or its authorized agents. The surety in such event shall assume the CONTRACTOR'S place in all respects and shall be paid by the OWNER for all work performed by it in accordance with the terms of the Contract, but in no event shall such payments exceed the contract amount, regardless of the cost to the surety to complete the Work.

In the event that the surety assumes the CONTRACTOR'S place, duties and responsibilities in the Contract, all monies remaining due the CONTRACTOR at the time of his default shall thereupon become due and payable to the surety as the work progresses, subject to all terms of the Contract. In case the surety does not, within the hereinabove specified time, exercise its obligation to assume the Contract or that portion thereof which the OWNER has ordered the CONTRACTOR to discontinue, then the OWNER shall have the power to complete by contract or otherwise, as it may determine, the Work herein described or such part thereof as it may deem necessary; and the CONTRACTOR hereto agrees that the OWNER shall have the right to take possession of or use any or all of the materials, plans, tools, equipment, supplies and property of every kind

provided by the CONTRACTOR for the purpose of the Work and to procure other tools, equipment and materials for the completion of the same and to charge to the account of the CONTRACTOR the expense of said contract for labor, materials, tools, equipment and expenses incident thereto. The expense so charged shall be deducted by the OWNER out of such monies as may be due or may at any time thereafter become due the CONTRACTOR under and by virtue of the Contract or any part thereof.

The OWNER shall not be required to obtain the lowest bid for the work of completing the Contract, but the expenses to be deducted shall be the actual cost of such work. In case such expense is less than the sum which would have been payable under the contract if the same had been completed by the CONTRACTOR, then in such case the OWNER may pay the CONTRACTOR the difference in the cost, provided that the CONTRACTOR shall not be entitled to any claim for damages or for loss of anticipated profits.

In case such expense shall exceed the amount which would have been payable under the Contract if the same had been completed by the CONTRACTOR, the CONTRACTOR and his surety shall pay the amount of the excess to the OWNER on notice from the OWNER for excess due including any costs incurred by the OWNER, such as inspection, legal fees and liquidated damages. When any particular part of the Work is being carried out by the OWNER by contract or otherwise under the provisions of this section, the CONTRACTOR shall continue the remainder of the Work in conformity with the terms of the contract and in such manner as not to hinder or interfere with the performance of workmen employed as above provided by the OWNER or surety.

5.7 SUSPENSION BY COURT ORDER AGAINST THE OWNER

The CONTRACTOR shall suspend such part or parts of the Work pursuant to a court order issued against the OWNER and shall not be entitled to additional compensation by virtue of such court order; neither shall the CONTRACTOR be liable to the OWNER in the event the Work is suspended by such court order, unless such suspension is due to the fault or negligence of the CONTRACTOR. A delay of the CONTRACTOR due to a court order against the OWNER, or due to the OWNER'S failure to secure right-of-way at the time required or because of a conflict of a utility with the Work, shall not be cause for additional compensation for damages sustained by the CONTRACTOR, but may be a cause for extension of contract working time only. The CONTRACTOR'S sole remedy for any suspensions of the Work is an equitable extention of time to perform the Work.

5.8 NO WAIVER OF RIGHTS OR ESTOPPEL

The OWNER, or any officer or agent thereof, shall not be precluded at any time, either before or after final completion and acceptance of the Work and final payment therefore from:

A. showing the true and correct amount, classifications, quality and character of the Work done and materials furnished by the CONTRACTOR or any other person under this Contract, or from showing at any time that any determination, return, decision, approval, order, letter, payment or certification is untrue and incorrect or improperly made in any particular, or that the Work or the materials or any parts thereof do not in fact conform to the contract requirements; and (b) demanding the recovery from the CONTRACTOR of any overpayments made to him, or such damages as the OWNER may sustain by reason of the CONTRACTOR'S failure to perform each and every part of this Contract in strict accordance with its terms; or both.

VI. AUTHORITY OF THE ENGINEER

6.1 All work shall be performed in a good and workmanlike manner and to the satisfaction of the Engineer. The Engineer shall decide all questions which arise as to the quality and acceptability of materials furnished, work performed, manner of performance, rate of progress of the work, sequence of the construction, interpretation of the plans and specifications, acceptable fulfillment of the Contract, compensation, mutual rights between contractors under these specifications and suspension of the Work. He shall determine the amount and quality of work performed and materials furnished, and his decisions and estimates shall be final. His estimate in such event shall be a condition precedent to the right of the CONTRACTOR to receive money due him under the Contract.

6.2 OWNER'S REPRESENTATIVES

Where the Contract Documents indicate that determinations, directions or approvals shall be made by the OWNER or "Owner's representatives," this shall mean the OWNER acting directly, or through duly authorized persons acting within the limit of authority delegated to them. Any determination, direction or approval of such authorized representatives shall be subject to review by the OWNER. For purposes of administering the schedule or the payment provisions of this Contract the Engineer may act as the Owner's representative for purposes of approving payments, changes, scheduling, or acceptance of the Work, at the OWNER'S discretion.

6.3 INSPECTIONS OF WORK PROGRESS

The Engineer shall visit the site at during construction of the Project as necessary as the Owner's Representative to verify that the Work is being performed in compliance with the Contract Documents and shall be given total access to the Project by the CONTRACTOR. Site visits or inspections by the Engineer shall in no way relieve the CONTRACTOR of any of its responsibilities or duties pursuant to the Contract Documents. The Engineer will neither have control over,

nor be responsible for, the construction means and methods, techniques, sequences, or procedures, or for the safety precautions and programs in conection with the Work or the Project. The CONTRACTOR shall be soley responsible for, the construction means and methods, techniques, sequences, or procedures, or for the safety precautions and programs in connection with the Work or the Project.

6.4 CONSTRUCTION STAKES

Engineer will provide the Contractor with primary horizontal and vertical control to consist of one construction baseline and two benchmarks.

The Contractor shall take all necessary precautions to preserve any and/or all markings and staking. Payment for costs of restaking shall be the responsibility of the Contractor.

6.5 APPROVAL OF SUBMITTALS

The Engineer shall review and approve or take other appropriate action the CONTRACTOR's submittals such as Shop Drawings, Product Data and Samples, for the purpose of checking for conformance with the Contract Documents. The Engineers review of the submittals shall not relieve the CONTRACTOR of any of its obligations to perform the Work in strict compliance with the Contract Documents. The Engineer's review shall not be considered approval of safety precautions, means and methods, techniques, sequences or procedures that are the responsibility of the CONTRACTOR.

VII. CLAIMS OR DISPUTES

7.1 CLAIMS AGAINST OWNER AND ACTION THEREON.

No claim against the OWNER under the Contract or for breach of the Contract or additional compensation for extra or disputed work shall be made or asserted against the OWNER under the Contract or in any court action, unless the CONTRACTOR shall have strictly complied with all requirements relating to the giving of notice and information with respect to such claim as required by the Contract.

7.2 CLAIM AGAINST OFFICERS, EMPLOYEES OR AGENT OF THE OWNER.

No claim whatsoever shall be made by the CONTRACTOR against any, past, present or future, officer, employee or agent of the OWNER for or on account of, anything done or omitted to be done in connection with this Contract.

VIII. MISCELLANEOUS PROVISIONS

8.1 FINANCIAL INTEREST IN ANY CONTRACT BY OWNER'S OFFICERS, EMPLOYEES OR AGENTS

No officer, employee or agent of the OWNER shall have a financial interest, direct or indirect, in any contract with the OWNER or be financially interested, directly or indirectly, in the sale to the OWNER of any land, materials, supplies or services, except on behalf of the OWNER as an officer or employee. Any willful violation of this article shall constitute malfeasance in office, and any officer or employee guilty thereof shall thereby forfeit his office or position. Any violation of this article with the knowledge, expressed or implied, of the persons, partnership, company, firm, association or corporation contracting with the OWNER shall render the contract involved voidable by the OWNER.

8.2 SERVICE OF NOTICES

The OWNER and the CONTRACTOR shall each designate addresses where all notices, directions or other communication may be delivered or to which they may be mailed.

Notices to the surety or sureties on contract bonds shall be directed or delivered to the home office, or to the agent or agents who executed the bonds on behalf of the surety or sureties, or to their designated agent for delivery of notices.

Actual delivery of any such notice, direction or communication to the aforesaid places or depositing it in a postpaid wrapper addressed thereto in any post office regularly maintained by the United States Postal Service shall be conclusively deemed to be sufficient service thereof upon the above persons as of the date of such delivery or deposit.

The designated addresses may be changed at any time by an instrument in writing executed by the party changing the addresses and delivered to the other party.

Nothing herein contained shall, however, be deemed to preclude or tender inoperative the service of any notice, direction or communication upon the above parties personally or, if the CONTRACTOR be a corporation, upon any officer or director thereof.

8.3 UNLAWFUL PROVISIONS DEEMED STRICKEN

In the event a term, condition, or provision of this Agreement is determined to be void, unenforceable, or unlawful by a court of competent jurisdiction, then that term, condition, or provision shall be deleted and the remainder of the Agreement shall remain in full force and effect.

8.4 ALL LEGAL PROVISIONS INCLUDED

It is the intent and agreement of the parties to this contract that all legal provisions of law required to be inserted herein shall be and are inserted herein. If through

mistake or oversight, however, any such provision is not herein inserted, or is not inserted in proper form, then upon application of either party, the contract shall be amended so as to strictly comply with the law and without prejudice to the rights of either party hereunder.

8.5 ASSIGNMENTS

The CONTRACTOR shall not assign, transfer, convey or otherwise dispose of this contract, or his right to execute it, or his right, title or interest in it or any part thereof without the previous written consent of the surety company and the written approval of the OWNER.

The CONTRACTOR shall not assign, either legally or equitably, by power of attorney or otherwise, any of the monies due or to become due under this Contract or its claim thereto without the prior written consent of the surety company and the written approval of the OWNER.
The approval of the OWNER of a particular assignment, transfer or conveyance shall not dispense with such approval to any further or other assignments.

The approval by the OWNER of any assignment, transfer or conveyance shall not operate to release the CONTRACTOR or surety hereunder from any of the Contract and bond obligations, and the CONTRACTOR shall be and remain fully responsible and liable for the defaults, negligent acts and omissions of his assignees, their agents and employees, as if they were his own.

8.6 STATE AND LOCAL SALES AND USE TAXES

The OWNER qualifies for exemption from the state and local sales and use taxes, pursuant to the provisions of Section 151.309 of the Texas Limited Sales, Excise and Use Tax Act. Therefore, the CONTRACTOR shall not pay such taxes which would otherwise be payable in connection with the performance of this Contract.

The CONTRACTOR shall issue an exemption certificate in lieu of the tax on the purchase, rental or lease of:

A. all materials, supplies, equipment and other tangible personal property incorporated into the real property being improved; and
B. all materials, supplies, equipment and other tangible personal property used or consumed by the CONTRACTOR in performing the Contract with the OWNER. Materials and supplies “used in the performance of a contract” include only those materials actually incorporated into the property being improved and those supplies directly used to incorporate such materials into the property being improved. Overhead supplies and supplies used indirectly or only incidental to the performance of the Contract with the OWNER are not included in the exemption.

Under “reasons said purchaser is claiming this exemption” in the exemption certificate, the CONTRACTOR must name the OWNER and the project for which the equipment, material and supplies are being purchased, leased or rented.

8.7 VENUE AND GOVERNING LAW

The parties agree that the laws of the State of Texas shall govern the interpretation, validity, performance and enforcement of this Construction Agreement, and that the exclusive venue for any legal proceeding involving this Construction Agreement shall be in Collin County, Texas.

8.8 NO WAIVER OF LEGAL RIGHTS

Inspection by the Engineer or OWNER; any order, measurement, quantity or certificate by the Engineer; any order by the OWNER for payment of money; any payment for or acceptance of any work; or any extension of time or any possession taken by the OWNER shall not operate as a waiver of any provisions of the contract or any power therein reserved to the OWNER of any rights or damages therein provided. Any waiver of any breach of contract shall not be held to be a waiver of any other or subsequent breach. The OWNER reserves the right to correct any error that may be discovered in any estimate that may have been paid and to adjust the same to meet the requirements of the Contract Documents. The OWNER reserves the right to recover by process of law sums as may be sufficient to correct any error or make good any deficiency in the Work resulting from such error, dishonesty or collusion by the CONTRACTOR or his agents, discovered in the Work after the final payment has been made.

Neither final acceptance of the Work, nor final payment shall relieve the CONTRACTOR of responsibility for faulty materials or workmanship, and the CONTRACTOR shall promptly remedy any defects due thereto and pay for any damage to other work resulting therefrom. Likewise, neither final acceptance nor final payment, nor partial or entire use or occupancy of the work by the OWNER shall constitute acceptance of work not done in accordance with the Contract Documents or relieve CONTRACTOR of liability with respect to any expressed or implied warranties or responsibility for faulty materials or workmanship, whether same be patently or latently defective.

8.9 OBLIGATION TO PERFORM FUNCTIONS

Any failure or neglect on the part of OWNER or Engineer or inspectors to enforce provisions herein dealing with supervision, control, inspection, testing or acceptance and approval of the work shall never operate to relieve CONTRACTOR from full compliance with the Contract Documents nor render OWNER liable to CONTRACTOR for money damages, extensions of time or increased compensation of any kind.

8.10 SUCCESSORS AND ASSIGNS

Subject to the limitations upon assignment and transfer herein contained, this contract shall be binding upon and inure to the benefit of the parties hereto, their respective successors and assigns.

8.11 HEADINGS

The title and headings contained in the Contract Documents and the subject organization are used only to facilitate reference, and in no way define or limit the scope of intent of any of the provisions of this Contract.

8.12 ENTIRE AGREEMENT; AMENDMENTS; BINDING EFFECT

This Construction Agreement, including the Contract Documents and all the documents incorporated therein represents the entire and integrated agreement between the OWNER, Collin County, and the CONTRACTOR, and supersedes all prior negotiations, representations, or agreements, either written or oral. This Construction Agreement may be amended only by written instrument signed by both, the OWNER, Collin County, and the CONTRACTOR. CONTRACTOR acknowledges that no representations have been made to it, upon which it is relying in entering into this Contract, which are not expressly set forth in the Contract Documents.

8.13 INTERPRETATION

Although this Agreement is drafted by the OWNER, Collin County, should any part be in dispute, the parties agree that this Contruction Agreement shall not be construed more favorable for either party. No rule of construction requiring that ambiguities in this Contract shall be construed more favorably for either party shall apply.

8.14 EXPENSES FOR ENFORCEMENT

In the event either Party hereto is required to employ an attorney to enforce the provisions of this Agreement or is required to commence legal proceedings to enforce the provisions hereof, the prevailing Party shall be entitled to recover from the other, reasonable attorney's fees and court costs incurred in connection with such enforcement, including collection.

8.15 FORCE MAJEURE

No party shall be liable or responsible to the other party, nor be deemed to have defaulted under or breached this Agreement, for any failure or delay in fulfilling or performing any term of this Agreement, when and to the extent such failure or delay is caused by or results from acts beyond the affected party’s reasonable control, including, without limitation: acts of God; flood, fire or explosion; war, invasion, riot or other civil unrest; actions, embargoes or blockades in effect on or after the date of this Agreement; or national or regional emergency (each of the foregoing, a “Force Majeure Event”). A party whose performance is affected by a Force Majeure Event shall give notice to the other party, stating the period of time the occurrence is expected to continue and shall use diligent efforts to end the failure or delay and minimize the effects of such Force Majeure Event.

IN WITNESS WHEREOF, the parties have executed this Construction Agreement upon the year and date indicated beneath their signatures hereto.

CONTRACTOR:

_____

By: _____

_____

Date: _____

ATTEST:

_____
Secretary

COLLIN COUNTY, TEXAS:

By: _____
Michelle Charnoski, NIGP-CPP, CPPB, Purchasing Agent

Date: _____

_____
Collin County Commissioners Court Order No.

ATTEST:

_____
Secretary

ACKNOWLEDGMENTS

STATE OF TEXAS §

COUNTY OF _____ §

BEFORE ME, _____ on this day personally appeared _____ _____, of _____, a _____corporation, known to me (or proved to me on the oath of) _____ or through _____ (description of identity card or other document) to be the person whose name is subscribed to the foregoing instrument and acknowledged to me that he/she executed the same as the act and deed of the corporation, for the purposes and consideration therein expressed and in the capacity therein stated.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the __ day of _____, 20__

_____
Notary Public, State of Texas

_____
Printed Name

My Commission expires on the _____ day of _____, _____.

STATE OF TEXAS §

COUNTY OF COLLIN §

BEFORE ME, _____ on this day personally appeared _____ _____, Purchasing Agent of COLLIN COUNTY, TEXAS, a political subdivision of the State of Texas, known to me (or proved to me on the oath of) _____ _____ or through _____(description of identity card or other document) to be the person whose name is subscribed to the foregoing instrument and acknowledged to me that he/she executed the same as the act and deed of COLLIN COUNTY, TEXAS, for the purposes and consideration therein expressed and in the capacity therein stated.

GIVEN under my hand and seal of office this the _____ day of _____ _____, 20__

_____
Notary Public, State of Texas

_____
Printed Name

My Commission expires on the _____ day of _____, _____.

Form **W-9**
(Rev. December 2014)
Department of the Treasury
Internal Revenue Service

Request for Taxpayer Identification Number and Certification

Give Form to the requester. Do not send to the IRS.

Print or type
See Specific Instructions on page 2.

1 Name (as shown on your income tax return). Name is required on this line; do not leave this line blank.

2 Business name/disregarded entity name, if different from above

3 Check appropriate box for federal tax classification; check only **one** of the following seven boxes:

☐ Individual/sole proprietor or single-member LLC ☐ C Corporation ☐ S Corporation ☐ Partnership ☐ Trust/estate

☐ Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=partnership) ▶ _____

Note. For a single-member LLC that is disregarded, do not check LLC; check the appropriate box in the line above for the tax classification of the single-member owner.

☐ Other (see instructions) ▶

4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3):

Exempt payee code (if any) _____

Exemption from FATCA reporting code (if any) _____

(Applies to accounts maintained outside the U.S.)

5 Address (number, street, and apt. or suite no.)

Requester's name and address (optional)

6 City, state, and ZIP code

7 List account number(s) here (optional)

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the Part I instructions on page 3. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN* on page 3.

Note. If the account is in more than one name, see the instructions for line 1 and the chart on page 4 for guidelines on whose number to enter.

Social security number

			–			–				

or

Employer identification number

		–							

Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
3. I am a U.S. citizen or other U.S. person (defined below); and
4. The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions on page 3.

Sign Here | **Signature of U.S. person ▶** | **Date ▶**

General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Future developments. Information about developments affecting Form W-9 (such as legislation enacted after we release it) is at *www.irs.gov/fw9*.

Purpose of Form

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following:

- Form 1099-INT (interest earned or paid)
- Form 1099-DIV (dividends, including those from stocks or mutual funds)
- Form 1099-MISC (various types of income, prizes, awards, or gross proceeds)
- Form 1099-B (stock or mutual fund sales and certain other transactions by brokers)
- Form 1099-S (proceeds from real estate transactions)
- Form 1099-K (merchant card and third party network transactions)
- Form 1098 (home mortgage interest), 1098-E (student loan interest), 1098-T (tuition)
- Form 1099-C (canceled debt)
- Form 1099-A (acquisition or abandonment of secured property)

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.

If you do not return Form W-9 to the requester with a TIN, you might be subject to backup withholding. See *What is backup withholding?* on page 2.

By signing the filled-out form, you:

1. Certify that the TIN you are giving is correct (or you are waiting for a number to be issued),
2. Certify that you are not subject to backup withholding, or
3. Claim exemption from backup withholding if you are a U.S. exempt payee. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners' share of effectively connected income, and
4. Certify that FATCA code(s) entered on this form (if any) indicating that you are exempt from the FATCA reporting, is correct. See *What is FATCA reporting?* on page 2 for further information.

006111 PERFORMANCE BOND

STATE OF TEXAS §
COUNTY OF COLLIN §

KNOW ALL MEN BY THESE PRESENTS:

That _____, a corporation organized and existing under the laws of the State of _____, and fully authorized to transact business in the State of Texas, whose address is_____ of the City of _____ County of _____, and State of _____,(hereinafter referred to as "Principal"), and _____ _____ (hereinafter referred to as "Surety", a corporation organized under the laws of the State of_____ and authorized under the laws of the State of Texas to act as surety on bonds for principals, are held and firmly bound unto _____(hereinafter referred to as "Owner") and unto all persons, firms and corporations who may furnish materials for or perform labor upon the buildings, structures or improvements referred to in the attached Contract, , in the penal sum of _____ Dollars ($_____) (not less than 100% of the approximate total amount of the Contract as evidenced in the proposal plus 10-percent of the stated penal sum as an additional sum of money representing additional court expenses, attorneys' fees, and liquidated damages arising out of or connected with the below identified Contract) in lawful money of the United States, for the payment whereof, the said Principal and Surety bind themselves, and their heirs, administrators, executors, successors, and assigns, jointly and severally, firmly by these presents:

WHEREAS, the Principal has entered into a certain written contract with the Owner, dated the _____day of _____ , 202____ , to which said Contract is hereby referred to and made a part hereof and as fully and to the same extent as if copied at length herein for the construction of IFB 2021-351, HVAC Replacement, 900 Park Blvd. Building.

CONDITION OF THIS OBLIGATION IS SUCH, that if the said Principal fully and faithfully executes the work and performance of the Contract in accordance with the plans specifications, and Contract Documents, including any extensions thereof which may be granted with or without notice to Surety, during the original term thereof, and during the life of any guaranty required under the Contract, and according to the true intent and meaning of said Contract and the plans and specifications hereto annexed, if the Principal shall repair and/or replace all defects due to faulty materials or workmanship that appear within a period of one year from the date of final completion and final acceptance of the work by OWNER; and if the Principal shall fully indemnify and save harmless the OWNER from all costs and damages which OWNER may suffer by reason of failure to so perform herein and shall fully reimburse and repay OWNER all outlay and expense which the OWNER may incur in making good any default or deficiency, then this obligation shall be void; otherwise, to remain in full force and effect; and in case said CONTRACTOR shall fail to do so, it is agreed that the OWNER may do said work and supply such materials and charge the same against said CONTRACTOR and Surety on this obligation. Provided further, that if any legal action be filed on this Bond, venue shall lie in Collin County, Texas.

"PROVIDED, HOWEVER, that this bond is executed pursuant to the provisions Texas Government Code, Chapter 2253, as amended, and Chapter 3503 of the Texas Insurance Code, as amended, and all liabilities on this bond shall be determined in accordance with the provisions of said articles to the same extent as if they were fully copied at length herein.

Surety, for value received, stipulates and agrees that the bond shall automatically be increased by the amount of any Change Order or supplemental agreement which increases the Contract price with or without notice to the Surety, but in no event shall a Change Order or Supplemental Agreement which reduces the Contract price decrease the penal sum of the Bond. And further that no change, extension of time, alteration, or addition to the terms of the Contract, or to the work performed thereunder, or the plans, specifications, or drawings accompanying the same shall in any way affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration, or addition to the terms of the Contract or to the work to be performed thereunder.

Surety agrees that the bond provides for the repairs and/or replacement of all defects due to faulty materials and workmanship that appear within a period of one (1) year from the date of completion and acceptance of the improvement by the OWNER.

The undersigned and designated agent is hereby designated by Surety herein as the agent resident to whom any requisite notice may be delivered and on whom service of process may be had in matters arising out of such suretyship.

IN WITNESS WHEREOF, the said Principal and Surety have signed and sealed this instrument this _____day of _____ 202_____ .

WITNESS

_____

PRINCIPAL

_____

Printed/Typed Name_____

Title:_____

Company:_____

_____

Address:_____

_____

WITNESS

_____

SURETY

_____

Printed/Typed Name _____

Title: _____

Company: _____

_____

Address: _____

_____

The Resident Agent of the Surety for delivery of notice and service of process is:

Name: _____

Address: _____

Phone Number: _____

Note: Date of Bond must NOT be prior to date of contract.

Revised 11/2008

006113 PAYMENT BOND

STATE OF TEXAS §
COUNTY OF COLLIN §

KNOW ALL MEN BY THESE PRESENTS:

That _____, a corporation organized and existing under the laws of the State of _____, and fully authorized to transact business in the State of Texas, whose address is_____ of the City of _____ County of _____, and State of _____ ,(hereinafter referred to as "Principal"), and _____ (hereinafter referred to as "Surety", a corporation organized under the laws of the State of_____ and authorized under the laws of the State of Texas to act as surety on bonds for principals, are held and firmly bound unto _____(hereinafter referred to as "Owner") and unto all persons, firms and corporations who may furnish materials for or perform labor upon the buildings, structures or improvements referred to in the attached Contract, , in the penal sum of _____ Dollars ($_____) (not less than 100% of the approximate total amount of the Contract as evidenced in the proposal) in lawful money of the United States, for the payment whereof, the said Principal and Surety bind themselves, and their heirs, administrators, executors, successors, and assigns, jointly and severally, firmly by these presents:

WHEREAS, the Principal has entered into a certain written contract with the Owner, dated the _____day of _____ , 202____ , to which said Contract is hereby referred to and made a part hereof and as fully and to the same extent as if copied at length herein for the construction of IFB 2021-351, HVAC Replacement, 900 Park Blvd. Building.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that the bond guarantees the full and proper protection of all claimants supplying labor and material in the prosecution of the work provided for in said Contract and for the use of each claimant, and that conversely should the Principal faithfully perform said Contract and in all respects duly and faithfully observe and perform all and singular the covenants, conditions, and agreements in and by said Contract, agreed to by the Principal, and according to the true intent and meaning of said Contract and the claims and specifications hereto annexed, and any and all duly authorized modifications of said Contract that may hereafter be made, notice of which modification to Surety being hereby waived, then this obligation shall be void; otherwise, to remain in full force and effect. Provided further, that if any legal action be filed on this Bond, venue shall lie in Collin County, Texas.

"PROVIDED, HOWEVER, that this bond is executed pursuant to the provisions Texas Government Code, Chapter 2253, as amended, and Chapter 3503 of the Texas Insurance Code, as amended, and all liabilities on this bond shall be determined in accordance with the provisions of said articles to the same extent as if they were fully copied at length herein.

Surety, for value received, stipulates and agrees that the bond shall automatically be increased by the amount of any Change Order or supplemental agreement which increases the Contract price with or without notice to the Surety and that no change, extension of time, alteration or addition to the terms of the Contract, or to the work performed thereunder, or the plans, specifications, or drawings accompanying the same, shall in anyway affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract, or to the work to be performed thereunder.

The undersigned and designated agent is hereby designated by Surety herein as the agent resident to whom any requisite notice may be delivered and on whom service of process may be had in matters arising out of such suretyship.

IN WITNESS WHEREOF, the said Principal and Surety have signed and sealed this instrument this _____day of _____ 202_____ .

WITNESS

_____

PRINCIPAL

_____

Printed/Typed Name_____

Title:_____

Company:_____

_____

Address:_____

_____

WITNESS

_____

SURETY

_____

Printed/Typed Name _____

Title: _____

Company: _____

_____

Address: _____

_____

The Resident Agent of the Surety for delivery of notice and service of process is:

Name: _____

Address: _____

Phone Number: _____

Note: Date of Bond must NOT be prior to date of contract.

Revised 11/2008

006119 MAINTENANCE BOND

STATE OF TEXAS §
COUNTY OF COLLIN §

KNOW ALL MEN BY THESE PRESENTS:

That _____, a corporation organized and existing under the laws of the State of _____, and fully authorized to transact business in the State of Texas, whose address is_____ of the City of _____ County of _____, and State of _____,(hereinafter referred to as "Principal"), and _____ _____ (hereinafter referred to as "Surety", a corporation organized under the laws of the State of_____ and authorized under the laws of the State of Texas to act as surety on bonds for principals, are held and firmly bound unto _____(hereinafter referred to as "Owner") and unto all persons, firms and corporations who may furnish materials for or perform labor upon the buildings, structures or improvements referred to in the attached Contract, , in the penal sum of _____ Dollars ($_____) in lawful money of the United States, for the payment whereof, the said Principal and Surety bind themselves, and their heirs, administrators, executors, successors, and assigns, jointly and severally, firmly by these presents:

WHEREAS, the Principal has entered into a certain written contract with the Owner, dated the _____day of _____ , 202____ , to which said Contract is hereby referred to and made a part hereof and as fully and to the same extent as if copied at length herein for the construction of IFB 2021-351, HVAC Replacement, 900 Park Blvd. Building.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that the bond guarantees the full and proper maintenance and repair of the work herein contracted to be done and performed for a period of _____ year(s) from the date of acceptance and Principal will do all necessary backfilling that may arise on account of sunken conditions in ditches, or otherwise, and do and perform all necessary work and repair any defective condition growing out of or arising from the improper laying or construction of same, or on account of any breaking of same caused by said CONTRACTOR in construction of same , or on account of any defect arising in any of said work laid or constructed by said CONTRACTOR or on account of improper excavation or backfilling, it being understood that the purpose of this section is to cover all defective conditions arising by reason of defective materials, work or labor performed by said CONTRACTOR, then this obligation shall be void; otherwise, to remain in full force and effect; and in case said CONTRACTOR shall fail to do so, it is agree that the OWNER may do said work and supply such materials and charge the same against said CONTRACTOR and Surety on this obligation. Provided further, that if any legal action be filed on this Bond, venue shall lie in Collin County, Texas.

"PROVIDED, HOWEVER, that said Surety, for value received, stipulates and agrees the bond shall automatically be increased by the amount of any Change Order or supplemental agreement which increases the Contract price with or without notice to the Surety and that no change, extension of time, alteration or addition to the terms of the Contract, or to the work performed thereunder, or the plans specifications, or drawings accompanying the same shall in any way affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration, or addition to the terms of the Contract or to the work to be performed thereunder.

The undersigned and designated agent is hereby designated by Surety herein as the agent resident to whom any requisite notice may be delivered and on whom service of process may be had in matters arising out of such suretyship.

IN WITNESS WHEREOF, the said Principal and Surety have signed and sealed this instrument this _____day of _____ 202_____ .

WITNESS

_____

PRINCIPAL

_____
Printed/Typed Name_____
Title:_____
Company:_____
_____
Address:_____
_____

WITNESS

_____

SURETY

_____
Printed/Typed Name _____
Title: _____
Company: _____
_____
Address: _____
_____

The Resident Agent of the Surety for delivery of notice and service of process is:
Name: _____
Address: _____
Phone Number: _____

Note: Date of Bond must NOT be prior to date of contract.

Revised 11/2008

SECTION 23 00 10 - MECHANICAL SUBMITTAL PROCESS

PART 1 - `GENERAL

1.1 SUBMITTALS

A. Comply with all submittal provisions of Division 1.

B. Submit electronic copies of the submittal to the prime consultant (i.e. engineer) in order to process and track the submittals properly in accordance with Division 1 and 23 submittal requirements. Consultants are to submit all submittals and RFI's to the mechanical engineer electronically. Send to **"mdengca@md-eng.com".** Submittals shall be labeled by their project specification section or CSI specification section if not listed in project specifications.

C. Contractor is responsible to separate submittals per specification section. Unseparated submittals are subject to rejection without review.

D. Allow a minimum of ten (10) working days for the review of submittals and each re-submittal.

E. Submittals that have been reviewed and marked as REJECTED (REJ) or REVISE & RESUBMIT (RES) should be resubmitted within 10 days to be reviewed again by engineer.

F. Compliance with the Contract documents shall be the sole responsibility of the Contractor. Items on equipment that are were not accepted by the Engineer in writing as an approved equal shall be replaced or revised to comply with the contract documents at the Contractor's expense.

G. Resubmission of rejected submittals shall be limited to one (1) in number. Costs for processing subsequent resubmittals in excess of the first resubmittal, resulting from the Contractor's disregard of Engineer's primary submittal rejection comments, shall be borne by the Contractor. Costs shall be based on Engineer's hourly rates as published in their current professional fee schedules and shall also include reimbursable costs for delivery, mailing, and photocopies at direct cost plus ten percent (10%).

1.2 REQUIRED SPECIFICATIONS (Project specific)

A. The chart below are the submittals required for the project.

1. Submittals marked with an "**X**" are required for this project.
2. Submittals without an "**X**" are not required for this project.

See required specifications on next page

Required X	Submittal Name	Spec Referenc
	Mechanical Demolition	23 04 10
X	**Common Work Results for HVAC** *-O&M manual, Shop Drawings*	23 05 00
X	**Common Motor Requirements for HVAC** *-Polyphase Motors, Single Phase Motors,* *-Motor Starters*	23 05 13
X	**Hangers & Supports for HVAC Piping & Equip.** *-Hangers and supports, Inserts, Hanger rods* *-Sleeves, Trapezes*	23 05 29
	Noise & Vibration Control for HVAC Piping	23 05 41
X	**Vibration & Seismic Controls for HVAC Pipe, etc.** *-Isolation material, Support units,*	23 05 48
X	**Identification for HVAC Piping & Equipment** *-Valve tags, Pipe markers, Equipment plates,*	23 05 53
	Testing, Adjusting & Balancing for HVAC *-Certifications*	23 05 93
X	**HVAC Insulation** *-Piping Insulation, Duct insulation, Adhesives* *-Sealants, Covers, Aluminum UV covers.*	23 07 00
	Commissioning of HVAC *-Commissioning Plan, Narrative* *-FTP (functional performance tests)*	23 08 00
	Commissioning Functional Performance Testing	23 08 10
	Commissioning Facility Start Up	23 08 20

Required X	Submittal Name	Spec Referenc
	Instrumentation & Control for HVAC *-Shop drawings, Software, Equipment*	23 09 00
	Direct-Digital Control System for HVAC	23 09 23
	Sequence of Operations for HVAC Controls *-Control system, Shop drawings. Testing*	23 09 93
	Facility Natural Gas Piping *-Piping, Valves, Cocks, Regulators, Flanges*	23 11 23
	Facility Underground Propane Fuel Storage *- Underground Vessel; Pipe & Fittings; Valves, and Specialties; Pressure regulators*	23 13 13
	Hydronic Piping	23 21 13
	Hydronic Pumps *-Manufacturers, Closed-coupled pumps (see* *-Auto Condensate pumps; Pump specialty fittings*	23 21 23
	Steam & Condensate Heating Piping	23 22 13
X	**Refrigeration Piping** *-Pipe, Fittings, Valves, Cocks, Hangers, Sleeves* *-Trapezes, Brazing Rod*	23 23 00
	HVAC Water Treatment	23 25 00
	Variable Frequency Motor Controllers (VFD) *-Manufacturer, Product info*	23 29 23
X	**Air Distribution** *-Duct Work, Flexible duct, Access doors* *-Fire & Smoke dampers*	23 31 13
	Ventilation Ducts *-Product Details. See Spec for more details*	23 31 13.01

Required X	Submittal Name	Spec Reference
	Exterior Ducts *-Product Details. See Spec for more details*	23 31 13.02
X	**Hangers & Supports for Duct Work** *-duct hangers*	23 31 50
	HVAC Fans	23 34 00
	HVAC Power Ventilators *-Up blast, Belt driven, Utility fans, V-belt*	23 34 23
	Vehicle Exhaust Removal-Filtration System *- Equipment*	23 35 16
	Air Terminal Units *-Boxes, Coils, Control perform/sequences, DDC systems*	23 36 10
	Diffusers, Registers, Grills *-Air supplies, Returns, Louvers, Roof hoods* *-Louvered penthouse, Goosenecks*	23 37 13
	Commercial Kitchen Hoods *-Product Data, Shop Drawings*	23 38 13
	HVAC Air Cleaning Devices	23 40 00
	Heat Generation Equipment *-Tubular Infrared Heaters, Heater flues*	23 50 00
	Heating Boilers *-Product Data-See Specification.*	23 52 00
	Fuel-Fired Heaters	23 55 00
	Air-Cooled Condensers *-Manufacturers, Air-cooled condensers, Aux equip*	23 63 13

Required X	Submittal Name	Spec Reference
	Refrigeration Equipment *-Product Data as Scheduled*	23 64 27
	Indoor Central-Station Air-Handling Units	23 73 00
	Packaged Outdoor HVAC Equipment *-Packaged Equipment, Controls, Hail Guards*	23 74 00
	Dedicated OSA Units *-Equipment*	23 75 00
X	**DX Split System** *-DC Condensing Unit, Gas-fired Furnace*	23 76 00
	VRF Air Conditioning Systems (General) *-VRF Equipment, Condenser, FCU,* *- Refrigeration selector boxes, Controls*	23 81 49
	VRF Air Conditioning Systems (LG) *-VRF Equipment, Condenser, FCU,* *- Refrigeration selector boxes, Controls*	23 81 49
	VRF Air Conditioning Systems (Mitsubishi) *-VRF Equipment, Condenser, FCU,* *- Refrigeration selector boxes, Controls*	23 81 49
	VRF Air Conditioning Systems (Daikin) *-VRF Equipment, Condenser, FCU,* *- Refrigeration selector boxes, Controls*	23 81 49
	VRF Air Conditioning Systems (Toshiba) *-VRF Equipment, Condenser, FCU,* *- Refrigeration selector boxes, Controls*	23 81 49
	Air Coils *-Heating & cooling coils, Reheat coils-duct*	23 82 16
	Unit Heaters *-Electric UH, Gas UH, Flue piping*	23 82 39
	Humidity Control Equipment *-Product Details. See Spec for more details*	23 84 00

END OF SECTION

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SECTION 23 05 00 - COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to the Work in this Section.

1.2 DESCRIPTION

A. The General Requirements for Mechanical Work are intended to be complementary to the General Requirements of the Construction Contract.

B. Work Included: Provide complete mechanical systems where shown on the drawings, as specified herein, and as needed for a complete and proper installation including, but not necessarily limited to the following summary of work:

1. Furnish and install a complete heating and air conditioning system as shown on drawings and described herein.
2. Other items and services required to complete the systems.

1.3 GENERAL REQUIREMENTS

A. Unless otherwise specified, materials are to be new and of current U.S. manufacture, free from defects and of the best quality of their respective kinds.

B. Equipment and/or materials damaged in shipment or handling, or otherwise damaged before installation, shall be replaced with new equipment and/or materials. Damaged equipment and/or materials shall not be repaired at the jobsite.

C. Furnishing of the proper equipment and/or materials and to see that it is installed as recommended by the manufacturer is entirely the responsibility of the Contractor. If required for proper installation, the Contractor shall obtain advice and supervisory assistance from a representative of the specific manufacturer of the equipment being installed.

D. Materials and adhesives to conform to Federal Standard Flame-Spread Properties, Inc., with composite fire and smoke hazard ratings, maximum 25 for flame spread and 50 for smoke developed. Adhesives to be waterproof.

E. The Contractor shall promptly notify the Engineer in writing of any conflict between the requirements of the Contract Documents and the manufacturer's directions and shall obtain the Engineer instructions before proceeding with the work. Should the Contractor perform any such work that does not comply with the manufacturer's directions or such instructions from the Engineer, he shall bear all costs arising in connection with the deficiencies.

F. Belts, pulleys, chains, gears, couplings, projecting screws, keys or other rotating parts which are located so that a person can come in close proximity thereto shall be fully enclosed properly provided with a guard.

1.4 QUALITY ASSURANCE AND APPLICABLE STANDARDS

A. Use adequate numbers of skilled workers that are thoroughly trained and experienced in the necessary crafts and are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Provide all equipment, materials, labor, supervision, and services necessary for or incidental to the installation of a complete and operating refrigeration and air handling system as indicated on the drawings and as specified.

C. The Contractor shall be responsible for fitting his material and apparatus into the building and shall carefully lay out his work at the site to conform to the structural conditions, to avoid all obstructions, to conform to the details of the installation and thereby to provide an integrated satisfactory operating installation. The contractor must support all duct, pipe, equipment, and all other items furnished and installed under this scope from steel joists or structural steel frames. It is prohibited to support duct, pipe, equipment, and all other items furnished under this scope from the metal deck.

D. Without additional cost to the Owner, provide such other labor and materials as are required to complete the work of this Section in accordance with the requirements of governmental agencies having jurisdiction, regardless of whether such materials and associated labor are called for elsewhere in these Contract Documents.

E. Codes: Perform all work in accordance with the latest edition of the following codes:
1. State and city building, fire, plumbing and mechanical codes.
2. International Fire Code
3. International Mechanical Code
4. International Plumbing Code
5. International Electrical Code
6. Energy Conservation Code
7. National Fire Protection Association (NFPA)
8. American with Disabilities Act (ADA)
9. ICC/ANSI A117.1 Accessible and Useable Buildings and Facilities.
10. All authorities having jurisdiction.

F. The Contractor shall comply in every respect with all requirements of National Fire Protection Association, local Fire Department regulations and utility company requirements. In no case does this relieve the Contractor of the responsibility of complying with these Specifications and Drawings where specified conditions are of higher quality than the requirements of the above-specified authorities. Where requirements of the Specifications and Drawings are more lenient than the requirements of the above authorities having jurisdiction, the Contractor shall make installations in compliance with the requirements of the above authorities with no extra compensation.

G. Where conflicts occur between drawings, specifications or code requirements, the most stringent requirement shall take precedence.

H. Standards: The specifications and standards of the following organizations are by reference made a part of these specifications. All work, unless otherwise indicated, shall comply with the requirements and recommendations wherever applicable:
1. American National Standards Institute (ANSI).
2. Air Conditioning and Refrigeration Institute (ARI).
3. American Gas Association (AGA).
4. American Society for Testing and Materials (ASTM).
5. American Society of Mechanical Engineers (ASME).
6. American Society of Refrigeration, Heating and Air Conditioning Engineers (ASHRAE).
7. Electrical Testing Laboratories (ETL).
8. National Bureau of Standards (NBS).
9. National Electrical Manufacturer's Association (NEMA).
10. National Fire Protection Association (NFPA).
11. Sheet Metal and Air Conditioning National Association (SMACNA).
12. Underwriters Laboratories, Inc. (UL).

I. Welding Qualifications: Qualify procedures and personnel according to the following:
1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. ASME Boiler and Pressure Vessel Code: Section IX.

1.5 REQUIREMENTS OF REGULATORY AGENCIES

A. The requirements and recommendations of the latest edition of the Occupational Safety and Health Administration (OSHA) Act are by reference made a part of these specifications. All work shall comply with the requirements and recommendations wherever applicable.

1.6 SUBMITTALS

A. Comply with all submittal provisions of Division 1.

B. Submit electronic copies of the submittal to the prime consultant (i.e. engiener) in order to process and track the submittals properly in accordance with Division 1 and 23 submittal requirements. Consultants are to submit all submittals and RFI's to the mechanical engineer electronically. Send to **"mdengca@md-eng.com".** Submittals shall be labeled by their project specification section or CSI specification section if not listed in project specifications

C. Product Data: Submit the following:

1. Materials list of items proposed to be provided under Division 23.
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements. The term "Compliance" is understood to mean that the Contractor certifies that the submitted equipment will meet or exceed the contract document requirements. Items that do not clearly meet this definition should be identified and explained as required in the following paragraph.
3. Identify the difference between the specified item or function and the proposed. Explain with enough detail so that the Engineer/Owner can easily determine that the item complies with the functional intent. List any disadvantages or advantages of the proposed item versus the specified item. Submit technical data sheets and/or pictures and diagrams to support and clarify. Organize in a clear and concise format. All substitutions shall be approved in writing by Engineer. The Engineer's decision shall be final.
4. Allow a minimum of ten (10) working days for the review of submittals and each re-submittal.
5. Submittals that have been reviewed and marked as REJECTED (REJ) or MAKE CORRECTIONS NOTED (MCN) should be resubmitted within 10 days to be reviewed again by engineer.
6. Compliance with the Contract documents shall be the sole responsibility of the Contractor. Items on equipment that are were not accepted by the Engineer in writing as an approved equal shall be replaced or revised to comply with the contract documents at the Contractor's expense.
7. Manufacturer's recommended installation procedures which, when reviewed by the Engineer, shall become the basis for accepting or rejecting actual installation procedures used on the work.
8. Sign the submittal as an indication of compliance with the contract documents. Any deviations from the contract documents shall be indicated on the submittal prior to signing. Any deviations not indicated shall be cause for rejection and removal of the non-complying equipment at the Contractor's expense.

D. Submittals required of materials and equipment under this section include the following:

1. Piping and Accessories Materials:
   a. **Clearly marked up** manufacturer's data showing compliance with the specifications for: **(Include model numbers and highlight products)**
      1) Piping material proposed for each system.
      2) Valves, cocks, and specialties.
      3) Flexible connectors for piping.
      4) Flanges.
2. Vibration Isolation and Sound Control Materials:
   a. **Submit shop drawings** showing the structural design and details of inertia bases, steel beam bases, and other custom-fabricated work not covered by manufacturer's submitted data.

b. Furnish layouts of templates to be furnished to fabricators of equipment bases, foundations, and other support systems, as needed for coordination of vibration isolation units with other work.
c. Submit shop drawings indicating the scope of vibration isolation work, locations of units and flexible connections. Include support isolation points for piping, air handling units, inertia bases, etc.
d. Include schedule of isolation units, showing size or manufacturer's part number, the weight supported and resulting deflection of each unit.
e. For spring isolation units, show wire size, spring diameter, free height, solid-compression height, operating height, fatigue characteristics and ratio of horizontal to vertical stiffness.
f. For spring-and-pad type isolation units, show the basis of spring rate selection for the range of loading weights.

3. Mechanical Identification Materials:
   a. **Clearly marked-up** product literature or samples showing compliance with specified materials for: **(Include model numbers and highlight products)**
      1) Valve tagging.
      2) Pipe marking.
      3) Equipment marking.
4. Insulation:
   a. Manufacturer's certified data on thermal performance.
   b. Details, when required, of methods to be used in providing for unusual piping expansion and contraction.
   c. Manufacturer's data on any alternate insulation material of reduced thickness, including pre-insulated pipe.
   d. Manufacturer's data on all jacketing materials, sealants and fasteners.
5. Refrigeration:
   a. **Provide clearly marked-up** manufacturer's data showing compliance with scheduled values and specifications for: **(Include model numbers and highlight products)**
      1) Condensing Units
   b. Provide all electrical characteristics.
6. Air Handling:
   a. **Provide clearly marked-up** manufacturer's data showing compliance with scheduled values and specifications for: **(Include model numbers and highlight products)**
      1) AHU, factory assembled.
      2) Fan coil units.
      3) Filters.
   b. Provide all electrical characteristics.
7. Testing and Balancing:
   a. Brief description of test and balance contractor experience.
   b. Certificate of Qualification from AABC.
   c. Biographical information of the certified Test and Balance Supervisor proposed to manage the project.
   d. List of instruments to be used with latest date of calibration test for each.
   e. Test and balance reports.
8. Record Documents: Reference the requirements detailed in this section.
9. Operation and Maintenance Data: Reference the requirements detailed in this section.

E. Resubmission of rejected submittals shall be limited to one (1) in number. Costs for processing subsequent resubmittals in excess of the first resubmittal, resulting from the Contractor's disregard of Engineer's primary submittal rejection comments, shall be borne by the Contractor. Costs shall be based on Engineer's hourly rates as published in their current professional fee schedules and shall also include reimbursable costs for delivery, mailing, and photocopies at direct cost plus ten percent (10%).

1.7 SUBSTITUTIONS

A. Comply with all provisions of Division 1.

B. The use of manufacturers' names and catalog numbers followed by the phrase "or equal" is generally used to establish a standard of quality and utility for the specified items and to provide a dimensional reference for construction documents that are drawn to scale.

C. Submittals for "equal" items shall, where applicable, include the following data that are not necessarily required for specified items:

1. Performance characteristics.
2. Materials.
3. Finish.
4. Certification of conformance with specified codes and standards.
5. Manufacturer's specifications and other data needed to prove compliance with the specified requirements. The term "Compliance" is understood to mean that the Contractor certifies that the submitted equipment will meet or exceed the contract document requirements. Items that do not clearly meet this definition should be identified and explained as required in Paragraph 6 below.
6. Identify the difference between the specified item or function and the proposed. Explain with enough detail so that the Engineer/Owner can easily determine that the item complies with the functional intent. List any disadvantages or advantages of the proposed item versus the specified item. Submit technical data sheets and/or pictures and diagrams to support and clarify. Include shop drawings for all piping and ductwork equipment per Paragraph 1.5 Submittals. Organize in a clear and concise format

D. Submittals of "equal" components or systems may be rejected if:

1. The material or equipment would necessitate the alteration of any portion of the mechanical, electrical, architectural or structural design.
2. Dimensions vary from the specified material or equipment in such a manner that accessibility or clearances are impaired or the work of other trades is adversely affected.

E. Proposed substitutions for materials or equipment must be submitted ten (10) days prior to final bid date for consideration as approved equals. Otherwise, such substitutions will not be permitted. Proposals for substitutions shall be made only by the prime bidders. Manufacturers, distributors, and sub-contractors shall not make proposals to the Architect for substitutions.

F. All equipment installed on this project shall have local representation, local factory authorized service, and a local stock of repair parts

G. No substitution shall be made unless authorized in writing by the Architect. Should a substitution be accepted, and should the substitute material prove defective or otherwise unsatisfactory for the service intended, and within the guarantee period, the Contractor shall replace this material or equipment with material or equipment specified, at his own expense, and to the satisfaction of the Architect.

H. Contractors submitting bids on substitute materials and equipment must also provide a written performance guarantee certifying that the substitute materials and equipment will produce the specified effects and meet the approval of the Architect.

1.8 ORDINANCES, PERMITS, METERS, UTILITIES AND ROYALTIES

A. Procure all permits and licenses necessary for completion of this project and pay all lawful fees required and necessary pursuant in obtaining said permits and licenses. All required certificates of approvals and inspections by local governing and regulating authorities shall be obtained and paid for by the Contractor.

B. Pay all fees required for the connection to utility mains, and any meter fees if required.

C. Pay any royalty payments required or fees for the use of patented equipment or systems. Defend all law suits or claims for infringement of any patent rights and shall hold the Owner and/or Engineer harmless from loss as a result of said suits or claims.

1.9 COMPATIBILITY OF EQUIPMENT

A. Assume full responsibility for satisfactory operation of all component parts of the mechanical systems to assure compatibility of all equipment and performance of the integrated systems in accordance with the requirements of the specifications. Should the Contractor consider any part of the specifications or drawings as rendering his acceptance of such responsibility impossible, prohibitive, or restrictive, he shall notify the Engineer before submitting his bid, and the bid shall be accompanied by a written statement of any objections or exceptions to the specifications and drawings.

B. The size of mechanical and electrical equipment indicated on the Drawings is based on the dimensions of a particular manufacturer. While other manufacturers may be acceptable, it is the responsibility of the Contractor to determine if the equipment he proposes to furnish will fit in the space. Fabrication Drawings shall be prepared when required by the Architect/Engineer or Owner to indicate a suitable arrangement.

C. All equipment shall be installed in a manner to permit access to all surfaces. All valves, motors, drives, filters, and other accessory items shall be installed in a position to allow removal for service without disassembly of another part.

1.10 CONSTRUCTION REQUIREMENTS

A. The drawings show the arrangements of work. Should project conditions necessitate rearrangement, or if the materials or equipment can be installed to a better advantage in a different manner, the Contractor shall, before proceeding with the work, prepare and submit five copies of Drawings of the proposed arrangement for the Architect's review. Allow a minimum of ten (10) working days for review.

B. Should the Contractor propose to install equipment requiring space conditions other than those shown, or rearrange the equipment, he shall assume responsibility for the rearrangement of the space and shall have the Engineer review the change before proceeding with the work. The request for such changes shall be accompanied by shop drawings of the space in question. Identify monetary credits proposed or other benefits of the change. Allow a minimum of ten (10) working days for review.

C. The Contractor shall be responsible for the proper location and size of all slots, holes or openings in the building structure pertaining to his work and for the correct location of pipe sleeves.

1.11 CONNECTIONS FOR OTHERS

A. After the equipment is set in place, this Contractor shall make all final connections and shall provide all required pipe, fittings, valves, traps, etc.

B. Provide all air gap fittings required, using materials hereinbefore specified. In each service line connected to an item of equipment or piece of machinery, provide a shutoff valve. On each drain not provided with a trap, provide a suitable trap.

C. All pipe fittings, valves, traps, etc., exposed in finished areas and connected to chrome plated lines provided by others shall be chrome plated to match.

D. Provide all galvanized sheet metal ductwork, transition pieces, etc., required for a complete installation. Exposed sheet metal shall be paint-grip type.

1.12 PROJECT RECORD DOCUMENTS

A. Provide the record documents associated with the work of Division 23 in strict accordance with the provisions of these specifications.

B. Throughout progress of the Division 23 Work, maintain an accurate record of changes in the Contract Documents that apply to work of Division 23. Changes shall include all addendums issued during bidding. Maintain an accurate record of the location of mechanical service lines and outlets and all outside utilities.

C. Delegate the responsibility for maintenance of Record Documents to one person on the Contractor's staff as approved by the Architect.

D. Accuracy of Records
   1. Thoroughly coordinate changes within the Record Documents, making adequate and proper entries on each page of Specifications and each sheet of drawings and other documents where such entry is required to show the change properly. Match the symbology and format of the base documents.
   2. Accuracy of records shall be such that a future verification of items shown in the Contract Documents may rely reasonably on information obtained from the approved Project Record Documents.

E. Maintain the job set of Record Documents completely protected from deterioration and from loss and damage until completion of the work and transfer of all recorded data to the final Project Record Documents.

F. Making Entries on Drawings
   1. Using an erasable colored pencil (not ink or indelible pencil), clearly describe the change by graphic line and note as required.
   2. Date all entries.
   3. Call attention to the entry by a "cloud" drawn around the area or areas affected.
   4. In the event of overlapping changes, use different colors for the overlapping changes.
   5. Make entries within 24 hours after receipt of information that the change has occurred.
   6. Maintain the base drawing format and use the same symbology.
   7. Convert field mark-ups to finished CADD record drawings when required in this section.

G. Conversion of Schematic Layouts
   1. In some cases on the drawings, arrangements of ductwork and piping and similar items are shown schematically and are not intended to portray precise physical layout. Determine final physical arrangement subject to the Engineer’s approval. However, design of future modifications of the facility may require accurate information as to the final physical layout of items which are shown only schematically on the drawings.
   2. Show on the job set of record drawings, by dimension accurate to within one inch, the centerline of each run of items such as all sleeves and piping, etc., below grade, in walls, or in the concrete slab. A surface mounted device indicates the exact location:
      a. Clearly identify the item by accurate note such as "Sanitary Sewer" and the like.
      b. Show, by symbol or note, the vertical location of the item "under slab," "in ceiling plenum," "exposed," and the like.
      c. Make all identification sufficiently descriptive that it may be related reliably to the specifications.

H. Final Project Record Documents
   1. The purpose of the final Project Record Documents is to provide factual
   2. information regarding all aspects of the Work, both concealed and visible, to enable future modification of the Work to proceed without lengthy and expensive site measurement, investigation, and examination.
   3. Provide CAD electronic files in .dwg format using AutoCAD software.
   4. Provide completed record drawings on USB drive and one full size hard copy of each drawing.
   5. Refer to Division 1 for additional requirements.

I. OPERATION AND MAINTENANCE DATA
   Submit two copies of a preliminary draft of the proposed manual or manuals to the Architect for review and comments. Allow a minimum of ten (10) working days for review.

J. Submit specified number copies of the approved manual to the Engineer prior to indoctrination of operation and maintenance personnel.

K. Prepare in accordance with the following standards:

Format:

Size: 8½" x 11"

Paper: White bond, at least 20 lb. weight

Text: Neatly written or printed

Drawings: 11" in height preferable; bind in with text; foldout acceptable; larger drawings acceptable but fold to fit within the Manual and provide a drawing pocket inside rear cover or bind in with text.

Flysheets: Separate each section of the Manual with neatly prepared flysheets briefly describing contents of the ensuing section; flysheets may be in color.

Binding: Use heavy-duty plastic or fiber-board covers with binding mechanism concealed inside the manual; 3-ring binders will be acceptable; all binding is subject to the Architect's approval.

Measurements: Provide all measurements in U.S. standard units such as feet-and-inches, lbs, and cfm. Where items may be expected to be measured within ten years in accordance with metric formulae, provide additional measurements in the "International System of Units" (SI).

L. Provide front and back covers for each manual, using durable material approved by the Architect, and clearly identified on or through the cover with at least the following information:

OPERATING AND MAINTENANCE INSTRUCTIONS

- Title Page
  - Job Name
  - Site Address
  - Include Contact information of prime contractor.
- Table of contents
- Warranty Information.
  - Include all contractor warranties
    - Signed and dated documents
- Permits-Inspections
- Subcontractor list
  - Include all subcontractors.
    - Company name, Contact info.
    - Trade Responsibility.
- Vendor list
  - Include name and addresses of vendors
    - Warranty information
    - Replaceable parts
- Approved submittals
  - Include all approved product submittals
- Reports/Certificates/Redlines
  - Engineers Observation Reports
  - Contractor Start-up Report
  - Manufacturer Start-up Report
  - Test & Balance Report
  - As-builts for Duct, & refrigeration piping
  - Owners Training Report (All Trades)
- O&M Manuals
- Equipment Information.
  - Include Model, Serial and location.
- Signed Approval
  - Page for approval signature of the engineer and approval date.

OPERATING AND MAINTENANCE MANUAL (Required Layout)

M. Contents: Include at least the following:

1. Neatly typewritten index near the front of the manual, giving immediate information as to location within the manual of all emergency information regarding the installation.
2. Complete instructions regarding operation and maintenance of all equipment provided including lubrication, disassembly, and reassembly.
3. Complete nomenclature of all parts of all equipment.
4. Complete nomenclature and part number of all replaceable parts, name and address of nearest vendor, and all other data pertinent to procurement procedures.
5. Copy of all guarantees and warranties issued.

6. Manufacturer's bulletins, drawings, and descriptive data, clearly indicating the precise items included in this installation and deleting, or otherwise clearly indicating, all manufacturers' data with which this installation is not concerned.
7. Such other data as required in other sections of these specifications.

1.13 WARRANTY

A. Contractor shall warranty all equipment and workmanship for a period of one year after date of substantial completion and replace or repair any faulty equipment or installation at no cost to the Owner for such service during this period, all in accordance with requirements of Division 1.
B. This warranty shall not void specific warranties issued by manufacturers for greater periods of time. Nor shall it void any rights guaranteed to the Owner by law.
C. Warranties shall be in writing in a form satisfactory to the Owner, and shall be delivered to the Owner before final payment is made.
D. Upon completion of the work of Division 23, thoroughly clean all exposed portions of the mechanical installation, removing all traces of soil, labels, grease, oil and other foreign material and using only the type cleaner recommended by the manufacturer of the item being cleaned.

PART 2 - PRODUCTS

2.1 NOT USED

PART 3 - EXECUTION

3.1 TESTING AND INSPECTION

A. Provide personnel and equipment, make required tests, and secure required approvals from the Engineer and governmental agencies having jurisdiction.
B. Make written notice to the Engineer adequately in advance of each of the following stages of construction:
   1. When all rough-in is complete, but not covered.
   2. As specified in all Division 23 sections.
   3. At the completion of the work of Division 23.
C. When material or workmanship is found to not comply with the specified requirements, remove the noncomplying items from the job site and replace them with items complying with the specified requirements at no additional cost to the Owner. This shall be performed within 3 days after receipt of written notice of noncompliance.

3.2 INSTALLATION METHODS

A. Unless noted otherwise, piping and ductwork may be run exposed in mechanical rooms and janitor's closets. Piping and ductwork exposed in mechanical rooms and janitor's closets shall be run tight against the structure, as required by the Engineer, allowing for expansion.
B. Conceal piping and ductwork to be installed as hereinbefore specified.
C. Piping suspended from the structure shall be adequately and properly supported on hanger rods or clamps as specified in Section 23 0529 “Hangers and Supports for HVAC Piping and Equipment”. Perforated strap hangers will not be permitted. The contractor must support all duct, pipe, equipment, and all other items furnished and installed under this scope from steel joists or structural steel frames. It is prohibited to support duct, pipe, equipment, and all other items furnished under this scope from the metal deck.
D. Where space is limited above ceilings, below concrete beams or other concrete projections, piping shall be sleeved through the beam or projection, rather than hung below. Provide sleeves where required and locate where approved by the Engineer.

E. Cut pipe accurately to measurements established at the building and install into position without springing or forcing. All open ends of pipes shall be capped or otherwise closed until the systems are closed with final connections.

F. No pipe joints nearer than 12" to a wall, ceiling or floor penetration will be permitted, unless joint is of the welded type.

G. Piping systems shall be made up straight and true and run at proper grades to permit proper flow of the contained material. Piping shall be graded for proper drainage.

H. Piping shall follow as closely as possible the routes shown on plans, which take into consideration conditions to be met at the site and in the building. Should any unforeseen conditions arise, lines shall be changed or rerouted as required after approval from the Engineer.

I. All piping shall be installed with due regard to expansion and contraction and so as to prevent excessive strain and stress in the piping and in connections to equipment.

J. All piping shall be clean when it is installed; rust and/or dirt shall be removed.

K. Screw joints shall be made with taper threads, properly cut. Threads shall be cut using graphite and oil applied to the pipe only. When threads are cut on pipes, the ends shall be carefully reamed to remove any burrs. Pipe shall be up-ended and hammered to remove all shavings and foreign material, before installing.

L. Requirements for assembling joints in cast iron and copper lines are set forth elsewhere in these specifications. For any special materials, consult the manufacturers for the recommended procedures in assembling the joints.

M. This Contractor shall provide wall or ceiling access doors for unrestricted access to all concealed items of the HVAC system.

N. Install roof pipe penetrations through sleeves, and flash with membrane flashing and roofing mastic compatible with roofing system. Roofing Supplier/Contractor shall approve roof penetration and flashing.

O. For additional installation requirements, refer to individual sections in Division 23.

3.3 CUTTING AND PATCHING

A. Perform cutting and patching associated with the work in strict accordance with the provisions of these Specifications and the following:

1. Coordinate work to minimize cutting and patching work. Cut and patch walls, floors, etc., resulting from work in existing construction or by failure to provide proper openings or recesses in new construction. If cutting and patching is required, it shall be performed by trades specializing in that type work.

2. Perform Engineer-approved cutting and demolition by methods which will prevent damage to other portions of the work and provide proper surfaces to receive installation of new work and/or repair.

a. Openings cut through concrete and masonry shall be made with masonry saws and/or core drills and at such locations acceptable to the Architect. Impact-type equipment will not be used except where specifically acceptable to the Architect.

b. Openings in precast concrete slabs or walls for pipes, etc., shall be core drilled to exact size. Oversize the hole to allow for link seals, and to deter pipe corrosion condensation from forming.

c. Where openings are cut through masonry walls, provide and install lintels or other structural supports to protect the remaining masonry. Adequate supports shall be provided during the cutting operation to prevent any damage to the masonry occasioned by the operation. All structural members, supports, etc., shall be of the proper size and shape, and shall be installed in a manner acceptable to the Architect.

d. Openings cut through plaster or drywall shall be cut prior to plaster finish coat or texture coat on drywall. Cutting of the finish coat of plaster or texture coat of drywall will not be permitted unless written approval of the Engineer is obtained.

e. Openings shall be restored and/or repaired as required to replace the cut surface to an "as-new" and/or "as original" condition. Refer to the appropriate section of the specifications for the material involved.

3. Perform fitting and adjusting of products to provide finished installation complying with the specified tolerances and finishes.

4. Provide all core drilling of holes. Where sleeves and/or blockouts are required, they shall be cut or provided at locations required. On completion of this work or as work progresses, make all repairs and do all patching required as a result of work under this Contract. All patching shall be performed in a manner that will restore the surrounding work to its original condition to the satisfaction of the Architect.

5. Assume responsibility for the proper size of all sleeves and/or blockouts in the building structure pertaining to the work and for providing the correct location of pipe sleeves and/or blockouts.

6. No cutting, boring or excavating which will weaken the structure will be permitted.

3.4 DEMOLITION AND RELOCATION

A. The Contractor shall modify, remove, and/or relocate all materials and items so indicated on the Drawings or required by the installation of new facilities. All removals and/or dismantling shall be conducted in a manner as to produce maximum salvage. Salvage materials shall remain the property of the Owner, and shall be delivered to such destination or otherwise disposed of as directed by the Owner. Materials and/or items scheduled for relocation and which are damaged during dismantling or reassembly operations shall be repaired and restored to good operative condition. The Contractor may, at his discretion, and upon the approval of the Owner, substitute new materials and/or items of like design and quality in lieu of materials and/or items to be relocated.

B. All items which are to be relocated shall be carefully removed in reverse to original assembly or placement and protected until relocated. The Contractor shall clean and repair and provide all new materials, fittings, and appurtenances required to complete the relocations and to restore to good operative order. All relocations shall be performed by workmen skilled in the work and in accordance with standard practice of the trades involved.

C. When items scheduled for relocation and/or reuse are found to be in damaged condition before work has been started on dismantling, the Contractor shall call the attention of the Owner to such items and receive further instructions before removal. Items damaged in repositioning operations are the Contractor's responsibility and shall be repaired or replaced by the Contractor as approved by the Owner, at no additional cost to the Owner.

D. Service lines and wiring to items to be removed, salvaged, or relocated shall be removed to points indicated on the Drawings, specified, or acceptable to the Owner. Service lines and wiring not scheduled for reuse shall be removed to the points at which reuse is to be continued or service is to remain. Such services shall be sealed, capped, or otherwise tied-off or disconnected in a safe manner acceptable to the Owner. All disconnections or connections into the existing facilities shall be done in such a manner as to result in minimum interruption of services to adjacent occupied areas. Services to existing areas or facilities which must remain in operation during the construction period shall not be interrupted without prior specific approval of the Owner as hereinbefore specified.

3.5 JOBSITE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Include required work to correct conditions detrimental to the timely and proper completion of all Division 21 Work. Do not proceed until unsatisfactory conditions are corrected.

B. The Contractor shall at all times take such precautions as may be necessary to properly protect all materials and equipment from damage from the time of delivery until the completion of the work. This shall include the erection of all required temporary shelters and supports to adequately protect any items stored in the open on the site from the weather, the ground and surrounding work; the cribbing of any items above the floor of the construction; and the covering of items in the incomplete building with tarpaulins or other protective covering; the installation of electric heaters in electrical switchgear and similar equipment to prevent moisture damage. Failure on the part of the Contractor to comply with the above will be sufficient cause for the rejection of the items in question.

C. Take particular care not to damage the building structure in performing work. All finished floors, step treads, and finished surfaces shall be covered to prevent any damage by workmen or their tools and equipment during the construction of the building.

D. Equipment and materials shall be protected from rust both before and after installation. Any equipment or materials found in a rusty condition at the time of final inspection must be cleaned of rust and repainted as specified elsewhere in these Specifications.

3.6 STORAGE AND PROTECTION

A. Contractor shall provide the required protection of equipment and materials from the time of delivery until the completion of the Work. Protect from damage, rust, rain, humidity and dust.

B. Do not receive equipment or materials on the jobsite until adequate space has been provided for storage.

C. Provide adequate supports for protection from the ground and erect required shelters for items stored in the open.

D. Items stored within the building are to be adequately protected and covered with tarpaulins or other protective covering.

E. Protect the building at all times during construction from damage by workmen, their tools and/or equipment. Protect floors, steps, wall, ceilings, doors, windows and other finish surfaces.

F. Equipment and materials found in a rusty condition at completion of the work will be thoroughly cleaned of rust and refinished as required to its original condition.

3.7 PREPARATION AND COORDINATION

A. Perform coordination work in strict accordance with provisions of these specifications and the following:

1. Coordinate as necessary with other trades to assure proper and adequate interface with all work.
2. Where pipes or other HVAC items are shown in conflict with locations of structural members and other equipment, include labor and materials required for extensions, offsets and supports to clear the encroachment.
3. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation of the HVAC system.
4. Coordinate accepted equipment changes from those scheduled or specified with other trades affected. Additional compensation to other trades for equipment changes is the responsibility of the Contractor making the change.

B. The Mechanical, Electrical, Plumbing, and associated Drawings are necessarily diagrammatic by their nature, and are not intended to show every connection in detail or every pipe or conduit in its exact location. These details are subject to the requirements of standards referenced elsewhere in these specifications, and structural and architectural conditions. The Contractor shall carefully investigate structural and finish conditions and shall coordinate the separate trades in order to avoid interference between the various phases of work. Work shall be organized and laid out so that it will be concealed in furred chases and suspended ceilings, etc., in finished portions of the building, unless specifically noted to be exposed. All exposed work shall be installed parallel or perpendicular to the lines of the building unless otherwise noted.

C. When the mechanical, plumbing and electrical Drawings do not give exact details as to the elevation of pipe, conduit and ducts, the Contractor shall physically arrange the systems to fit in the space available at the elevations intended with proper grades for the functioning of the system involved. Piping, exposed conduit and the duct systems are generally intended to be installed true and square to the building construction and located as high as possible against the structure in a neat and workmanlike manner. The Drawings do not show all required offsets, control lines, pilot lines and other location details. Work shall be concealed in all finished areas.

D. The general installation precedence of materials shall be as follows. Note that if an interference is encountered, this shall guide the contractor in the determination of which trade shall be given the "Right-of-Way".

Building lines
Structural Members
Soil and Drain Piping
Condensate Drains
Vent Piping
Supply, Return, and Outside Air Ductwork
Exhaust Ductwork
Fire Protection Piping
Gas Piping
Domestic Water (Cold and Hot)
Electrical Conduit

E. Where items such as diffusers, thermostats, switches, and control panels are not specifically located on the Drawings, locate as determined in the field by the Architect. Where such items are installed without such specific direction, relocate as directed by the Architect and at no additional cost to the Owner.

F. Verify all dimensions and distances. No additional compensation will be allowed because of differences between work shown on the Drawings and actual dimensions and distances at the jobsite.

3.8 PAINTING

A. All equipment shall be delivered to the job with suitable factory finish. Should the finish be damaged in transit or during the installation, it shall be finished to match appearance of original finish. All work shall be subject to approval by Owner.

B. All equipment, piping, conduit, insulation, etc., furnished and installed in exposed areas under Divisions 23 of these Specifications and as hereinafter specified shall be cleaned, prepared, and painted according to the following specification. In the event of a conflict between the specifications referenced, the provisions of this specification shall prevail only for Division 23 work.

C. Before painting, materials and equipment surfaces shall be thoroughly cleaned of cement, plaster, and other foreign materials, and all oil and grease spots shall be removed. Such surfaces shall be carefully wiped and all cracks and corners scraped out. Exposed metal work shall be carefully brushed down with the steel brushes to remove rust and other spots and left smooth and clean.

3.9 TRAINING

A. Contractors are responsible to provide owner with an adequate amount of training to be able to operate any system installed.
   1. This includes training for any HVAC or Fire.
   2. Provide a sign in sheet that is to be added to the O&M manual
      a. Owners & all building maintenance personal are required to have training.

END OF SECTION

SECTION 23 05 13 - COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes general requirements for single-phase and poly-phase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

1.3 COORDINATION

A. Coordinate features of motors installed units, and accessory devices to be compatible with the following:
   1. Motor controllers.
   2. Torque, speed, and horsepower requirements of the load.
   3. Ratings and characteristics of supply circuit and required control sequence.
   4. Ambient and environmental conditions of installation location.

PART 2 - PRODUCTS

2.1 GENERAL MOTOR REQUIREMENTS

A. Comply with requirements in this Section except when stricter requirements are specified in HVAC equipment schedules or Sections.
B. Comply with NEMA MG 1 unless otherwise indicated.
C. Provide a shaft grounding ring for motors used in direct-driven VFD motor applications.
D. Comply with IEEE 841 for severe-duty motors.

2.2 MOTOR CHARACTERISTICS

A. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3600 feet above sea level.
B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

2.3 POLYPHASE MOTORS

A. Description: NEMA MG 1, Design B, medium induction motor.
B. Efficiency: Energy efficient, as defined in NEMA MG 1.
C. Service Factor: 1.15.
D. Multispeed Motors: Variable torque.
   1. For motors with 2:1 speed ratio, consequent pole, single winding.
   2. For motors with other than 2:1 speed ratio, separate winding for each speed.
E. Rotor: Random-wound, squirrel cage.
F. Bearings: Re-greaseable, shielded, antifriction ball bearings suitable for radial and thrust loading.
G. Temperature Rise: Match insulation rating.
H. Insulation: Class F (non-inverter duty motors).
I. Code Letter Designation:

1. Motors Smaller than 15 HP: Manufacturer's standard starting characteristic.

J. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.

2.4 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS

A. Motors Used with Reduced-Voltage and Multispeed Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.

B. Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.

1. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width modulated inverters.
2. Energy- and Premium-Efficient Motors: Class B temperature rise; Class F insulation.
3. Inverter-Duty Motors: Class F temperature rise; Class H insulation.
4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.

C. Severe-Duty Motors: Comply with IEEE 841, with 1.15 minimum service factor.

2.5 SINGLE-PHASE MOTORS

A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:

1. Permanent-split capacitor.
2. Split phase.
3. Capacitor start, inductor run.
4. Capacitor start, capacitor run.

B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.

C. Bearings: Pre-lubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.

D. Motors 1/20 HP and Smaller: Shaded-pole type.

E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

2.6 MOTOR STARTERS

A. Provide motor starters as manufactured by one of the following:

1. General Electric Company.
2. Siemens Energy and Automation.
3. Square D Schneider Electric.
4. Cutler Hammer.

B. General:

1. Starters furnished as integral parts of factory-assembled, pre-wired equipment shall conform to the requirements of this Section.
2. All controllers shall be provided with a heavy-duty type push-button station, rated for 10 amperes continuous load at 600 volt or less.
3. Enclosures shall be general purpose NEMA Type 1, except that pushbutton stations installed outside the building or otherwise exposed to the weather shall be NEMA Type 3R, dust and weather tight. NEMA Type 4 enclosures shall be provided for surface mounting, except as otherwise indicated.
4. Pushbutton stations for non-interlocking contactors shall be momentary contact type with start button, stop button, and red indicator light. Where required for delayed "seal-in" or where otherwise noted.

C. Manual Motor Starters
   1. Provide single-phase, horsepower rated manual motor starters, of sizes and ratings indicated. Equip with manually operated quick-make, quick-break toggle mechanisms; and with one-piece melting alloy type thermal units. Starter to become inoperative when thermal unit is removed. Provide starters with double break, silver alloy contacts, visible from both sides of starter, green pilot lights, and switch capable of being padlocked “OFF”.
   2. Provide surface mounted starters in NEMA Type 1 or Type 3 enclosure as required.

D. Magnetic Motor Starters
   1. Provide fused disconnect switches complete with time delay fuses.
   2. Provide contactors with three overload relays.
   3. 120 volt holding coil.
   4. Provide pilot light in cover, green type.
   5. Provide reset button, and Hand-Off-Automatic switch behind lockable cover, field convertible to Off/Auto or Start/Stop pushbutton.
   6. Provide two sets of normally open auxiliary contacts in addition to standard auxiliary holding contacts supplied with each contactor.
   7. Provide surface mounted starters in NEMA Type 1 or Type 3 enclosure as required.

E. Combinations Motor Starters
   1. Provide fused, 3-pole, load break disconnect switches with RK-1 fuses, rotary operating handle, and lock-off facility.
   2. Restrict opening of switch enclosure by the use of a defeater screw, unless switch is in the OFF position.
   3. Provide contactors with three overload relays.
   4. 120 volt holding coil.
   5. Provide pilot light in cover, green.
   6. Provide reset button, and Hand-Off-Automatic switch behind lockable cover, field convertible to Off/Auto or Start/Stop pushbutton.
   7. Provide two sets of normally open auxiliary contacts in addition to standard auxiliary holding contacts supplied with each contactor.
   8. Provide control transformer of sufficient capacity to handle operating coil and associated controls.

PART 3 - EXECUTION

3.1 MOTOR STARTERS

A. Install motor starters as indicated, in accordance with Division 16 and equipment manufacturer's written instructions, and with recognized industry practices complying with applicable requirements of NEC, UL, and NEMA standards.
B. In finished areas, mount motor protection switches flush and install suitable cover plates.
C. Install heaters correlated with full load current of motors provided.
D. Set overload devices to suit motors provided.
E. Install fuses in fusible disconnect switches.

END OF SECTION

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SECTION 23 05 29 - PIPE HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to the Work in this Section

1.2 SUMMARY

A. Provide all equipment, materials, labor, supervision, and services necessary for or incidental to the installation of all necessary identification items as indicated on the drawings and as specified.

B. Work included:

1. Pipe hangers and supports.
2. Sleeving for mechanical equipment.

C. Submittals: Provide submittals as required in Section 23 0500 “Common Work Results for HVAC”.

1.3 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Without additional cost to the Owner, provide such other labor and materials as are required to complete the work of this Section in accordance with the requirements of governmental agencies having jurisdiction, regardless of whether such materials and associated labor are called for elsewhere in these Contract Documents.

1.4 SUBMITTALS:

A. **Provide submittals as required in Section 23 00 10, “Submittal Process”.**

PART 2 - PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

A. Supports, hangers, anchors, guides and supplementary steel shall be provided for horizontal and vertical piping and shall meet or exceed the ASA Code for Pressure Piping.

B. Rod sizes noted are minimum sizes. The structural integrity of the supports is the responsibility of the Contractor.

C. Hangers Supporting and Contacting Brass or Copper:

1. 3" and Smaller: Grinnell Fig. CT-109, copper plated, split-ring hanger with adjusters.
2. 4" and Larger: Grinnell Fig. CT-65, copper plated, clevis hanger with 2 nuts each rod.
3. Isolate copper or brass from ferrous metals with an approved dielectric material.

D. Hangers Supporting Insulated Lines:

1. Outside Diameter of Insulation 6" or Smaller and all Ferrous Pipe 3" Diameter and Smaller: Grinnell Fig. 108, malleable iron, split type with adjustable swivel and locknut.
2. Outside Diameter of Insulation 7" and Larger and all Ferrous Pipe Larger than 3" Diameter: Grinnell Fig. 260, malleable iron, clevis hanger with two nuts on each support.

E. Protection Shields for Hangers:

1. Galvanized metal shields shall encircle the lower half of the insulation.

2. Provide shields at hangers on dual and low temperature pipes on trapeze type hangers.
3. Provide rigid insulation at all shields and hangers, extending a minimum of 6" each side of hanger.
4. Shield gauges shall be as follows:

Insulation Diameter	U.S.S. Gauge (Galvanized)
Up to 3"	22

F. Supports for Vertical and Horizontal Piping in Chases and Partitions:
1. Provide securely anchored supports for pipes serving plumbing fixtures and equipment near the area the pipe penetrates the wall.
2. Supports shall be steel plate, angles or unistruts mounted vertically or horizontally with unistrut clamps P2426, P2008 or P1109.
3. Attach supports to wall or floor construction with clip angles, brackets or other approved anchoring devices.
4. Brass and copper pipe shall be isolated from support with sheet polyethylene, minimum 1/8" thick.

2.2 INSERTS
A. Provide inserts at each hanger as required for concrete support. Avoid interference with concrete reinforcing.
B. Inserts to be malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, and lugs for attaching to forms.
C. Provide reinforcing as required to support load.
D. Size inserts to suit threaded hanger rods.

2.3 HANGER RODS
A. Provide steel hanger rods, threaded both ends, threaded one end or continuous threaded.
B. Size hanger rods as follows:

Pipe Size	Rod Diameter
4" & Smaller	3/8"

2.4 SLEEVES
A. Provide sleeves where pipes penetrate floors, walls, foundations, fireproofing, etc.
B. Size sleeves large enough to allow for movement due to expansion and to provide for continuous movement. Provide a bead of sealant in space between pipe and sleeve. Use link-seal to seal between pipe and sleeve for all slab on grade floor penetrations.
C. Use Schedule 40 galvanized steel pipe sleeves for all floor and foundation penetrations. Sleeves shall extend minimum of 2" above finished floor and flush with vertical wall surface.

2.5 TRAPEZES
A. Trapezes of Kindorf, Elcen or approved equal may be provided where multiple lines run horizontally at the same elevation.

2.6 STRAP HANGERS
A. Under no circumstances will perforated strap iron or wire be acceptable for hangers on this project.

PART 3 - EXECUTION

3.1 INSTALLATION OF SUPPORTS

A. All pipe supports shall be designed and installed to avoid interferences with other piping, hangers, ducts, electrical conduit, supports, building structure, equipment, etc. All piping shall be installed with due regard to expansion and contraction. The type of hanger, method of support, location of support, etc., shall be governed in part by this specification.

B. Pipe hangers shall be attached to the structure as follows:

1. Poured-in-Place Concrete: Each hanger rod shall be fitted with a nut at its upper end, which nut shall be set into an Underwriters' Laboratories, Inc., listed universal concrete insert placed in the formwork before concrete is poured.
2. Steel Bar Joists: Where pipes and loads are supported under bar joists, hanger rods shall be run through the space between the bottom angles and secured with a washer and two nuts. Where larger lines are supported beneath bar joists, hanger rods shall be secured to angle irons of adequate size. Each angle shall span across two or more joists as required to distribute the weight properly and shall be welded to the joists or otherwise permanently affixed thereto.
3. Steel Beams: Pipes and loads supported under steel beams shall be installed using approved beam clamps.

3.2 SPACING

A. Install hangers for copper tubing with the following maximum spacing and minimum rod sizes:

1. NPS 1/2: Maximum span, 5 feet; minimum rod size, 3/8 inch.
2. NPS 5/8: Maximum span, 5 feet; minimum rod size, 3/8 inch.
3. NPS 1: Maximum span, 6 feet; minimum rod size, 3/8 inch.
4. NPS 1-1/4: Maximum span, 8 feet; minimum rod size, 3/8 inch.
5. NPS 1-1/2: Maximum span, 8 feet; minimum rod size, 3/8 inch.
6. NPS 2: Maximum span, 8 feet; minimum rod size, 3/8 inch.
7. NPS 2-1/2: Maximum span, 9 feet; minimum rod size, 3/8 inch.
8. NPS 3: Maximum span, 10 feet; minimum rod size, 3/8 inch.
9. NPS 4: Maximum span, 12 feet; minimum rod size, 1/2 inch.

B. Spacing and rod sizes for other piping materials shall be as recommended by the manufacturer.

3.3 TRAPEZES

A. Trapeze members, including suspension rods, shall be properly sized for the number, size and loaded weight of the lines they are to support. Install as noted above.

3.4 MISCELLANEOUS

A. Install any other special foundations, hangers and supports indicated on the drawings, specified elsewhere, or required by installation conditions.

END OF SECTION

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SECTION 23 05 48 - VIBRATION CONTROLS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to the Work in this Section.

1.2 SUMMARY

A. The extent of vibration isolation work is indicated by drawings and schedules, and by the requirements of this section.

B. The types of vibration isolation work specified in this section include the following:
   1. Support isolation for motor-driven mechanical equipment.
   2. Isolation including support isolation for piping risers.
   3. Support isolation of piping.
   4. Flexible connections for piping at equipment.

C. Refer to other sections of these specifications for equipment foundations, hangers, sealants, gaskets, flexible connections for piping, and other work related to vibration isolation work.

1.3 QUALITY ASSURANCE

A. Product Qualification: Provide each type of vibration isolation unit produced by a specialized manufacturer, with not less than 5 years' successful experience in the production of units similar to those for the project.
   1. Except as otherwise indicated obtain support isolation units from a single manufacturer.
   2. Engage the manufacturer to provide technical supervision of the installation of support isolation units produced by him, and of associated inertia bases (if any).

B. Manufacturer: Acceptable vibration isolation support unit manufacturers are as follows:
   1. Mason Industries, Inc.
   2. Vibration Mountings and Controls, Inc.
   3. Amber Booth
   4. Peabody Kinetics

C. Manufacturer Certification: Where vibration isolation support units are indicated for a minimum static deflection, provide manufacturer's certification that units have been tested and comply with the indicated requirements.

D. All items of equipment, whether suspended, floor mounted or otherwise supported, which are capable of producing vibration, shall be installed with vibration isolation. The isolation shall prevent the transmission of objectionable noise or vibration to the building structure.

E. Submit for approval data showing disturbing frequency, supported weight, static deflection or natural frequency, and calculations supporting same for each isolator.

1.4 SUBMITTALS

A. Manufacturer's Data, Vibration Isolation:
   1. Provide submittals as required in Section 23 00 10, “Submittal Process”.
   2. For information, submit manufacturer's specifications, detailed drawings, performance characteristics data and installation instructions for each type of unit required.
   3. Include data for each type and size of unit, showing isolation efficiency, stiffness, natural frequency and transmissibility at lowest operating speed of equipment.
   4. Where required, include independent test agencies certified report of test results for each type of unit.
   5. For spring units, show wire size, spring diameter, free height, solid-compression height, operating height, fatigue characteristics and ratio of horizontal to vertical stiffness.

6. Include performance certifications where required.

PART 2 - PRODUCTS

2.1 ISOLATION MATERIALS AND SUPPORT UNITS

A. Double deflection neoprene mountings shall have a minimum static deflection of 0.35". All metal surfaces shall be neoprene covered to avoid corrosion and have friction pads both top and bottom so they need not be bolted to the floor. Bolt holes shall be provided where bolting is required. On equipment such as small vent sets and close coupled pumps, steel rails shall be used above the mountings to compensate for the overhang.

B. Vibration hangers shall contain a steel spring and 0.3" deflection neoprene element in series. The neoprene element shall be molded with a rod isolation bushing that passes through the hanger box. Spring diameters and hole sizes shall be large enough to permit the hanger rod to swing through a 30 degree arc before contacting the hole and short-circuiting the spring. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection.

C. Vibration hangers shall be as described above, but they shall be pre-compressed to the rated deflection so as to keep the piping or equipment at a fixed elevation during installation. The hangers shall be designed with a release mechanism to free the spring after the installation is complete and the hanger is subjected to its full load. Deflection shall be indicated by a scale.

D. Vibration hangers shall contain a steel spring located in a neoprene cup manufactured with a grommet to prevent short-circuiting. The cup shall contain a steel washer designed to properly distribute the load on the neoprene and prevent its extrusion. Spring diameters and hole sizes shall be large enough to permit the hanger rod to spring through a 30 degree arc before contacting the hole and short circuiting the spring. Springs shall have as minimum additional travel to solid equal to 50% of the rated deflection. Hangers shall be provided with an eyebolt on the spring end and provision to attach the housing to the flat iron duct straps.

E. Vibration isolator shall be steel members welded to height saving brackets to cradle machines having legs or bases that do not require a complete supplementary base. Members shall be sufficiently rigid to prevent strains in the equipment.

F. Flexible neoprene connectors shall be used on all equipment as indicated on the drawings. They shall be manufactured of multiple plies of nylon tire cord fabric and neoprene. No steel wire or rings shall be used as pressure reinforcement. Straight connectors shall have two spheres. Neoprene elbows shall have a single sphere forming the corner of the joint itself. Connectors up to and including 2" diameter may have threaded ends. Connectors 2-1/2" and larger shall have floating steel flanges. All connectors shall be rated a minimum of 150 psi at 200 degrees F. All sizes operating at pressures above 100 psi shall employ control cables with end fittings isolated from the anchoring plates by means of 1/2" thick bridge bearing neoprene washer bushings designed for a maximum of 1000 psi.

G. Where piping passes through equipment walls, floors or ceilings, the vibration isolator shall be a split seal consisting of two bolted pipe halves with 3/4" or thicker neoprene sponge bonded to the inner faces. The seal shall be tightened around the pipe to eliminate clearance between the inner sponge face and the piping. Concrete may be packed around the seal to make it integral with the floor, wall or ceiling if the seal is not already in place around the pipe prior to the construction of the building member. Seals shall project a minimum of 1" past either face of the wall. Where temperatures exceed 240 degrees F., 10# density fiberglass may be used in lieu of the sponge.

H. Isolator pads shall be neoprene waffle rated for 60#/sq. in.

PART 3 - EXECUTION

3.1 PERFORMANCE OF ISOLATORS

A. General: Comply with the minimum static deflections recommended by ASHRAE, including the definitions of critical and non-critical locations, for the selection and application of vibration isolation materials and units as indicated.

B. Manufacturer's Recommendations: Except as otherwise indicated, comply with manufacturer's recommendations for selection and application of vibration isolation materials and units.

3.2 APPLICATIONS

A. General: Apply the types of vibration isolation materials and units indicated at the locations shown or scheduled. Selection is Contractor's option where more than one type is indicated.

B. Provide Neoprene Pads at the following locations/items of equipment:
   1. Where shown on drawings.

C. Provide Vibration Isolation Springs for the following items of equipment:
   1. Where shown on drawings.

D. Provide Spring Isolator, housed at the following items of equipment:
   1. Where shown on drawings.

E. Provide Isolation Hangers for the following:
   1. Piping connected to machinery.

3.3 INSTALLATION

A. General:
   1. Except as otherwise indicated, comply with manufacturer's instructions for the installation and load application to vibration isolation materials and units.
   2. Adjust to ensure that units do not exceed rated operating deflections or bottom out under loading, and are not short-circuited by other contacts or bearing points.
   3. Remove spacer blocks and similar devices (if any) intended for temporary protection during shipping or against overloading during installation.
   4. Anchor and attach units to substrate and equipment as required for secure operation and to prevent displacement by normal forces, and as indicated.
   5. Adjust leveling devices as required to distribute loading uniformly onto isolators. Shim units as required where leveling devices cannot be used to distribute loading properly.
   6. Install inertia base frames on isolator units as indicated, so that a minimum of 2" clearance below base will result when frame is filled with concrete and supported equipment has been installed and loaded for operation.
   7. Locate isolation hangers as near the overhead support structure as possible.
   8. Weld riser isolator units in place as required preventing displacement from loading and operations.

3.4 EXAMINATION OF RELATED WORK

A. Installer of vibration isolation work shall observe the installation of other work related to vibration isolation work, including work connected to vibration isolation work; and, after completion of other related work (but before equipment startup), shall furnish a written report to the Contractor listing observed inadequacies for proper operation and performance of vibration isolation work. Report shall cover, but not necessarily be limited to the following:
   1. Equipment installations (performed as work of other sections) on vibration isolators.
   2. Piping connections including flexible connections.
   3. Passage of piping which is to be isolated through walls and floors.

B. Do not start-up equipment until inadequacies have been corrected in a manner acceptable to the vibration isolation Installer.

3.5 DEFLECTION MEASUREMENTS

A. Upon completion of vibration isolation work, take measurements and prepare a report showing measured equipment deflections for each item of equipment.

END OF SECTION

SECTION 23 05 53 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to the Work in this Section.

1.2 SCOPE

A. Provide all equipment, materials, labor, supervision, and services necessary for or incidental to the installation of all necessary identification items as indicated on the drawings and as specified.

B. Work included:

1. Valve tagging
2. Pipe marking
3. Equipment marking

C. Submittals: Provide submittals as required in Section 23 00 10. “Submittal Process”.

1.3 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Without additional cost to the Owner, provide such other labor and materials as are required to complete the work of this Section in accordance with the requirements of governmental agencies having jurisdiction, regardless of whether such materials and associated labor are called for elsewhere in these Contract Documents.

C. When requested, provide the Architect with manufacturer's certificate that materials meet or exceed minimum requirements as specified. Marking system shall conform to ASME 13.1, latest edition and OSHA 29 CFR 1910.261 requirements.

PART 2 - PRODUCTS

2.1 PIPE MARKERS

A. Provide pipe markers for pipes that provide 360 degree visibility with ANSI approved color coded background, color of legend in relation to background color, legend letter size, and length of color field. Additionally, direction of flow arrows shall be printed on the same markers, and words shall be repeated and reversed for use with flow in either direction.

1. Each marker shall be formed with a clear acrylic covering suitable for use outdoors.
2. For diameters 3/4" to 6", marker shall be formed in order to snap on and completely surround the pipe.

2.2 EQUIPMENT PLATES

A. Plate shall be black with white letters that appear when the plate is engraved.

B. Plate material shall be specifically suited for conditions surrounding the equipment. Outdoor equipment shall require special plate material for outdoor use.

C. Plate size shall be as required with lettering size appropriate for the information shown but in no case less than 1/8" high. Lettering style shall match existing facility standards.

D. Nomenclature for plates shall be based on the equipment designations shown on the equipment schedules and as approved by the Architect.

2.3 CONCEALED DEVICES

A. Operable devices and equipment located above ceilings shall be marked with color coded W. H. Brady "Tack" type markers.

2.4 MANUFACTURERS

A. Provide marking system as manufactured by W. H. Brady Company, Seton, Craftmark, or approved equal.

PART 3 - EXECUTION

3.1 GENERAL

A. Place all markers and plates in such locations that they are easily read by a person without assuming awkward or hazardous positions.

3.2 PIPE MARKERS

A. For diameters 3/4" to 6", markers shall snap around the pipe, completely surrounding the pipe. Markers shall not require taping or the use of any adhesive material or fasteners to permanently secure them to the pipe.

B. Install sufficient quantities of markers that tracing of pipe systems can be readily accomplished. Install within three feet before and/or after penetrations through walls, floors, ceilings, underground or other non-accessible enclosures; at access doors, manholes or other access points which permit view of concealed piping; and when there is a change in direction of the concealed pipe. Locations in major mechanical rooms shall be labeled at a maximum spacing of every 20 feet. Other piping shall have labels at a maximum spacing of every 30 feet and at least once in every area that the pipe passes over or through. Install additional markers where directed by the Architect.

3.3 EQUIPMENT PLATES

A. Provide engraved plates for all HVAC equipment and all remote mounted starter/disconnects.

B. Secure all plates with two self-tapping metal screws with round heads. Alternately, plates may be fastened with "pop" rivets provided no cracking or injury occurs to the plate. Plates attached with adhesives shall not be permitted.

END OF SECTION

SECTION 23 07 00 - HVAC INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to the Work in this Section.

1.2 SUMMARY

A. Provide all equipment, materials, labor, supervision, and services necessary for or incidental to the insulation of the mechanical systems as indicated on the drawings and as specified herein.

B. Factory insulated equipment is excluded from this section of the specifications except that the insulating material characteristics shall equal or exceed those of specified materials for similar service.

C. Work Included:

1. Piping:
   a. Cooling coil condensate drain lines.
   b. All refrigerant lines.
2. Ductwork:
   a. Supply air:
      1) Insulate externally with thermal duct wrap.
   b. Return air:
      1) Insulate externally with thermal duct wrap.
   c. All round ductwork exposed to view shall be double wall factory internally insulated with 1" thick glass fiber duct and fittings.

D. Submittals: Provide submittals as required in Section 23 00 10, “Submittal Process”.

1.3 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Without additional cost to the Owner, provide such other labor and materials as are required to complete the work of this Section in accordance with the requirements of governmental agencies having jurisdiction, regardless of whether such materials and associated labor are called for elsewhere in these Contract Documents.

C. When requested, provide the Engineer with manufacturer's certificate that materials meet or exceed minimum requirements as specified.

D. Pipe joints or cuts, shall be sealed with manufacturers glue. Any type of duct tape, foil tape, electrical tape or any other product that what the manufacturer supplies will be rejected and all insulation will be removed and replaced at the contractors cost.

E. Splits or exposed piping will not be acceptable. All incorrectly installed insulation will be repaired at contractors cost.

F. Acceptable Manufacturers:

1. Fiberglass Insulation:
   a. Owens-Corning Fiberglas
   b. Knauf Insulation
   c. Manson Insulation
   d. Manville
   e. Certain Teed
2. Urethane Insulation:
   a. Armstrong (Armalok)
   b. Thermacor
3. Mastics:
   a. Benjamin Foster

b. Insul-Coustic
c. Chicago Mastic
d. Childers Products

4. High Temperature Bonding Cements: Ryder Thermocote
5. PVC Fittings: Zeston, Inc.

1.4 GENERAL

A. All materials shall be applied by workmen skilled in this trade. Mechanical fasteners shall be used whenever possible to assure permanent construction. Unsightly work shall be cause for rejection.
B. Materials will be applied only after all surfaces have been tested and cleaned.
C. All material, jacket, coverings, sealers, mastics and adhesives shall not exceed flame spread rating of 25 and smoke developed of 50 in accordance with ASTM Method E84, UL Standard 723 and NFPA Bulletins 255 and 90A.
D. Insulation shall be vermin resistant.
E. Fiberglass insulation shall not contain formaldehyde, asbestos, lead, mercury, mercury compounds, or poly-brominated diphenyl ether fire retardants.
F. Fiberglass insulation products shall be UL GREENGUARD Gold certified.
G. Fiberglass insulation products shall have a minimum of 50 percent recycled glass content certified and UL Validated.
H. Fiberglass insulation products shall be constructed with 100% formaldehyde-free thermosetting resin binder and bio-soluble glass.
I. Non-compressible insulation material shall be installed at hangers of cold piping to eliminate through metal conductance.
J. Sizing, paint, pipe shield or saddle, and internal duct insulation shall be provided under other sections of Division 23.
K. Insulation of cold surfaces shall be vapor sealed.
L. Minimum thickness of insulation shall be as listed or energy code as adopted by authority having jurisdiction. However, sufficient insulation shall be provided to eliminate condensation on the cold surfaces and to maintain a maximum exterior insulation surface of 125ºF. (OSHA Standard) on the hot surfaces.

PART 2 - PRODUCTS

2.1 PIPING SYSTEMS

A. Pipe Insulation:
1. Above Ground-Use Fiberglass, Preformed, One-piece, Pipe Insulation: Fiberglass bonded with a 100% formaldehyde-free, thermosetting resin binder. Type I, 850 deg. F (454 deg. C) or Type IV 1000 deg. F (538 deg. C). UL/ULC Classified per UL 723. Comply with ASTM C 585, ASTM C 411, ASTM C 795, and ASTM C 547, Type I, and Type IV, equipped with factory-applied ASJ+SSL+ or ASJ-SSL vapor retarder.
a. Use pre-formed PVC fitting covers with fiberglass inserts. Fiberglass shall be same density as pipe insulation.
b. Where insulation is exposed to weather, use Manville Flame-Safe ML, or approved equal, Metal-Jacketed Fiberglass pipe insulation. Securement shall be made by 1/2" 0.020 aluminum bands with approved closure system.
2. 1” Armstrong SOLID CORE Armaflex or equal for all refrigerant lines. Split Armaflex is not approved in refrigeration applications. Both the liquid and gas refrigerant lines must be insulated
3. Condensate drain lines shall be insulated from AC unit to indirect waste termination points and first 10'-0" of horizontal drain line at floor drains receiving condensate. Material shall be closed cell type with 3/4" thick molded pipe covering with a density of 7 lbs. thermal conductivity at 0.28 at 75ºF. Do not split the insulation. All joints shall be glued with manufacturer's adhesive.

2.2 DUCTWORK SYSTEMS

A. External insulation for metal ductwork (flexible blanket): Johns Manville Microlite fiberglass duct wrap with FSK reinforced craft paper and aluminum foil facing, conforming to the requirements of NFPA 90A and 90B.

B. Other manufacturers are Certainteed, Knauf, and Owens Corning or approved equal.

C. Fibrous-Glass Duct Liner: Duct liner shall be rotary-fiber bonded with 100% formaldehyde free, bio-based binder, having a bonded black mat-faced airstream surface, factory-applied edge coating, meeting requirements of NFPA 90A and 90B, ASTM C1071, and NAIMA AH124, “Fibrous Glass Duct Liner Standard”. Duct liner shall comply with the fiberglass requirements set forth in Part 1.4 of this specification.

1. Acceptable Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. CertainTeed Corporation; Insulation Group.
   b. Johns Manville.
   c. Knauf Insulation.
   d. Owens Corning.
2. Maximum Thermal Conductivity: .24 Btu/(ft² x hr. x °F) @ 75°F mean temperature.
3. Maximum Service Temperature: ASTM C411 – 250°F (121°C)
4. Noise Reduction Coefficient (NRC) : ASTM C423 – 1”=.70, 1-1/2”=.80, 2”=.95
5. Maximum Rated Air Velocity: ASTM C1071 – 6,000 ft. /min. (30.5 m/sec.)
6. Mold & Mildew Growth / Fungi Resistance: ASTM C1338, ASTM G21/G22 – Pass
7. Water Vapor Sorption: ASTM C1104 – Less than 3%
8. Corrosiveness/Corrosion: ASTM C665/C1617 - Does Not Accelerate / Pass
9. Duct liner adhesive shall be applied to the sheet metal with a minimum coverage of 90%. Adhesive shall meet the requirements of ASTM C916.
10. All duct liner products shall avoid air erosion up to velocities of 6,000 feet per minute.

D. Solvent-Based Liner Adhesive: Comply with NFPA 90A or NFPA 90B and with ASTM C 916.

2.3 ADHESIVES

A. Water based, polymeric, UL classified lagging adhesive for applying canvas and glass cloth; Foster 30-36 or Childers CP-50.

B. A fast setting, rubber based, UL classified, vapor barrier lap and attachment adhesive; Foster 85-15 or Childers CP-85.

C. Same adhesive, except non-flammable when wet; Foster 85-20 or Childers CP-82.

D. A rubber based, UL classified, fast setting contact adhesive for adhering flexible cellular insulation; Foster 82-40 or Armstrong 520.

2.4 INSULATION THICKNESS

A. Piping insulation thickness based on a maximum k value of 0.23 Btu in/hr ft² °F at a mean temperature of 75°F.

Pipe Sizes			
System	**Runouts To 12 ft. Max.**	**1 1/2" and Less**	**1 1/2” Up**
Refrigerant piping	1"	1"	2"
Condensate drain piping	1"	1"	1"

B. Exterior Duct Insulation: All supply, return and outside air ductwork, shall be insulation 2" thick minimum, with a minimum installed R value of 8.0.

2.5 DUCT SEALANTS

A. A fast setting, rubber based, UL classified, high velocity duct sealer; Foster 32-14 or 3M EC-800.

B. Same sealer, except non-flammable when wet; Foster 30-02.

PART 3 - EXECUTION

3.1 GENERAL

A. The installation of all insulation shall be made by experienced craftsmen in a neat, workmanlike manner and shall be in accordance with the manufacturer's published recommendations for service intended, as interpreted by the Architect.

B. All adhesives used in conjunction with insulation shall be compatible with the insulation and vapor barrier used and be vermin-proof and mildew resistant.

3.2 APPLICATION

A. Install materials in accordance with manufacturer's instructions.

B. Ductwork:

1. External Duct Insulation: All external duct shall be installed without sagging or loose fitting sections. Outer jacket shall be sealed with mastic to form a continuous vapor barrier. Install as recommended by the insulation manufacturer.

2. Flexible fiberglass insulation shall be wrapped around ducts and secured with outward clinching staples. Ducts 24" wide and larger shall have the insulation additionally secured with stick clips on 18" centers or with 4" wide bands of adhesive applied on 18" centers. Insulation shall be lapped a minimum of 4" and all seams and penetrations shall be sealed with an approved mastic reinforced with 3" glass mesh reinforcement. Where insulation terminates, all raw glass shall be sealed to duct.

C. Insulation shall be the full specified thickness, continuous through walls, floors, ceilings, etc. Reducing thickness or cutting back of insulation to pass obstructions or through sleeves will not be permitted.

D. Valve and fitting insulation shall be built up to the thickness of the adjacent pipe insulation or may be factory prefabricated units at the Contractor's option.

E. Any painting of pipe insulation shall be accomplished under the Painting Section. After finish painting, any insulation showing splits or other signs of poor workmanship shall be replaced.

F. No part of any system shall be insulated until all required tests have been completed.

G. All insulation shall be installed so that it does not interfere with the functions of thermometer wells, gage connections and/or cocks, unions, access panels, hand holes, manholes, sight glasses, etc., or obscure serial numbers or other nameplate data.

H. Insulation shall be extended to include stiff leg supports as required to prevent sweating.

I. Complete vapor barriers to prevent sweating shall be installed on all cold systems and equipment. If a single tape adhesive system or staples are used for closure of the longitudinal lap, a vapor barrier mastic must be used to ensure a vaporproof closure. All edges and abutments shall be sealed, waterproof and vaporproof. Supplier of jacket materials shall certify that the material proposed is approved for use in return air plenums, where applicable.

J. Where necessary, the application of insulation shall be arranged to accommodate movement of piping due to thermal expansion and/or contraction.

K. Refrigeration Piping in AV/IT & Electrical Rooms: All exposed piping and condensate piping shall be installed into a wall escutcheon or gutter so that no piping shall be visible.

L. Exterior Refrigeration Piping: All pipe and fittings specified herein to be insulated when installed exposed to weather, and wrapped with an 0.016" smooth or corrugated aluminum jacket with proper closure system positioned to shed water to make a waterproof assembly. Fittings shall be insulated with molded insulation fittings or pipe insulation carved and mitered to fit properly. Insulation shall be butted together and adhered in place with contact cement. Where possible tubing shall be slipped on without slitting. Where insulation terminates, it shall be neatly beveled and finished. No portion of this insulation shall be concealed prior to approval by the Architect.

M. Piping supports shall pass completely around the exterior of the finished insulation. Rigid blocks of insulation material shall be provided at all support points. In addition, sheet metal saddles shall be provided at support points in accordance with the following table:

Pipe Size	Gauge Metal	Saddle Length
Up to 2-1/2"	18	6"
3" - 5"	16	10"
6" - 8"	16	14"
10" and Over	16	18"

N. Saddles shall cover the bottom of the insulation, and saddle edges shall be hemmed or suitably covered to prevent damage to the insulation material.

O. The vapor barrier and finish shall be continuous at all support points.

P. Shop Application of Duct Liner: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-19, "Flexible Duct Liner Installation."

1. Adhere a single layer of indicated thickness of duct liner with at least 90 percent adhesive coverage at liner contact surface area. Attaining indicated thickness with multiple layers of duct liner is prohibited.
2. Apply adhesive to transverse edges of liner facing upstream that do not receive metal nosing.
3. Butt transverse joints without gaps, and coat joint with adhesive.
4. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.
5. Do not apply liner in rectangular ducts with longitudinal joints, except at corners of ducts, unless duct size and dimensions of standard liner make longitudinal joints necessary.
6. Apply adhesive coating on longitudinal seams in ducts.
7. Secure liner with mechanical fasteners 4 inches from corners and at intervals not exceeding 12 inches transversely; at 3 inches from transverse joints and at intervals not exceeding 18 inches longitudinally.
8. Secure transversely oriented liner edges facing the airstream with metal nosings that have either channel or "Z" profiles or are integrally formed from duct wall. Fabricate edge facings at the following locations:
   a. Fan discharges.
   b. Intervals of lined duct preceding unlined duct.
   c. Upstream edges of transverse joints in ducts where air velocities are higher than 2000 fpm or where indicated.
9. Secure insulation between perforated sheet metal inner duct of same thickness as specified for outer shell. Use mechanical fasteners that maintain inner duct at uniform distance from outer shell without compressing insulation.
   a. Sheet Metal Inner Duct Perforations: 3/32-inch diameter, with an overall open area of 23 percent.

Q. Lined exterior ductwork shall be treated with an acid etch bath and two coats of UV resistant paint. Color shall be approved by Architect.

R. Terminate inner ducts with buildouts attached to fire-damper sleeves, dampers, turning vane assemblies, or other devices. Fabricated buildouts (metal hat sections) or other buildout means are optional; when used, secure buildouts to duct walls with bolts, screws, rivets, or welds.

END OF SECTION

SECTION 23 23 00 - REFRIGERANT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to the Work in this Section.

1.2 SUMMARY

A. The Contractor shall furnish and install items as shown on the drawings or as necessary to provide a complete working system in accordance with the intent of the drawings and specifications, including all valves as indicated or as necessary to completely control the entire piping system. The piping drawings are diagrammatic and indicate the general routing, locations, and connections. The piping may require be offsetting, lowering or rising as needed to avoid interferences or as directed at the site. This does not relieve the Contractor from responsibility for the proper installation of piping systems.

B. Work Included:

1. Refrigerant piping and accessories.

C. Submittals: Provide submittals as required in Section 23 00 10, “Submittal Process”.

1.3 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Without additional cost to the Owner, provide such other labor and materials as are required to complete the work of this Section in accordance with the requirements of governmental agencies having jurisdiction, regardless of whether such materials and associated labor are called for elsewhere in these Contract Documents.

C. When requested, provide the Engineer with manufacturer's certificate that materials meet or exceed minimum requirements to comply with ANSI, ASTM, ASME, CISPI, IAPMO, PDI, and AWWA and all other applicable standards.

D. Copies of each welder's certification documents shall be furnished to the Engineer prior to them performing work.

E. All pipes, valves, and fittings shall be manufactured in the United States. Mill Test reports and manufacturer’s certifications shall be submitted to the Engineer on all such materials used.

PART 2 - PRODUCTS

2.1 PIPE AND PIPE FITTINGS

A. Refrigerant Piping:

1. Seamless ACR copper tubing, Type L, hard drawn with wrought or bronze solder joint fittings.

2.2 VALVES, COCKS AND SPECIALTIES

A. Materials: Bronze, or copper only

2.3 PIPE HANGERS AND SUPPORTS

A. Supports, hangers, anchors, guides and supplementary steel shall be provided for horizontal and vertical piping and shall meet or exceed the ASA Code for Pressure Piping.

B. Rod sizes noted are minimum sizes. The structural integrity of the supports is the responsibility of the Contractor.

C. Hangers Supporting and Contacting Copper:

1. 3" and Smaller: Grinnell Fig. CT-109, copper plated, split-ring hanger with adjusters.

D. Hangers Supporting Insulated Lines:

1. All hangers must support outside of insulation and not on pipe directly.

E. Supports for Vertical and Horizontal Piping in Chases and Partitions:

1. Provide securely anchored supports for pipes serving plumbing fixtures and equipment near the area the pipe penetrates the wall.
2. Supports shall be steel plate, angles or unistruts mounted vertically or horizontally with unistrut clamps P2426, P2008 or P1109.
3. Attach supports to wall or floor construction with clip angles, brackets or other approved anchoring devices.
4. Brass and copper pipe shall be isolated from support with sheet polyethylene, minimum 1/8" thick.

2.4 SLEEVES

A. Provide sleeves where pipes penetrate floors, walls, foundations, fireproofing, etc.

B. Size sleeves large enough to allow for movement due to expansion and to provide for continuous movement. Provide a bead of sealant in space between pipe and sleeve.

2.5 TRAPEZES

A. Trapezes of Kindorf, Elcen or approved equal may be provided where multiple lines run horizontally at the same elevation.

2.6 STRAP HANGERS

A. Under no circumstances will perforated strap iron, zip ties, tape, fabric strap or wire be acceptable for hangers or supports on this project.

2.7 BRAZING ROD

A. Refrigerant piping shall be brazed with no less than silver solder "Sil-Fos"#15.

PART 3 - EXECUTION

3.1 GENERAL

A. All work shall be performed by workmen skilled in the trade required for the work. All materials and equipment shall be installed in accordance with the approved recommendations of the manufacturer and the best practices of the trade in conformance with the contract documents.

3.2 INSTALLATION

A. Refer to Section 23 0500, “Common Work Results for HVAC” for general installation requirements.

B. Erection of Pipe above Grade: Piping shall be properly supported and adequate provisions shall be made for flashing, expansion, contraction, slope and anchorage. All piping shall be cut accurately for fabrication to measurements established at the construction site. Pipe shall be worked into place without springing and/or forcing, properly clearing all structural elements, finished rooms, windows, doors, and other openings and equipment. Cutting or other weakening of the building structure to facilitate installation will not be permitted

C. All changes in direction shall be made with fittings, except that bending of pipe will be permitted providing a hydraulic pipe bender is used. Bent pipe showing kinks, wrinkles or other malformation will not be acceptable.

D. Copper tubing shall be joined by the following method:
   1. The tubing shall be reamed to remove all burrs from the inside diameter of the pipe.
   2. The tubing and fitting shall be sanded or brushed to a uniform bright finish.
   3. The tubing shall be brazed with silver solder no less than #15 sil-fos.

E. Provide sleeves around all pipes passing through walls, floors, ceiling, partitions, structural members or other building parts.

F. Refrigerant Piping:
   1. Refrigerant piping shall not be run concealed in walls or partitions nor underground or under the floor except as indicated on the drawings. Where pipe passes through building structure, pipe joints shall not be concealed, but shall be located where they may be readily inspected.
   2. Refrigerant piping shall be brazed with silver solder "Sil-Fos"#15. The inside of tubing and fittings shall be free of flux. The parts to be joined shall be cleaned bright with emery cloth and shall be heated to a temperature slightly greater than the solder flow point, and shall be kept hot until the solder has penetrated the full depth of the fitting. Joints shall be cooled in the air after which flame marks and traces of flux shall be removed. During the brazing operation, the tubing shall be protected from forming an oxide film on the inside by slowly flowing dry nitrogen to expel the air. Installation of the piping shall comply with ANSI B31.5.
   3. Refrigerant lines shall be installed so that the gas velocity in the evaporator suction line is sufficient to move the oil along with the gas to the compressor. Where equipment location requires a vertical riser, the line size shall be as shown and installed to provide sufficient gas velocity or a double riser shall be installed as shown on the drawings. The larger riser shall have a trap, of minimum volume, formed by the use of 90 degree and 45 degree ells. The small riser shall be located with its inlet just upstream of the trap and shall connect to the top of the horizontal line. Valves shall not be installed in risers except as shown on the drawings.
   4. Refrigerant driers, sight glass liquid and moisture indicators, and strainers shall be provided in refrigerant piping for remote installations when not furnished by the manufacturer as part of the equipment. Driers shall be installed in liquid line with service valves and a valved bypass line which are the same size as liquid line in which the drier is installed. Driers of 50 cubic inches and larger shall be installed with the cover and the full cartridge being easily removable.
   5. Sight glass liquid and moisture indicators shall be installed in the liquid line downstream of the drier. Connections shall be the same size as the liquid line in which it is installed, up to 7/8"; 1-1/8" and larger shall have a 1/4" indicator installed in the "By-pass" position.
   6. Refrigeration lines shall not be installed over and IT equipment or electrical equipment. Route lines accordingly. IF routing refrigeration lines over IT equipment or other electrical equipment is unavoidable, refrigeration lines shall be installed wrapped with an 0.016" smooth or corrugated aluminum jacket with proper closure system positioned to shed water to make a waterproof assembly.
   7. Refrigerant Charging Valve: A valved refrigerant charging connection shall be provided for each field piped refrigeration system when not provided as part of the condensing unit. The valve shall be located on the reducing outlet of a full size tee in the liquid line, upstream from the refrigerant drier and sight glass moisture indicator. Valves shall be of the seal cap type, 1/2" min. port size.

3.3 INSTALLATION OF SUPPORTS

A. All pipe supports shall be designed and installed to avoid interferences with other piping, hangers, ducts, electrical conduit, supports, building structure, equipment, etc. All piping shall be installed with due regard to expansion and contraction. The type of hanger, method of support, location of support, etc., shall be governed in part by this specification.

B. Pipe hangers shall be attached to the structure as follows:

1. Poured-in-Place Concrete: Each hanger rod shall be fitted with a nut at its upper end, which nut shall be set into an Underwriters' Laboratories, Inc., listed universal concrete insert placed in the formwork before concrete is poured.
2. Steel Bar Joists: Where pipes and loads are supported under bar joists, hanger rods shall be run through the space between the bottom angles and secured with a washer and two nuts. Where larger lines are supported beneath bar joists, hanger rods shall be secured to angle irons of adequate size. Each angle shall span across two or more joists as required to distribute the weight properly and shall be welded to the joists or otherwise permanently affixed thereto.
3. Steel Beams: Pipes and loads supported under steel beams shall be installed using approved beam clamps.

3.4 SPACING

A. Install hangers for copper tubing with the following maximum spacing and minimum rod sizes:

1. NPS 1/2: Maximum span, 5 feet; minimum rod size, 3/8 inch.
2. NPS 5/8: Maximum span, 5 feet; minimum rod size, 3/8 inch.
3. NPS 1: Maximum span, 6 feet; minimum rod size, 3/8 inch.
4. NPS 1-1/4: Maximum span, 8 feet; minimum rod size, 3/8 inch.
5. NPS 1-1/2: Maximum span, 8 feet; minimum rod size, 3/8 inch.

B. Spacing and rod sizes for other piping materials shall be as recommended by the manufacturer.

3.5 TRAPEZES

A. Trapeze members, including suspension rods, shall be properly sized for the number, size and loaded weight of the lines they are to support. Install as noted above.

END OF SECTION

SECTION 23 31 13 – AIR DISTRIBUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to the Work in this Section.

1.2 SUMMARY

A. Provide all equipment, materials, labor, supervision and services necessary for or incidental to the installation of all air distribution items as indicated on the drawings and as specified.

B. Work Included:

1. Ductwork.
2. Access Doors.

1.3 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Without additional cost to the Owner, provide such other labor and materials as are required to complete the work of this Section in accordance with the requirements of governmental agencies having jurisdiction, regardless of whether such materials and associated labor are called for elsewhere in these Contract Documents.

C. When requested, provide the Engineer with manufacturer's certificate that materials and methods meet or exceed minimum requirements as specified.

D. Under no circumstances shall OBD’s or butterfly dampers be used on any registers. In accessible areas manual dampers shall be used. In hard lid ceiling areas, remote cable dampers shall be used. Access panels shall not be used to access any damper in a hard lid ceiling.

E. Mechanical rooms and Electrical rooms shall not be used as return air plenums. Hard duct OSA & R/A directly into FCU’s.

F. Return Air, Exhaust, Air Make-up & OSA ducts shall be steel duct work connections. Flexible duct shall not be used for these types of terminations.

1.4 SUBMITTALS

A. **Provide submittals as required in section 23 00 10, “Submittal Process.”**

PART 2 - PRODUCTS

2.1 SHEET METAL DUCTWORK

A. Ducts shall be constructed of new-galvanized steel sheets and erected in a first class manner, straight and smooth, with joints neatly finished, anchored securely to the building and free from vibration.

B. All ducts penetrating fire walls shall be minimum 26-gauge galvanized steel regardless of SMACNA Standards.

C. All elbows shall be curved elbows with a centerline radius equal to 1-1/2 times the width of the duct. Air turns consisting of curved metal vanes, arranged to permit the air to follow abrupt turns without appreciable turbulence shall be installed in square elbows, only where approved by the engineer. Air turns shall be the manufacturer's standard products, and shall be quiet and free from vibration.

D. All primary and secondary ductwork of constant volume, shall be fabricated in accordance with the Sheet Metal and Air Conditioning Contractor's National Association, Inc. (SMACNA) "HVAC Duct Construction Standards, Metal and Flexible, Second Edition, 2005". The duct static pressure rating for this duct shall be two times the external static pressure of the system fan. The requirements for the seal class corresponding to the above static pressure shall be met.

E. Longitudinal joints shall be Pittsburgh lock or Acme grooved seam. Side panels greater than 10 inches in depth shall be cross-broken for added stiffness.

F. Transverse joints (With a side wall larger than 14") shall be Ductmate, TDC or types fabricated according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" Figure 1-4, "Transverse (Girth) Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

G. At each major branch from a primary rectangular or square trunk duct, and where shown on the drawings, install a splitter damper or multiblade adjustable air pickup. Splitter damper shall have end bearings and consist of a blade constructed of 20 gauge-galvanized steel securely riveted or welded to a square operating rod. The length of the splitter blade shall be 1-1/2 times the width of the split in the main duct, but in no case less than 12". Multi-blade adjustable pickup shall be as manufactured by Titus Model AG-45 or approved equal with operator adjustable from the duct exterior.

H. Each individual air supply duct tap shall be equipped with a volume control device for the manual adjustment of airflow in each tap. Face bars, blanks, OBD's and equalizing grids shall not be used to regulate airflow.

I. Volume dampers shall have end bearings and be multi-blade type with opposed acting blades linked together and controlled by a single operator. Multi-blade dampers shall be not less than No. 16-gauge galvanized steel mounted to plenum or ductwork per SMACNA requirements.

J. Regulators shall be stamped galvanized steel, lever type with locking screw mounted on face of ductwork or concealed type with adjustable cover plate as manufactured by Young Regulator Model No. 315 with 2-1/4" diameter cover plate or approved equal.

K. Dampers handles shall be extended so the damper is not obstructed by any insulation and easily adjustable.

L. Damper quadrants, volume dampers and other duct flow control quadrants shall be as manufactured by Young Regulator or approved equal and shall be damper sleeves.

M. For all areas where damper adjustments cannot be accessed through the ceiling, Bowden cable controls shall be used. Damper controller and cable shall be concealed above the ceiling. Cable shall consist of Bowden cable 0.054" stainless steel control wire encapsulated with 1/16" flexible galvanized spiral wire sheath. Control kit shall consist of 270-896 bracket with a 7/8" diameter cold rolled steel zinc plated threaded cap suitable for painting, and 14 gauge steel rack and pinion gear drive converting rotary motion to push-pull motion. Control shafts shall be D-style flatted ¼" diameter with 265 degree rotation providing graduations for positive locking and control, and 1-1/2" linear travel capability. Control kit shall be manually operated using Young Regulator Model 030-12 wrench. Provide a wrench for each cable control system installed. Control kit shall be Young Regulator Model 270-896P with tamper proof screws or prior approval equal.

N. On the inlet and outlet of each piece of air moving equipment or terminal unit, unless noted otherwise, install a flexible connection made with sufficient slack to render it flexible.

O. Furnish and install 24-gauge galvanized steel counter flashings for all ducts penetrating roofs and for all roof mounted equipment unless directed otherwise by the Engineer.

P. All duct penetrations through the floor to another level must be sealed with 24-gauge sheet metal fastened to the floor and duct sealing the hole. No open areas are acceptable. All Standards for penetrations through floors and fire safety must be followed.

2.2 FLEXIBLE DUCTWORK

A. Core material shall be a PVC Coated Fiberglass reinforced fabric supported by helically wound galvanized steel. The fabric shall be mechanically fastened to the steel helix without the use of adhesive.
B. The internal working pressure rating shall be at least as follows with a bursting pressure of at least 2-1/2 times the working pressure.
C. The duct shall be rated for a velocity of at least 5500 feet per minute.
D. Suitable for operating temperatures of at least 250 degrees F.
E. Factory insulate the flexible duct with flexible fiberglass insulation. The R value shall be at least 8.0 at a mean temperature of 75 degrees F. (R4.2 & 6 not acceptable)
F. Cover the insulation with a reinforced aluminum pigmented vapor barrier jacket having a permeance of not greater than 0.05 perms when tested in accordance with ASTM E 96, procedure A.
G. The ductwork shall be UL 181 listed, Class 1 Air Duct and comply with NFPA 90A and NFPA 90B.
H. Duct shall be secured with metal bands no less than 1.5” wide.
I. Duct shall be Flexmaster Type 8M or pre-approved equal

2.3 ACCESS DOORS

A. Access doors mounted in painted surfaces shall be of Milcor (Inland-Ryerson Construction Products Company) manufacturer or approved equal, Style K for plastered surfaces and Style M or DW for non-plastered surfaces. The Style K doors shall be set so that the finished surface of the door is even with the finished surfaces of the adjacent finishes. Access doors mounted on tile surfaces shall be stainless steel materials. Access doors shall be a minimum of 18" x 18" in size.
B. Access doors are not permitted in public areas of buildings.

2.4 FIRE AND SMOKE DAMPERS

A. Provide combination fire and smoke dampers where shown on the drawings. Dampers shall meet all requirements of fire dampers and additionally shall include an operating shaft, which, when rotated 90 deg., causes the damper to operate between closed and open. All dampers shall comply with the requirements of UL-555S, 350°F temperature rating and with pressure and velocity levels as required by the installation. Provide breakaway duct connects as required by UL.
B. Each damper shall be provided with and end switch.
C. Each damper shall have a duct door with-in 6” of the outlet of each damper. The minimal size duct door shall be no less 8x8.
D. Each damper shall be furnished complete with 18 gauge galvanized factory sleeve and damper operator (pneumatic or electric to conform to control system) factory installed on exterior of sleeve and properly linked to damper operating shaft. Operators shall be UL listed and labeled as Fire Damper Operators.
E. Each damper shall be activated by a duct smoke detector provided by Division 26.
F. Dampers shall be as manufactured by Ruskin, Nailor-Hart or approved equal.
G. Wiring
    1. Each smoke zone shall be wired on a separate circuit.
        a. Each fire/smoke damper shall be wired on a separate circuit in each designated zone.
        b. Each smoke damper for make-up air shall be wired on a separate circuit in each designated zone, separate from the fire/smoke damper and the exhaust damper.
        c. Each smoke damper for smoke exhaust shall be wired on a separate circuit in each designated zone, separate from the fire/smoke damper and make-up air damper.

PART 3 - EXECUTION

3.1 INSTALLATION - METAL DUCTS

A. All ductwork shall be installed as recommended by SMACNA and as shown or indicated on the drawings. Coordinate ductwork with all other trades and elements of the building construction.

B. All ductwork accessories shall be provided as specified or shown or indicated on the drawings, install as recommended by SMACNA and the manufacturer.

C. Ductwork shall be installed in a neat, workmanlike manner with ducts generally parallel to structure and tops of ducts as high as possible against building construction. Provide offsets as necessary to avoid obstructions, piping, or structural members, It is contractors responsibility to communicate with other trades to reduce the amount of offsets needed. The additional cost of offsets and fittings shall not be passed onto the owner.

D. Flexible ductwork shall be installed and supported as recommended by SMACNA and the manufacturer. Refer to section 2.4 for more details.

E. At each major branch from a primary rectangular or square trunk duct, and where shown on the drawings, install a splitter damper or multi-blade adjustable air pickup. Refer to section 2.1 for requirements.

F. Volume dampers shall be installed within ducts or plenums where shown on the drawings and on all supply/return/exhaust taps for balancing of system.

G. All Dampers shall be marked with a flag for easy identification of location.

H. Round ductwork shall be fastened together with a minimum of three sheet metal screws equally spaced around the perimeter of the duct and taped with an approved duct sealing tape. Ductwork shall be furnished complete with all factory fabricated starting collars, Y shaped branch takeoffs, adjustable elbows, etc.

I. Where ducts are in mechanical rooms or unfinished areas, or where dampers occur above lift out ceilings, regulators shall be stamped galvanized steel, lever type with locking screw mounted on face of ductwork. For all other areas, where damper adjustments cannot be accessed through the ceiling, regulators shall be the concealed type with adjustable cover plate.

J. On the inlet and outlet of each piece of air moving equipment, unless noted otherwise, install a flexible connection made with sufficient slack to render it flexible.

K. Where air intakes and/or discharges are indicated on the drawings and no air device is indicated, install 1/4" bird screens over each duct opening set in galvanized steel frames and securely attach to the openings.

L. Provide concentric taps on all connections from the main duct to branch ducts.

M. Provide stamped steel duct access doors at each fire damper, fire and smoke damper, where control devices occur within ductwork, and as indicated on the drawings. Access doors shall be fully insulated where duct is lined internally. Provide with mounting flange, double thickness door with cam latch, gasket and retaining wire. No tools shall be required to open the access door.

N. The minimum size of each access door shall be sufficient to provide adequate access for the intended purpose of installation.

3.2 FIELD QUALITY CONTROL

A. Commissioning: Include testing and verification of functional and operational performance at intended pressure and temp ranges, training for operations maintenance and documentation. Commissioning test pressure shall not exceed the pressure rating to which the ductwork has been designed and fabricated.

B. Air Leakage Testing: Test in accordance with ASHRAE 90.1 and with SMANCA HVAC Air Duct Leakage Test Manual, including operation at static pressure on at least 25 percent of the total installed duct area.

3.3 DUCT SEALING

A. All exposed duct shall be internally sealed, or gasket sealed fittings shall be used.
   1. Duct sealer on exposed joints will not be acceptable.

B. All seams, joints and taps must be sealed with a water and air tight sealant.

C. Sealer must be a Water Based Duct Sealer designed for use in high velocity air conditioning, refrigeration, ventilating, and air distributing systems up to 15w.g.. It must be suitable for use in both indoor and outdoor applications and exceeds all SMACNA Pressure and Sealing Classes.
   1. Duct tape and Foil tape is not an approved sealer.

END OF SECTION

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SECTION 23 31 50 - HANGERS AND SUPPORTS FOR DUCTWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to the Work in this Section

1.2 SUMMARY

A. Provide all equipment, materials, labor, supervision, and services necessary for or incidental to the installation of all necessary identification items as indicated on the drawings and as specified.

B. Contractor shall field verify and coordinate all ductwork hangers and supports, dimensions, clearances, and ductwork elevations with new and existing building structures.

C. Submittals: Provide submittals as required in Section 23 05 00 “Common Work Results for HVAC”.

1.3 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Without additional cost to the Owner, provide such other labor and materials as are required to complete the work of this Section in accordance with the requirements of governmental agencies having jurisdiction, regardless of whether such materials and associated labor are called for elsewhere in these Contract Documents.

C. All duct shall be installed in a quality workmanship. Ductwork shall be straight and level.

D. Methods of supporting ductwork shall be in accordance with the SMANCA Manual, Section 1 – Low Velocity Systems, unless otherwise shown on the drawings or specifications herein.

E. SMANCA – Sheet Metal and Air Conditioning Contractors National Association Inc.

F. Electrically operated and power actuated tools for installing welded studs and power driven fasteners, shall be listed by a nationally recognized testing agency.

1.4 SUBMITTALS

A. Provide submittals as required in section 23 00 10, “Submittal Process.”

1.5 RELATED WORK SPECIFIED ELSEWHERE

A. 23 31 13: Air Distribution

B. 23 07 00: HVAC Insulation

PART 2 - PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

A. Type 1: Hangers shall be rod type hangers: Mild Carbon steel, unless otherwise specified: fully threaded with (2) removeable nuts on each end for positioning and locking rod in place. Rods must be galvanized, or Cadmium plated.

B. Type 2: 1”-1.5” 24 gage galvanized strap. Strap must be fastened to SMANCA standards.

C. Type 3: Dyna-Tite Suspension system: Using aviation grade galvanized wire rope and cable locks. This application shall only be acceptable for round exposed duct.

D. Hangers for ducts shall be as specified in the SMANCA Manual, with the following exceptions.
   1. Lower hanger attachments for rectangular duct with any dimensions 36” wide and above shall be trapeze hangers, supported by minimal 3/8 threaded galvanized rod.
   2. Trapeze hangers shall be a minimum 1-1/2 x 1-1/2 x ¼” angle or 1-5/8 Unistrut larger size as required by larger or heavier ductwork.
   3. Lower hanger attachments for rectangular duct maximum dimensions less than 30” 24 gage flat strap attached directly to duct. Fasteners penetrating duct must be completely sealed.
   4. Wire used as supports or as banding shall not be acceptable.
   5. Threaded support rods shall utilize sufficient support, jamb, and lock nuts to allow adjustment for duct heights.

2.2 MISCELLANEOUS FASTENERS AND UPPER HANGER ATTACHMENTS
- A. Machine Bolts and Nuts: Galvanized or cadmium plated steel.
- B. Steel “C” clamps with lock nuts. Elcen Co. No. 29L, with 25B steel retaining clips.
- C. Hilti KH-EZI All-thread concrete screw anchor
- D. Hilti HMN nail in anchor.
- E. Hilti HDI-P Threaded rod expansion fitting.
- F. Sheet metal fasteners shall be a minimum #10x3/4 sheet metal screw.

2.3 BRANCH FITTINGS, JOINTS & TURNING VANES
- A. Provide supports necessary for lengths over 16” or heights over 8”.

PART 3 - EXECUTION

3.1 UPPER HANGER ATTACHMENTS
- A. General Note: Upper hanger attachments for ductwork shall be secured to overhead structural steel or steel bar joists wherever possible, unless otherwise specified.
- B. When required by ductwork support spacing schedules, provide intermediate structural steel members, framed to span the structural steel or steel bar joists. The minimum size of structural steel members, for the use of intermediate steel framing, shall be 2-1/2 x 2-1/2 x ¼” steel angles. Steel members shall be shop primed prior to installation. Intermediate steel shall be sized for span and load to show no deflection.
- C. Secure upper hanger attachments to bar joists at the panel points of joists.
- D. Under no circumstance shall any hole be drilled in structural steel members.
- E. Exercise extreme caution in the field drilling of holes in precast concrete work, to avoid damage to reinforcing. Power driven types of fasteners shall be utilized in the attachment of hangers to precast concrete work.
- F. Upper hanger attachments shall be specified in the manual, with the following exceptions:
  1. Do not use flat bar, bent rod, or power activated drive pins as upper hanger attachments in concrete construction. Expansion nails or concrete screws shall be the only approved product.
- G. Attachments to structural steel: Secure to steel beams with beam clamps, welded studs, or “C” clamps with locking nuts and safety bars.
- H. Under no circumstances shall power activated fasteners be used unless with prior written consent from the Mechanical Engineer’s Representative.
- I. Do not attach welded studs or power activated fasteners to steel less than 3/16” in thickness.
- J. Attachments to Cellular Steel or Fluted Metal Decks: Do not support ductwork from cellular or fluted metal roof decks. Attach hangers to structural steel members wherever possible.

K. Riser Supports: Support vertical ducts by means of two steel angles or channels, anchor bolted to the floor slab or adjacent structural member at every floor through which the riser passes.

L. Steel angle or channel support sizes shall be as follows:

Max Side Dimension	Support Angle	Support Channel
36”	1 x 1x 1-1/8	1 x ½ x 1/8
48”	1-1/2 x 1-1/2 x 1/8	1-1/2 x ¾ x 1/8
60”	2 x 2 x 1/8	2 x 1 x 1/8
Over 60”	2-1/2 x 2-1/2 x 3/16	2 x 1 x 3/16

3.2 DUCT HANGER SPACING

Duct hanger spacing shall be in strict accordance with SMANCA and as follows:

Rectangular Duct Hangers Minimum Sizes:

Max. Side of Duct Perimeter	Rod Pair at 10’ Spacing	Rod Pair at 8’ Spacing	Rod Pair at 4’ Spacing
0-72	¼”	¼”	¼”
73-96	3/8”	¼”	¼”
97-120	3/8”	3/8”	¼”
121-168	½”	3/8”	3/8”
169-192	½”	½”	3/8”

Round Hanger Strap.

Duct Diameter	Strap Hangers	Max Spacing
4-26	(1) 1” x 22 Ga.	10’
27-36	(1) 1” x 18 Ga.	10’
37-50	(1) 1” x 18 Ga.	10’
51-60	(2) 1” x 18 Ga.	10’

END OF SECTION

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SECTION 23 76 00—DX SPLIT SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The Drawings and General Provisions of the Contract, including General and Supplementary Conditions Specification Sections, apply to the Work in this Section.

1.2 SUMMARY

A Provide all equipment, materials, labor, supervision and services necessary for or incidental to the installation of a complete and operating refrigeration and air handling system as indicated on the drawings and as specified.

B Work included:

1. Direct Expansion Condensing Units

C Submittals: Provide submittals as required in Section 23 10 00 “Submittal Process”

1.3 QUALITY ASSURANCE

A Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B Without additional cost to the Owner, provide such other labor and materials as are required to complete the work of this Section in accordance with the requirements of governmental agencies having jurisdiction, regardless of whether such materials and associated labor are called for elsewhere in these Contract Documents.

C When requested, provide the Engineer with manufacturer's certificate that the equipment meets or exceeds minimum requirements as specified.

D All equipment shall have a minimum EER in accordance with ASHRAE 90.1 unless specified otherwise.

E The units shall be listed by Electrical Laboratories (ETL) and bear the ETL label.

F All wiring shall be in accordance with the National Electric Code (NEC).

G The system will be produced in an ISO 9001 and ISO 14001 facility, which are standards set by the International Standard Organization (ISO). The system shall be factory tested for safety and function.

PART 2 - PRODUCTS

2.1 D-X CONDENSING UNIT (NON-RESIDENTIAL TYPE)

A. General: Condensing unit shall be designed, constructed, assembled, rated, and tested in accordance with ARI Standards 210 and 270. Unit shall have capacities to meet the design conditions specified or indicated on the drawings. The unit shall be a factory packaged unit and shall be suitable for mounting on ground or roof of building. The package shall consist of one of more refrigerant compressors with electric motors, condensers, fans, controls, control wiring and piping, all factory assembled in a weatherproof enclosure mounted on a structural steel base ready for field connection to the system piping. Unit shall be factory pressurized with nitrogen or dry air and shall still be holding pressure prior to connection of field piping. The unit shall be sufficiently rigid and shall be arranged to permit handling by a crane, boom or by helicopter. The unit shall be provided with equipment rails and flashing if required for roof application.

B. Energy Efficiency Ratio (E.E.R.): Units shall produce not less than scheduled BTU's per watt input when tested in accordance with ARI Standard 210. The Contractor shall submit data to demonstrate that the units will produce the energy efficiency ratio specified. The unit shall be ASHRAE 90.1 compliant when paired with scheduled air handling unit.

C. Unit Enclosure: Unit enclosure shall be constructed of steel not less than 18 US gage thickness, with removable access panels completely weatherized for outside installation, and properly reinforced and braced. Panels and access door shall be provided for inspection and access to all internal parts. Surface of steel parts shall be factory corrosion protected by a painted or coating system. Joints shall be watertight.

D. Compressors: Compressors shall be semi-hermetic or full hermetic type and shall be equipped with oil failure protection, low suction and high pressure protection, oil heater(s), suction and discharge service valves and provision for field testing and charging units. If standard with the manufacturer, two or more compressors, but not more than four may be provided in lieu of a single compressor with cylinder unloading in which case capacity reduction shall be provided by sequence operation of the compressors or combination of the two methods. Where compressors are paralleled, not more than three compressors per refrigerant circuit shall be provided. Each compressor shall be provided with devices to protect the compressor from short-cycling whenever the compressor is shutdown by any of the safety controls. Compressors shall be provided with factory installed vibration isolation and shall be warranted for a minimum of ten (10) years.

E. Compressor Motor and Motor Starter: Compressor motor shall be suitable for electric power characteristics as shown on drawings. Motor shall conform to NEMA MG-1. Motor starters shall conform to NEMA ICS. Motor shall be constant speed, squirrel cage induction, low starting current, high torque type, and shall be furnished with magnetic part wind or across the line motor starter with general purpose enclosures protected from the weather. Provide ambient compensated 3-leg protection for all starters. Compressor shall be direct-connected.

F. Air-Cooled Condenser: Air-cooled condenser shall be enclosed within unit housing and shall consist of coils, fans, and electric motor. The condenser shall provide a minimum of 3 deg. F of subcooling. The air-cooled condenser may be used for refrigerant storage in lieu of a separate receiver, provided that condenser storage capacity is designed for such use. Controls shall temporarily bypass system low pressurestat to permit start-up whenever minimum ambient temperature is below design evaporator coil suction temperature.

G. Condenser coil shall be finned-tube type and shall be seamless copper or aluminum tubes with aluminum fins. On condensers with all aluminum construction, aluminum alloy conforming to ASTM B210, alloy 1100, shall be used for the tubes, and aluminum alloy conforming to chemical requirements of ASTM B209, alloy 7072, shall be used for fins and sheets. Fins shall be soldered or mechanically bonded to tubes and installed in a metal casing. Coil shall be tested after assembly at pressures specified in ANSI B9.1 for refrigerant employed in system.

H. Fans shall be either centrifugal or propeller driven as best suited for the application. Fans shall be directly connected to motor shaft, or indirectly corrected to motor by means of v-belt drive. Fans shall be statically and dynamically balanced.

I. Motors shall conform to NEMA MG-1. Motor starters shall conform to NEMA ICS. Motors shall be totally enclosed type or open type so located within an enclosure as to be fully protected from weather. Motor starter shall be magnetic across-the-line type with weather-resistant enclosure. Thermal protection shall be manual reset type.

J. Condenser Controls: Head pressure control shall be provided to ensure condensing temperature for proper system operation at all ambient temperatures down to 10°F. Control shall be by condenser flooding method, factory installed.

K. Solid state variable speed fan motor controller may be provided to control airflow over coil. Condensers with multiple fans may be provided with fan cycling control to cycle one of two fans, two of three fans or four of six fans in response to outdoor ambient temperature. The use of dampers to control condenser air flow shall not be permitted.

L. Units shall be as manufactured by Carrier to match existing equipment and control system.

2.1 DX FAN COIL UNIT – WITH ELECTRIC HEAT

A. Chassis: Galvanized steel with flanged edges, with baked enamel finish and removable access panel.

B. Cabinet: Steel with baked enamel finish in manufacturer's standard paint color as selected by Architect.
   1. Horizontal Unit Bottom Panels: Fastened to unit with cam fasteners and hinge and attached with safety chain; with cast aluminum discharge grilles.
C. Insulation: One half (1/2) inch thick, coated glass fiber complying with ASTM C 1071 and attached with adhesive complying with ASTM C 916. Insulation and adhesive shall have a combined maximum flame spread index of twenty five (25) and smoke developed index of fifty (50) when tested according to ASTM E 84 by a qualified testing agency. Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
D. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and thermal expansion valve. Comply with ARI 206/110.
   1. Coil shall be compatible and by the same manufacturer as the outdoor condenser.
   2. Coil: Cased in 22-gauge, galvanized steel cabinet.
   3. Evaporator Material: Aluminum Coil
   4. TXV refrigeration valve for R-410a required.
   5. Fully insulated cabinet
   6. Interior drain pan required. Connect to existing drain lines. Verify drains are clear and properly sloped.
   7. Warranty: 1 year labor, 10 year parts
E. Drain Pans: Single-wall, galvanized-steel sheet,.
   1. Fabricated with one percent slope in at least two planes to collect condensate from cooling coils (including coil piping connections, coil headers, and return bends) and to direct water toward drain connection.
      i. Length: Extend drain pan downstream from leaving face to comply with ASHRAE 62.1
   2. Drain Connection: Located at lowest point of pan and sized to prevent overflow. Terminate with threaded nipple on both ends of pan.
   3. Pan-Top Surface Coating: Asphaltic waterproofing compound.
   4. Units with stacked coils shall have an intermediate drain pan to collect condensate from top coil.
F. Filters: Minimum arrestance and a minimum efficiency reporting value (MERV) according to ASHRAE 52.2 and all addendums. Filter MERV rating at 1” thickness shall be thirteen (13) when tested according to ASHRAE 52.2.
G. Fan and Motor Board: Removable.
   1. Fan: Forward curved, double width, centrifugal; directly connected to motor. Thermoplastic or painted steel wheels, and aluminum, painted steel, or galvanized steel fan scrolls.
   2. Motor: Permanently lubricated, multispeed; resiliently mounted on motor board.
   3. Wiring Termination: Connect motor to chassis wiring with plug connection.
H. Electric Heat:
   1. Electric heaters shall be constructed of highgrade resistance wire supported by ceramic insulators on plated steel brackets. The heat elements shall be suspended in front of the outlet, after the blower and coil. An auto and manual thermal limit switch shall protect the heat elements in the event of an air failure.
   2. Single-phase heaters shall be available in 115, 208, 230, or 277 volts (60 Hz). Three-phase electric heat shall be available in 208, 230, or 460 volts (60 Hz)
   3. Electric heaters can be controlled in single, 2, or 3 stages of operation

PART 3 - EXECUTION

3.1 INSTALLATION

A. Equipment shall be installed as shown or indicated on the drawings and as recommended by the manufacturer.
B. Control Wiring.
   1. All low voltage control wiring shall inside walls shall be installed into rigid conduit.
   2. All exterior low voltage control wiring shall be installed in a liquid tight conduit.

C. Install unit's level and plumb.
D. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.
E. DX Refrigerant systems use a high pressure refrigerant and have unique installation procedures and requirements. It is imperative that the installation of these systems meet factory specifications in order for the systems to meet the expected performance and efficiency.
    1. Factory training for installing technicians. – Prior to installation, the installing mechanical contractor must provide written proof that all installing technicians have received adequate training by the equipment manufacturer or approved alternate. Approved contractors who are awarded this project may contact the manufacturer to arrange training prior to installation for any unqualified technicians. The mechanical contractor's installation price shall be inclusive of the manufacturer's installation requirements including the cost of training, specialty tools, and cost charged by the manufacturer for technical assistance.
    2. Job installation support and certification. – In order to assure properly installed system components and approved installation procedures, the specified manufacturer or approved alternate must provide installation technical support for the installing contractor via telephone and the internet, and job site supervision. Upon completion of installation and prior to factory startup, a factory authorized commissioning agent must inspect the installation of each system to verify proper installation. Upon verification of proper installation, the manufacturer is to submit a letter of certification approving the installation of their respective systems.
    3. Factory Startup and Warranty Approval – Upon verification and written receipt of proper installation, a factory authorized commissioning agent is to perform a factory approved initial startup of all system components. Such that the requirements to receive the maximum manufacturer's warranty are met and confirmed with the manufacturer.

3.2 PRODUCT SUPPORT
A. Maintain a fully staffed service office within 400 miles (1 day drive) of the job site. Fully staffed means a full time secretary, complete service library, at least 2 factory trained service technicians and the factory recommended spare parts inventory.
B. Provide a 24 hour/7 day technical support phone number to factory service office. Support shall be for all components including controls, mechanical components, system operation and alarm codes, etc.
C. The Manufacturer or local representative shall maintain a complete parts inventory for all systems that will allow for 24 hour receipt of any necessary part.
D. Provide owner/operator and service training both on line and at designated training centers.

3.3 EQUIPMENT START-UP
A. Equipment start up shall be by factory trained personnel. The startup shall be attended by the controls contractor and Test and Balance contractor.
B. Without prior approval from the engineer and owner, all mechanical equipment shall not be operated during construction of the building per manufacturer recommendations. The mechanical contractor shall be responsible to provide temporary heating or cooling as needed to climatize the building.

END OF SECTION

SECTION 26 00 10 – ELECTRICAL SUBMITTAL PROCESS

PART 1 - GENERAL

1.1 SUBMITTALS

A. Comply with all submittal provisions of Division 1.

B. Submit electronic copies of the submittal to the prime consultant (i.e. architect) in order to process and track the submittals properly in accordance with Division 1 and 26 submittal requirements. Architects and consultants are to submit all submittals and RFI's to the electrical engineer electronically. Send to **"mdengca@md-eng.com".** Submittals shall be labeled by their project specification section or CSI specification section if not listed in project specifications.

C. Contractor is responsible to separate submittals per specification section. Unseparated submittals are subject to rejection without review.

D. Allow a minimum of ten (10) working days for the review of submittals and each re-submittal.

E. Submittals that have been reviewed and marked as REJECTED (REJ) or REVISE & RESUBMIT (RES) should be resubmitted within 10 days to be reviewed again by engineer.

F. Compliance with the Contract documents shall be the sole responsibility of the Contractor. Items on equipment that were not accepted by the Architect in writing as an approved equal shall be replaced or revised to comply with the contract documents at the Contractor's expense.

G. Resubmission of rejected submittals shall be limited to one (1) in number. Costs for processing subsequent resubmittals in excess of the first resubmittal, resulting from the Contractor's disregard of Architect/Engineer's primary submittal rejection comments, shall be borne by the Contractor. Costs shall be based on Architect/Engineer's hourly rates as published in their current professional fee schedules and shall also include reimbursable costs for delivery, mailing, and photocopies at direct cost-plus ten percent (10%).

H. Submittals required of materials and equipment include following:

1. Materials list of items proposed to be provided under Division 26.
2. Manufacturer's specifications and other data needed to prove compliance with specified requirements. Term "Compliance" is understood to mean that Contractor certifies that submitted equipment meets or exceeds Contract Document requirements. Items that do not clearly meet this definition should be identified and explained as required in following paragraph.
3. Identify difference between specified item and proposed item. Explain with enough detail so that it can easily be determined that item complies with functional intent. List the disadvantages or advantages of proposed item versus specified item. Submit technical data sheets and/or pictures and diagrams to support and clarify. Organize in clear and concise format. Substitutions shall be approved in writing by Engineer. Engineer's decision shall be final.
4. Items of equipment that are not accepted in writing as approved equal shall be replaced or revised to comply with Contract Documents at Contractor's expense.
5. The manufacturers recommended installation procedures shall become basis for accepting or rejecting actual installation procedures used on Work.
6. Shop drawings shall consist of detailed drawings with dimensions, schedules, weights, capacities, installation details and pertinent information needed to describe the material or equipment.

I. Provide a dimension layout of electrical rooms(s) and elevator equipment room(s) if applicable.

*** Submittals with a (X) shall be submitted

individually with the correlating spec.

*** Do not combine submitted specifications.

Required X	Submittal Name	Spec Reference
X	**Common Work Results for Electrical** -Submittals, Shop Drawings.	26 05 00
X	**Electrical Demolition** *-See Specification for information*	26 05 01
X	**Electrical Work in Existing Facilities** -Site Inspection Report	26 05 02
X	**Fire Stopping** -Materials	26 05 03
	Site Electrical -Electrical Service	26 05 05
X	**Low Voltage Electrical Power Conductors** -Conductors, Cables	26 05 19
X	**Grounding & Bonding** -Materials, Chemical ground rod	26 05 26
X	**Hangers & Supports for Electrical** -Hanger & clamps, Fabricated devices	26 05 29
X	**Raceways and Boxes for Electrical Systems** -Boxes, Floor Boxes	26 05 33
	Cable Trays for Electrical Systems -Cable Trays	26 05 36
	IN-Floor Raceways -In-floor Duct Systems	26 05 39
X	**Identification for Electrical Systems** -Submit all marking systems per spec.	26 05 53
	Overcurrent Protective Device Corr. Study -Final Report	26 05 73
	Electrical Testing -Final Report	26 05 93
X	**Disconnect Switches** -Manufacturer, Switches, Components	26 06 20
	Commissioning of Electrical Systems *-Commissioning Plan, Narrative Descriptions* *-FTP (functional performance tests)*	26 08 00

Required X	Submittal Name	Spec Reference
	Lighting & Receptacle (Relay) Panelboards -Product Data per Specification	26 09 26
	Lighting Control System *-Product Data per Specification*	26 09 33
	Occupancy Sensors *-Sensor, Shop Drawing for sensor layout.*	26 09 55
	Low Voltage Underground Service Entrance *-Metering Equipment, Raceways& Fittings*	26 21 16
	Low Voltage Transformers *-Product Data per Specification*	26 22 00
	Switchboards *-Manufacturer, Bus, Feeder protective devices* *-Metering, Enclosures, Name plates,*	26 24 13
	Panelboards *-Manufacturer, Panelboards, Distribution* *-Lighting, Circuit breakers* *-Magnetic*	26 24 16
	Tenant Metering *-Product Data per Specification*	26 25 00
	Feeder & Plug-in Busway-600V or less	26 25 00.10
	Electrical Cabinets & Enclosures *-Hinged cover enclosures, cabinets, Fab.*	26 27 16
	Wiring Devices *-Receptacles, Switches, Wall plates*	26 27 26
X	**Enclosed Switches** *-Components*	26 28 16
	Enclosed Controllers *-Manufacturers, Controllers, Enclosures*	26 29 13
	Solar Photovoltaic System	26 31 13

END OF SECTION

SECTION 26 05 00 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Division 01, Commissioning Requirements, apply to this section and all of Division 26, 27 and 28, and will require the contractor participation in the Commissioning Process.

1.2 SUMMARY

A. Section Includes:

1. Electrical equipment coordination and installation.
2. Sleeves for raceways and cables.
3. Sleeve seals.
4. Grout.
5. Common electrical installation requirements.

1.3 DEFINITIONS

A. Retain abbreviations that remain after this Section has been edited.

B. EPDM: Ethylene-propylene-diene terpolymer rubber.

1.4 COORDINATION

A. Coordinate arrangement, mounting, and support of electrical equipment:

1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
3. To allow right of way for piping and conduit installed at required slope.
4. Connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.

B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

C. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 08 Section "Access Doors and Frames."

D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

E. Coordination Drawings: Contractor shall prepare above ceiling and roof coordination drawings for efficient installation of different components and coordination for installation of products and materials fabricated by each trade.

1. Content: Project-specific information, drawn accurately to scale. Do not base Coordination Drawings on reproductions of the Contract Documents or standard printed data. Include the following information, as applicable:
   a. Indicate functional and spatial relationships of components of architectural, structural, mechanical, and electrical systems.
   b. Indicate dimensions shown on the Contract Drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect for resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
2. Sheet Size: At least 8-1/2 by 11 inches but no larger than 30 by 40 inches.

3. Number of Copies: Submit two opaque copies of each submittal. Architect will return one copy.
   a. Submit five copies where Coordination Drawings are required for operation and maintenance manuals. Architect will retain two copies; remainder will be returned. Mark up and retain one returned copy as a Project Record Drawing.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. All materials purchased for this Project shall be new.
   1. Where specified product is not manufactured, manufacturer's current product meeting specification shall be substituted, subject to written approval of Engineer.

B. Space allocations in electrical spaces are based on equipment scheduled in each case. Should the Contractor offer equipment of another make, he shall verify that such equipment will fit in the spaces allowed.

C. Manufacturers' names are listed herein to establish a standard. The products of other manufacturers will be acceptable; if, in the opinion of the Architect, the substitute material is of a quality as good or better than the material specified, and will serve with equal efficiency and dependability, the purpose for which the items specified were intended.
   1. Requests for substitution shall be submitted in writing by the Contractor prior to award of contract. Requests for substitution or prior approval from manufacturers or their representatives will not be accepted.
   2. It is fully the Contractor's responsibility to assemble and submit sufficient technical information to fully illustrate that the material or equipment proposed for substitution is equal or superior as the Architect or his Engineer is under no obligation to perform the service for the Contractor. The proposal shall be accompanied by manufacturers' engineering data, photometric calculations, specification sheet, and a sample, if practical or if requested. In no event shall a proposal for substitution be cause for delay of work.
   3. Should the substitution be accepted, the Architect will issue a written notice of acceptance to the Contractor. Verbal approval for substitution requests will not be given.
   4. Should a substitution be accepted under the above provisions, and should the substitution prove defective or otherwise unsatisfactory for the intended service, within the warranty period, the Contractor shall replace the substitution with the equipment or material specified, and on which the specifications required him to base his proposal.

2.2 SLEEVES FOR RACEWAYS AND CABLES

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral water stop, unless otherwise indicated.

C. Sleeves for Rectangular Openings: Galvanized sheet steel.
   1. Minimum Metal Thickness:
      a. For sleeve cross-section rectangle perimeter less than 50 inches and no side more than 16 inches, thickness shall be 0.052 inch.
      b. For sleeve cross-section rectangle perimeter equal to, or more than, 50 inches and 1 or more sides equal to, or more than, 16 inches, thickness shall be 0.138 inch.

2.3 SLEEVE SEALS

A. Retain this article if annular space between pipe sleeves and raceways or cables must be sealed against hydrostatic pressure. Sleeve seals are usually furnished with EPDM sealing elements, plastic pressure plates, and carbon-steel bolts. NBR and silicone sealing elements, carbon- and stainless-steel pressure plates, and stainless-steel bolts are available for special applications.

B. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Advance Products & Systems, Inc.
   b. Calpico, Inc.
   c. Metraflex Co.
   d. Pipeline Seal and Insulator, Inc.
2. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
3. Pressure Plates: Plastic. Include two for each sealing element.
4. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.4 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, non-staining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. Comply with NECA 1 and the National Electrical Code.

B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.

C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

E. Right of Way: Give to piping systems installed at a required slope.

3.2 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.

B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.

C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.

D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.

E. Cut sleeves to length for mounting flush with both surfaces of walls.

F. Extend sleeves installed in floors 2 inches above finished floor level.

G. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable, unless indicated otherwise.

H. Seal space outside of sleeves with grout for penetrations of concrete and masonry
   1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.

I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants."

J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."

K. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work. In areas where mechanical work is routed through RPB units, the electrical feeders/branch circuits should also be routed through the same RPBs. Coordinate between trades as required.

L. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

M. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.

3.3 SLEEVE-SEAL INSTALLATION

A. Install to seal exterior wall penetrations.

B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.4 FIRESTOPPING

A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

END OF SECTION

SECTION 26 05 01- ELECTRICAL DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to the Work in this Section.

1.2 SUMMARY

A. Provided all equipment, materials, labor supervision, and services necessary for or incidental to the demolition of electrical equipment and materials as indicated on the drawings, and as specified.

B. Work included:

1. Removal of panels, switchboards, light fixtures, receptacles, conduit and wire and other electrical equipment and materials where indicated.
2. Arrange for the disposal of lamps and ballasts in accordance with TSCA.

1.3 STANDARDS

A. All work shall comply with the Toxic Substances Control Act (TSCA) 1976.

1.4 SUBMITTALS AND SHOP DRAWINGS

A. Submit qualifications of the disposal company.

1.5 QUALITY ASSURANCE

A. Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Without additional cost to the Owner, provide such other labor and materials as are required to complete the work of this Section in accordance with the requirements of governmental agencies having jurisdiction, regardless of whether such materials and associated labor are called for elsewhere in these Contract Documents.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 DISCONNECTION OF THE SOURCES OF POWER

A. Prior to the demolition of work by any trade, provide a qualified electrician to disconnect all sources of power serving equipment scheduled for demolition. Verify by testing that power has been disconnected. The electrician shall remain on the site during demolition, to disconnect and test electrical work that becomes accessible during the course of demolition.

3.2 SALVAGE AND DISPOSAL

A. Tour the project site with the Owner’s representative to identify and mark those items, scheduled for demolition, which the Owner wishes to retain. Deliver those items so marked, to the Owner’s storage, within the project site, as directed.

B. All remaining demolition items shall become the Contractor's property and shall be removed from the site. Hazardous materials shall be disposed of in accordance with federal regulations.
C. Refer to Section 26 57 00 for additional instructions concerning the disposal of lamps and ballasts.

3.3 CONDUIT, WIRE AND PANELBOARDS
A. Where equipment, wiring devices and/or light fixtures are scheduled for demolition, remove the associated wire and raceway back to the circuit breaker serving the equipment, unless specifically noted otherwise.

3.4 FIRE ALARM SYSTEM
A. Remove all components of the existing fire alarm system, within the area of demolition, including conduit, wire, initiating devices, and annunciating devices.
B. Removing fire alarm systems during demolition will put system in "trouble" alarm mode. Leave connected and secured, away from any celling or wall until fire alarm contractor is on the job.

END OF SECTION

SECTION 26 05 02 - ELECTRICAL WORK IN EXISTING FACILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to the Work in this Section.

1.2 SUMMARY

A. Provide labor, materials, equipment, transportation, tools and services, and perform operations required for, and reasonably incidental to the providing or modification of electrical work and systems in existing facilities.

1.3 SHOP DRAWINGS

A. Show the joining of new work with existing, illustrating the actual existing conditions in accordance with Division 01.

1.4 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Without additional cost to the Owner, provide such other labor and materials as are required to complete the work of this Section in accordance with the requirements of governmental agencies having jurisdiction, regardless of whether such materials and associated labor are called for elsewhere in these Contract Documents.

PART 2 - PRODUCTS

2.1 WIRING METHODS AND MATERIALS

A. Where new conduits, wires, cables, outlets, light fixtures wiring devices, fire alarm devices, etc. are installed, they shall be of the type and quality specified, regardless of the types and quality of existing materials that are to remain.

B. Where existing light fixtures are shown to be relocated and such relocation can be made without disconnecting and extending the existing wiring, the light fixture and wiring may remain, if permitted by local codes, for the occupancy under construction.

C. Where existing light fixtures are shown to be removed, they must not be used elsewhere as they are not suitable for meeting the energy code.

PART 3 - EXECUTION

3.1 SITE INSPECTION

A. The Contract Documents do not propose to show all existing systems material or equipment. Obtain information related to existing facilities from existing documents, measurements, notations, photographs, surveys and other observations at the site.

B. Visit the project site and verify the existing materials, conditions, wiring methods, penetrations through fire rated walls, supporting devices and panelboards. Inspect ceiling spaces, panelboard interiors, connections to light fixtures, etc. Note any existing conditions which require work to bring the project into code compliance for the occupancy under construction.

C. Modify, repair and replace materials relating to any existing conditions whether shown on the drawings, noted during the site visit or discovered during the course of construction, which require work to bring the project into code compliance for the occupancy under construction.
D. Where existing light fixtures are shown to remain, - clean, re-lamp, repair damaged parts and replace ballast if defective so as to bring the fixture to good operating condition.
E. Where new inaccessible ceilings are shown to be installed, survey the existing conditions and relocate any j-boxes, pull boxes and any other items of electrical equipment requiring access. Where such relocations are difficult, coordinate with the architect to provide an access panel.

3.2 SCHEDULE OF WORK

A. Since the building will continue in use throughout the construction period, carry out the work under this Division in such a manner as to minimize disturbance to the occupants.
B. The schedule contemplates working in designated areas in the existing building while other adjacent areas are still being occupied. Carry out work in this Division in such a manner as to minimize disturbance to those occupied areas.
C. Should the work in the designated areas affect any services to the areas to remain in use, new permanent or temporary services or a combination of both shall be installed as required to enable those occupied areas to function properly.
D. Perform no work in the existing building which would interfere with its use during normal hours of occupancy, unless special permission is granted by the Owner. Included shall be operations which would cause objectionable noise or service interruptions.
E. Any work involving a service suspension shall be scheduled in advance with the Owner
F. Should it be necessary to perform certain operations on an “overtime” basis in order not to interrupt the normal usage of the building, include the costs of such overtime without change in the Contract amount.

3.3 TEMPORARY WORKING ACCESS

A. Remove existing wire, conduit, equipment, fixtures, and other items as required to provide access for work in existing facilities.
B. Reinstall and refinish items removed, or otherwise damaged, to match existing adjacent conditions upon completion of the work

3.4 DISRUPTION OF EXISTING FUNCTIONS

A. Access: Access to and use of the existing facilities and site will be restricted, and shall be under the direction and control of the Owner.
B. Outages: Schedule power outages to avoid interference with the Owner's or other tenant's activities. Obtain approval prior to the requested outage as specified in Division 1. Provide a schedule showing sequence and duration of all activities during the requested outage.
C. Disruptions: Maintain existing electrical, communications, alarm, and other existing systems, and maintain existing functions in service except for scheduled disruptions as specified in Division 1. Where existing functions to remain in use are disrupted, they shall be fully restored after disruption, in full compliance with this Division of the Specifications.
D. Duration: Complete as large a portion of the work as possible before initiating disruption and perform only that work necessary so as to minimize duration of disruption. Maintain adequate personnel, supplies, materials, equipment, tools, and other resources at job site to avoid unnecessary delay in resumption of normal service.
E. Schedule: Provide a complete schedule to the Owner for review and approval indicating the type and duration of any required disruption involved in the execution of the work.

3.5 SALVAGE, DEMOLITION AND RELOCATION

A. General

1. Modify, remove, or relocate materials, equipment and devices as indicated or required by the installation of new facilities.
2. Working jointly with the Owner's Representative, establish and mark salvage and demolition items before commencing work; report items scheduled for relocation, reinstallation or reuse, which are found to be in damaged condition; await further instructions from the Owner before commencing with work.
3. Demolition material shall be removed from the site and disposed of by the Contractor. Salvaged equipment and devices shall be the property of the Owner unless noted otherwise. Store or dispose of as directed by Owner.

B. Relocations

1. Make minor relocations necessitated by the conditions at the site or as directed by the Owner's Representative, without additional cost to the Owner.
2. Repair and restore to good functional condition, equipment, materials and items scheduled for relocation, which are damaged during dismantling or reassembly operations.
3. New materials and items of similar design and quality may be substituted for materials and items indicated to be relocated upon approval of Shop Drawings, product data, and samples.
4. Remove carefully, in reverse order to original assembly or placement, items which are to be relocated.
5. Protect items until relocation is complete.
6. Clean and repair items to be relocated, and provide new materials, fittings, and appurtenances required to complete the relocations and to restore to good operating order.
7. Perform the relocation work in full compliance with this Division of the Specifications, utilizing skilled workers.

C. Relocating Devices: Remove and reinstall in locations designated by the Owner's Representative wiring devices, fixtures, equipment, other devices and associated wire and conduit required for the operation of the various systems that are installed in existing-to-be-removed construction.

END OF SECTION

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SECTION 26 05 03 - FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to the Work in this Section.

1.2 SUMMARY

A. Only tested firestop systems shall be used in specific locations as follows:
   1. Penetrations for the passage of conduit and other electrical equipment through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.
   2. Completion of firestop installations to maintain the rating integrity of the barrier penetrated.
   3. SUBMITTALS: Provide submittals as required in section 26 00 10, “Submittal Process.”

1.3 DEFINITIONS

A. Firestopping: Material or combination of materials used to retain integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, water and hot gases through penetrations in fire rated wall and floor assemblies.

1.4 REFERENCES

A. Test Requirements: ASTM E-814, "Standard Method of Fire Tests of Through Penetration Fire Stops" (July 1997).

B. Underwriters Laboratories (UL) of Northbrook, IL runs ASTM E-814 under their designation of UL 1479 and publishes the results in their "FIRE RESISTANCE DIRECTORY" that is updated annually.
   1. UL Fire Resistance Directory:
      a. Through-Penetration Firestop Devices (XHCR)
      b. Fire Resistance Ratings (BXUV)
      c. Through-Penetration Firestop Systems (XHEZ)
      d. Fill, Voids, or Cavity Material (XHHW)
      e. Forming Materials (XHKU)

C. Inspection Requirements: ASTM E 2174-01 “Standard Practice for On-Site Inspection of Installed Fire Stops”.

D. International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments.

E. ASTM E-84, Standard Test Method for Surface Burning Characteristics of Building Materials.

F. All major building codes: ICBO, SBCCI, BOCA, and IBC. (Note to specifier: Retain or delete building codes listed above as applicable).

G. NFPA 101 - Life Safety Code

H. NFPA 70 – National Electric Code.

1.5 QUALITY ASSURANCE

A. A manufacturer's direct representative (not distributor or agent) to be on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures. This will be done per manufacturer's written recommendations published in their literature and drawing details.

B. Firestop System installation must meet requirements of ASTM E-814 or UL 1479 tested assemblies that provide a fire rating equal to that of construction being penetrated.

C. Proposed firestop materials and methods shall conform to applicable governing codes having local jurisdiction.
D. Firestop Systems do not reestablish the structural integrity of load bearing partitions/assemblies, or support live loads and traffic. Installer shall consult the structural engineer prior to penetrating any load bearing assembly.
E. For those firestop applications that exist for which no UL tested system is available through a manufacturer, a manufacturer's engineering judgment derived from similar UL system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineer judgment drawings must follow requirements set forth by the International Firestop Council (September 7, 1994 as may be amended from time to time).

1.6 SUBMITTALS
A. Submit Product Data: Manufacturer's specifications and technical data for each material including the composition and limitations, documentation of UL firestop systems to be used and manufacturer's installation instructions to comply with Section 26 00 10.
B. Manufacturer's engineering judgment identification number and drawing details when no UL system is available for an application. Engineer judgment must include both project name and contractor’s name that will install firestop system as described in drawing.
C. Submit material safety data sheets provided with product delivered to job-site.

1.7 INSTALLER QUALIFICATIONS
A. Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having the necessary experience, staff, and training to install manufacture’s products per specified requirements. A manufacturer’s willingness to sell its firestopping products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer.

1.8 DELIVERY, STORAGE, AND HANDLING
A. Deliver materials undamaged in manufacturer's clearly labeled, unopened containers, identified with brand, type, and UL label where applicable.
B. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job-site.
C. Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements.
D. Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.
E. Do not use damaged or expired materials.

1.9 PROJECT CONDITIONS
A. Do not use materials that contain flammable solvents.
B. Scheduling
1. Schedule installation of CAST IN PLACE firestop devices after completion of floor formwork, metal form deck, or composite deck but before placement of concrete.
2. Schedule installation of other firestopping materials after completion of penetrating item installation but prior to covering or concealing of openings.
C. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.
D. Weather conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.
E. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

PART 2 - PRODUCTS

2.1 FIRESTOPPING, GENERAL

A. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.

B. Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.

C. Firestopping materials are either “cast-in-place” (integral with concrete placement) or “post installed”. Provide cast-in-place Firestop devices prior to concrete placement.

2.2 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with through penetration firestop systems (XHEZ) listed in Volume II of the UL Fire Resistance Directory, provide products of the following manufacturers as identified below:

1. Hilti, Inc., Tulsa, Oklahoma (800) 879-8000
2. Tremco Sealants & Coatings, Beechwood, Ohio (216) 292-5000
3. 3M Fire Protection Products, St. Paul, Minnesota (612) 736-0203
4. Johns-Manville Firetemp
5. Other manufacturers listed in the U.L. Fire Resistance Directory – Volume 2

2.3 MATERIALS

A. Use only firestop products that have been UL 1479, ASTM E-814 tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.

B. Cast-in place firestop devices are installed prior to concrete placement for use with non-combustible and combustible plastic conduit penetrating concrete floors, the following products are acceptable:

1. Hilti CP 680 Cast-In Place Firestop Device
2. Hilti CP 681 Tub Box Kit
3. Equivalent products listed in the U.L. Fire Resistance Directory – Volume 2

C. Sealants or caulking materials for use with non-combustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT), the following products are acceptable:

1. Hilti FS-ONE Intumescent Firestop Sealant
2. Hilti CP 604 Self-leveling Firestop Sealant
3. Hilti CP 620 Fire Foam
4. 3M Fire Stop Sealant 2000
5. 3M Fire Barrier CP25 WB
6. Tremco Tremstop Fyre-Sil Sealant
7. Equivalent products listed in the U.L. Fire Resistance Directory – Volume 2

D. Sealants or caulking materials for use with sheet metal ducts, the following products are acceptable:

1. Hilti CP 601s Elastomeric Firestop Sealant
2. Hilti CP 606 Flexible Firestop Sealant
3. Hilti FS-ONE Intumescent Firestop Sealant
4. Hilti CP 604 Self-leveling Firestop Sealant
5. Equivalent products listed in the U.L. Fire Resistance Directory – Volume 2

E. Intumescent sealants or caulking materials for use with combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles and plastic pipe, the following products are acceptable:
   1. Hilti FS-ONE Intumescent Firestop Sealant
   2. 3M Fire Barrier CP25 WB
   3. Tremco Tremstop WBM Intumescent Firestop Sealant
   4. Equivalent products listed in the U.L. Fire Resistance Directory – Volume 2

F. Intumescent sealants, caulking or putty materials for use with flexible cable or cable bundles, the following products are acceptable:
   1. Hilti FS-ONE Intumescent Firestop Sealant
   2. Hilti CP 620 Fire Foam
   3. Hilti CP 618 Firestop Putty Stick
   4. 3M Fire Barrier CP25 WB
   5. Tremco Tremstop WBM Intumescent Firestop Sealant
   6. Equivalent products listed in the U.L. Fire Resistance Directory – Volume 2

G. Non curing, re-penetrable intumescent sealants, caulking or putty materials for use with flexible cable or cable bundles, the following products are acceptable:
   1. Hilti CP 618 Firestop Putty Stick
   2. Equivalent products listed in the U.L. Fire Resistance Directory – Volume 2

H. Wall opening protective materials for use with U.L. listed metallic and specified nonmetallic outlet boxes, the following products are acceptable:
   1. Hilti CP 617 Firestop Putty Pad
   2. Equivalent products listed in the U.L. Fire Resistance Directory – Volume 1

I. Firestop collar or wrap devices attached to assembly around combustible plastic conduit, the following products are acceptable:
   1. Hilti CP 642 Firestop Collar
   2. Hilti CP 643 Firestop Collar
   3. 3M Fire Barrier PPD Plastic Pipe Device
   4. Hilti CP 645 Wrap Strip
   5. Equivalent products listed in the U.L. Fire Resistance Directory – Volume 2

J. Materials used for large size/complex penetrations made to accommodate cable trays, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:
   1. Hilti CP 637 Firestop Mortar
   2. Hilti FS 657 FIRE BLOCK
   3. Hilti CP 620 Fire Foam
   4. 3M Firestop Foam 2001
   5. 3M Fire Barrier CS-195 Composite Sheet
   6. Equivalent products listed in the U.L. Fire Resistance Directory – Volume 2

K. Non curing, re-penetrable materials used for large size/complex penetrations made to accommodate cable trays, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:
   1. Hilti FS 657 FIRE BLOCK
   2. Equivalent products listed in the U.L. Fire Resistance Directory – Volume 2

L. Provide a firestop system with an "F" Rating as determined by UL 1479 or ASTM E814, which is equal to the time rating of construction being penetrated.

PART 3 - EXECUTION

3.1 PREPARATION

A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
   1. Verify penetrations are properly sized and in suitable condition for application of materials.
   2. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
   3. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.
   4. Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestopping.
   5. Do not proceed until unsatisfactory conditions have been corrected.

3.2 COORDINATION

A. Coordinate location and proper selection of cast-in-place Firestop Devices with trade responsible for the work. Ensure device is installed before placement of concrete.
B. Responsible trade to provide adequate spacing of field run pipes to allow for installation of cast-in-place firestop devices without interferences.

3.3 INSTALLATION

C. Regulatory Requirements: Install firestop materials in accordance with UL Fire Resistance Directory.
D. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of through-penetration and construction joint materials.
   1. Seal all holes or voids made by penetrations to ensure an air and water resistant seal.
   2. Protect materials from damage on surfaces subjected to traffic.

3.4 FIELD QUALITY CONTROL

E. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.
F. Keep areas of work accessible until inspection by applicable code authorities.
G. Inspection of through-penetration firestopping shall be performed in accordance with ASTM E 2174, “Standard Practice for On-Site Inspection of Installed Fire Stops” or other recognized standard.
H. Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing firestop systems already installed by other trades.

3.5 ADJUSTING AND CLEANING

I. Remove equipment, materials and debris, leaving area in undamaged, clean condition.
J. Clean all surfaces adjacent to sealed holes and joints to be free of excess firestop materials and soiling as work progresses.

END OF SECTION

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SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Building wires and cables rated 600 V and less.
   2. Connectors, splices, and terminations rated 600 V and less.

B. Related Requirements:
   1. Division 26 Section "Identification for Electrical Systems" for building wire and cable colors and identification.

1.3 DEFINITIONS

A. VFC: Variable-frequency controller.

1.4 SUBMITTALS

A. Product Data: For each type of product provide submittals as required in section 26 00 10, “Submittal Process.”

B. Qualification Data: For testing agency.

C. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
   1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with NFPA 70.

1.6 COORDINATION

A. Set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. American insulated Wire Corp.: a Leviton Company.
   2. Senator Wire & Cable Company.
   3. Southwire Company.
   4. General Cable Corporation.

5. Stabiloy of Alcan Cable.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with UL 1277, UL 1685, and NFPA 70 for Type TC-ER cable used in VFC circuits.

D. Conductors: Aluminum and copper, complying with NEMA WC 70/ICEA S-95-658.
   1. All branch circuits are to be copper.

E. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for Type THHN/THWN-2 Type XHHW-2 and Type USE.

F. Pull Cords: Minimum 1/8" nylon.

G. Pulling Compound: Ideal "Yellow 77".

H. Fire-resistive Cable: Comply with NEMA WC 70. Cable shall be UL labeled as 2-hour fire-rated, type MI mineral-insulated with nickel-clad copper conductor, magnesium oxide insulation, copper alloy sheath, and rated 600 volts. Provide factory installed terminations or field termination kits from the same manufacturer as the cable.
   1. Pentair Pyrotenax
   2. In lieu of the mineral-insulated cable above, a 2-hour fire rated metal clad cable may be substituted. Provide RSCC & Cable VITALink.

I. Aluminum Conductor
   1. Use of aluminum conductors Type XHHW-2 is permitted for feeder (NEC definitions) circuits in sizes 1/0 AWG and larger. All branch circuits shall be copper conductor. Aluminum alloy conductors shall be compact strand AA-8000 Series electrical grade conductor such as STABILOY® of Alcan Cable.
   2. Connectors and terminations installed with aluminum alloy conductors shall be only those listed by Underwriter's Laboratories, Inc. standard 486-B, and marked "AL7CU" for 75° C or "AL9CU for 90° C. Connectors and terminations shall be sized to accept aluminum conductors of the ampacity specified. Connections and terminations shall be installed according to the manufacturer's recommendations.
   3. Sizing of conductors and conduits shall be based on schedule on Drawings.
   4. Tighten Electrical connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque values or with tightening torques specified in UL Standard 486B.
   5. Only U.S manufactured Aluminum Wire & Cable with XHHW-2 Insulation are approved.

J. Use the following color code system:

	240/120 Volt Systems	208Y/120 Volt Systems	480Y/277 Volt Systems
Phase A	Black	Black	Brown
Phase B	Orange	Red	Orange
Phase C	Blue	Blue	Yellow
Neutral	White	White	Gray
Ground	Green	Green	Green
Switch	Purple	Purple	Purple

K. Cable: Comply with NEMA WC 70/ICEA S-95-658 for metal-clad cable, Type MC, mineral-insulated, metal-sheathed cable, Type MI, and Type SO with ground wire.
   1. Metal-Clad cable is permitted only as follows:
      a. Where concealed above accessible ceilings for final connections from junction boxes to luminaries. Maximum length of (6) six feet, with a maximum of (4) four connections to a junction box.
      b. Where concealed below accessible raised floor for final connections from junction boxes to devises. Maximum length of (6) six feet, with a maximum of (4) four connections to a junction box.
   2. VFC Cable: Type TC-ER with oversized crosslinked polyethylene insulation, spiral-wrapped foil plus 85 percent coverage braided shields and insulated full-size ground wire.

2.2 CONNECTORS AND SPLICES
A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. AFC Cable Systems, Inc.
   2. Hubbell Power Systems, Inc.
   3. O-Z/Gedney; EGS Electrical Group LLC.
   4. 3M; Electrical Products Division.
   5. Tyco Electronics Corp.
   6. Thomas & Betts.
B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70 and marked for intended location and application.

2.3 PRODUCT DELIVERY, STORAGE, AND HANDLING
A. Deliver wires and cables to the project in full cartons or reels marked with conductor size, insulation type, and Underwriters' Laboratories, Inc. label.
B. Store wires and cables in a manner to prevent damage from the elements, personnel, equipment, and moisture.
C. Handle wires and cables in a manner to prevent damage to conductor, insulation, and identifying

PART 3 - EXECUTION

3.1 INSPECTION
A. Examine the system in which the wire is to be installed for defects in equipment and installation which may cause damage to the wire.
B. Do not start work until defects have been corrected and until permission is obtained from the Construction Manager.

3.2 WIRING INSTALLATION IN RACEWAYS
A. Pull all conductors into a raceway at the same time. Use UL listed wire-pulling lubricant for pulling 4 AWG and larger wires.
B. Install wire in raceway after interior of building has been physically protected from the weather and all mechanical work likely to injure conductors has been completed.
C. Completely and thoroughly swab raceway system before installing conductors.

3.3 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper for feeders smaller than No. 1/0 AWG; copper or aluminum for feeders No. 1/0 AWG and larger. Conductors shall be solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
B. Retain one of two "Branch Circuits" paragraphs below.
C. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
D. VFC Output Circuits Cable: Extra-flexible stranded for all sizes.
E. Minimum Conductor Sizes:
   1. Feeders and Branch Circuits: No. 12 AWG.
   2. Class 1 Control Circuits: No. 14 AWG.
   3. Class 2 Control Circuits: No. 16 AWG.
F. Conductors shall be sized per “Feeder and Branch Circuit Sizing Schedule” on Drawings, unless noted otherwise.
G. Unless indicated otherwise, power circuits shall be 2#12, 1#12G, ¾”C.

3.4 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: Type THHN/THWN-2, single conductors in raceway.
B. Fire Pump Service Entrance: Type THHN-THWN or Type XHHW, single conductors in raceway, installed below floor slab or installed in at least 2 inches of concrete, or mineral-insulated, metal-sheathed cable, Type MI.
C. Emergency Feeder Circuits: Type THHN-THWN or Type XHHW, single conductors in raceway, installed below floor slab or installed in a minimum 1-hour fire rating, or mineral-insulated, metal-sheathed cable, Type MI.
D. Exposed Feeders: Type THHN/THWN-2, single conductors in raceway.
E. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN/THWN-2, single conductors in raceway.
F. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2 or Type XHHW-2, single conductors in raceway.
G. Exposed Branch Circuits, Including in Crawlspaces: Type THHN/THWN-2, single conductors in raceway.
H. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway.
I. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway.
J. Branch Circuits Installed below Raised Flooring: Type THHN/THWN-2, single conductors in raceway.
K. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.
L. Class 1 Control Circuits: Type THHN-THWN, in raceway.
M. Class 2 Control Circuits: Type THHN-THWN, in raceway, Power-limited cable, concealed in building finishes (not allowed in exposed ceiling of finished spaces), or Power-limited tray cable, in cable tray.
N. VFC Output Circuits: Type TC-ER cable with braided shield.

3.5 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.
B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.
C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members and follow surface contours where possible.
F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."
G. Identify and color-code conductors and cables according to Division 26 Section "Identification for Electrical Systems."
H. Do not install conductors supplied from different panelboards, distribution panels, or switchboards in same conduit or raceway, unless otherwise noted.
I. Circuits of multiple phases passing through enclosures shall have phases grouped to reduce the reactance effect.
J. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated

3.6 CONNECTIONS
A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than un-spliced conductors.
C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches (150 mm).

3.7 IDENTIFICATION
A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."
B. Identify each spare conductor at each end with identity number and location of other end of conductor and identify as spare conductor.

3.8 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS
A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.9 FIRESTOPPING
A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 078413 "Penetration Firestopping."

3.10 FIELD QUALITY CONTROL
A. Perform the following tests and inspections with the assistance of a factory-authorized service representative as required:
1. Perform each of the following visual and electrical tests:
a. Inspect exposed sections of conductor and cable for physical damage and correct connection according to the single-line diagram.
b. Test bolted connections for high resistance using one of the following:
1) A low-resistance ohmmeter.
2) Calibrated torque wrench.
3) Thermographic survey.
c. Inspect compression applied connectors for correct cable match and indentation.
d. Inspect for correct identification.
e. Inspect cable jacket and condition.

f. Insulation-resistance test on each conductor with respect to ground and adjacent conductors. Apply a potential of 500-V dc for 300-V rated cable and 1000-V dc for 600-V rated cable for a one-minute duration.
g. Continuity test on each conductor and cable.
h. Uniform resistance of parallel conductors.

2. Initial Infrared Scanning: After Substantial Completion, but before Final Acceptance, perform an infrared scan of each splice in conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner. Correct deficiencies determined during the scan.
   a. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
   b. Record of Infrared Scanning: Prepare a certified report that identifies switches checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
3. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each switch 11 months after date of Substantial Completion.

B. Cables will be considered defective if they do not pass tests and inspections.
C. Prepare test and inspection reports to record the following:
   1. Procedures used.
   2. Results that comply with requirements.
   3. Results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

3.11 VOLTAGE DROP

A. Voltage drop within AC systems shall not exceed two percent for feeder conductors.

B. Voltage drop within AC systems shall not exceed three percent for branch conductors. Refer to table below for maximum permitted branch conductor lengths at rated voltages:

Voltage Configuration	#12 AWG 20 amp OCP	#10 AWG 20 amp OCP	#10 AWG 30 amp OCP	#8 AWG 40 amp OCP	#6 AWG 50 amp OCP
120V, single phase	56 feet	93 feet	62 feet	72 feet	91 feet
208V, single phase	97 feet	162 feet	108 feet	124 feet	159 feet
240V, single phase	112 feet	187 feet	125 feet	144 feet	183 feet
277V, single phase	129 feet	216 feet	144 feet	166 feet	211 feet
480V, single phase	225 feet	374 feet	249 feet	288 feet	367 feet
208V, three phase	112 feet	187 feet	100 feet	115 feet	133 feet
240V, three phase	103 feet	173 feet	125 feet	144 feet	183 feet
480V, three phase	259 feet	433 feet	288 feet	333 feet	424 feet

Note: Table assumptions include copper conductors at 80% load capacity, 1.0 power factor, 75ºC temperature rating, EMT conduit, and three percent voltage drop.

C. Total voltage drop within DC systems shall not exceed three percent (combined PV source circuits and PV output circuits).

END OF SECTION

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SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY
- A. Section includes grounding and bonding systems and equipment.

1.3 SUBMITTALS
- A. Product Data: For each type of product indicated.
- B. Provide submittals as required in section 26 00 10, “Submittal Process.”
- C. As-Built Data: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article, including the following:
  1. Test wells.
  2. Ground rods.
  3. Ground rings.
  4. Grounding arrangements and connections for separately derived systems.
- D. Field quality-control reports.

1.4 QUALITY ASSURANCE
- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.
- C. Grounding electrode resistance to earth testing.
- D. Grounding conductor continuity testing and conductor insulation testing.

1.5 REFERENCED STANDARDS
- A. National Electrical Code, NFPA 70.
- B. EIA/TIA Standard 607
- C. IEEE - Standard 142 - Recommended Practice for Grounding of Industrial and Commercial Power Systems.
- D. IEEE – Standard 1100 – Recommended Practice for Powering and Grounding Electronic Equipment.
- E. IEEE Standard 81 - Guide for Measuring Earth Resistivity.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION
- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

2.2 CONDUCTORS
- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
  1. Solid Conductors: ASTM B 3.

2. Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.
4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm) in diameter.
5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

C. Grounding Bus: Predrilled rectangular bars of annealed copper, 24” in length and 1/4 by 4 inches (6.3 by 100 mm) in cross section, with 9/32-inch (7.14-mm) holes spaced 1-1/8 inches (28 mm) apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V and shall be Lexan or PVC, impulse tested at 5000 V.

2.3 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. All connections made below grade, in inaccessible locations, and all connections and splices in the grounding electrode conductor system shall be made by exothermic weld process equal to Cadweld. Provide polyethylene inspection well covers and lids equal to Erico #T416B, unless noted otherwise.

C. All other connections shall be hydraulically crimped irreversible connectors equal to Thomas and Betts 54000 Series.

D. Connections to cable trays shall be Thomas and Betts 10105 malleable iron mechanical clamp.

E. Connections to domestic cold-water piping shall be Thomas and Betts GUV Series copper alloy U-bolt and mechanical clamp.

F. Connections to building structural steel shall be exothermic weld equal to Cadweld.

G. Connections which require flexibility for movement, expansion, or vibration shall be made with flexible flat conductor, multiple strands of 30-gauge copper conductors or equivalent circular mil area to the primary ground conductor. Protect ends with copper bolt hole end pieces.

2.4 CONDUIT

A. Provide malleable iron conduit grounding bushings where:
1. Metallic raceways terminate at metal housings without mechanical and electrical connection to housing.
2. At each end of metallic conductors for grounding conductors where conduits are electrically non-continuous.
3. At the ends of service entrance conduit.

2.5 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel; 3/4 inch by 10 feet (19 mm by 3 m).

B. Chemical-Enhanced Grounding Electrodes: Copper tube, straight or L-shaped, charged with nonhazardous electrolytic chemical salts.
1. Self-contained ground rod(s) using electrolytically enhanced grounding shall be provided for power system grounding where indicated on the drawings. The ground rod shall operate by hygroscopically extracting moisture from the air to activate the electrolytic process improving performance. The ground rod system shall be UL listed and have been manufactured for a minimum of 10 years. The ground rod system shall be 100% self-activating sealed and maintenance free. The system shall not require the addition of chemical or water solutions.

2. The copper ground rod shall consist of 2” nominal diameter hollow copper tube with a wall thickness of not less than .083”. The tube shall be permanently capped on the top and bottom. Air breather holes shall be provided in the top of the tube and drainage holes shall be provided in the bottom of the tube for electrolyte drainage into the surrounding soil. Shaft configuration: Straight Shaft Model No: K2-1020CS; UL Listing: 467.
3. Termination: Factory-attached No. 4/0 AWG bare conductor at least 48 inches (1200 mm) long.
4. Backfill Material: Electrode manufacturer's recommended material.
5. Provide a precast concrete box with slots for conduit entrances. Minimum size shall be ten-inch diameter by twelve high. Provide a cast iron, flush traffic rated cover with “breather” slots, XIT model #XB-12.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 10 AWG and smaller, and stranded conductors for No. 8 AWG and larger unless otherwise indicated.
B. Underground Grounding Conductors: Install bare tinned-copper conductor, No. 2/0 AWG minimum.
   1. Bury at least 24 inches (600 mm) below grade.
   2. Duct-Bank Grounding Conductor: Bury 12 inches (300 mm) above duct bank when indicated as part of duct-bank installation.
C. Isolated Grounding Conductors: Green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection, with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.
D. Grounding Bus: Install in electrical equipment rooms, in rooms housing service equipment, in MDF and IDF rooms, in server rooms and elsewhere as indicated.
   1. Install bus horizontally, on insulated spacers 2 inches (50 mm) minimum from wall, 6 inches (150 mm) above finished floor unless otherwise indicated.
   2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down; connect to horizontal bus.
E. Conductor Terminations and Connections:
   1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
   2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
   3. Connections to Ground Rods at Test Wells: Bolted connectors.
   4. Connections to Structural Steel: Welded connectors.

3.2 GROUNDING AT THE SERVICE

A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

3.3 GROUNDING SEPARATELY DERIVED SYSTEMS

A. Generator: Install grounding electrode(s) at the generator location. The electrode shall be connected to the equipment grounding conductor and to the frame of the generator.

3.4 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

A. Comply with IEEE C2 grounding requirements.

B. Grounding Manholes and Handholes: Install a driven ground rod through manhole or handhole floor, close to wall, and set rod depth so 4 inches (100 mm) will extend above finished floor. If necessary, install ground rod before manhole is placed and provide No. 1/0 AWG bare, tinned-copper conductor from ground rod into manhole through a waterproof sleeve in manhole wall. Protect ground rods passing through concrete floor with a double wrapping of pressure-sensitive insulating tape or heat-shrunk insulating sleeve from 2 inches (50 mm) above to 6 inches (150 mm) below concrete. Seal floor opening with waterproof, nonshrink grout.

C. Grounding Connections to Manhole Components: Bond exposed-metal parts such as inserts, cable racks, pulling irons, ladders, and cable shields within each manhole or handhole, to ground rod or grounding conductor. Make connections with No. 4 AWG minimum, stranded, hard-drawn copper bonding conductor. Train conductors level or plumb around corners and fasten to manhole walls. Connect to cable armor and cable shields according to written instructions by manufacturer of splicing and termination kits.

D. Pad-Mounted Transformers and Switches: Install two ground rods and ground ring around the pad. Ground pad-mounted equipment and noncurrent-carrying metal items associated with substations by connecting them to underground cable and grounding electrodes. Install tinned-copper conductor not less than No. 2 AWG for ground ring and for taps to equipment grounding terminals. Bury ground ring not less than 6 inches (150 mm) from the foundation.

3.5 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:

1. Feeders and branch circuits.
2. Lighting circuits.
3. Receptacle circuits.
4. Single-phase motor and appliance branch circuits.
5. Three-phase motor and appliance branch circuits.
6. Flexible raceway runs.
7. Armored and metal-clad cable runs.
8. Busway Supply Circuits: Install insulated equipment grounding conductor from grounding bus in the switchgear, switchboard, or distribution panel to equipment grounding bar terminal on busway.
9. X-Ray Equipment Circuits: Install insulated equipment grounding conductor in circuits supplying x-ray equipment.

C. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.

D. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.

E. Isolated Grounding Receptacle Circuits: Install an insulated equipment grounding conductor connected to the receptacle grounding terminal. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service unless otherwise indicated.

F. Isolated Equipment Enclosure Circuits: For designated equipment supplied by a branch circuit or feeder, isolate equipment enclosure from supply circuit raceway with a nonmetallic raceway fitting listed for the purpose. Install fitting where raceway enters enclosure and install a separate insulated equipment grounding conductor. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service unless otherwise indicated.

G. Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

H. Metallic Fences: Comply with requirements of IEEE C2.
   1. Grounding Conductor: Bare, tinned-copper, not less than No. 8 AWG.
   2. Gates: Shall be bonded to the grounding conductor with a flexible bonding jumper.
   3. Barbed Wire: Strands shall be bonded to the grounding conductor.

3.6 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Ground Bonding Common with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor and install in conduit.

C. Ground Rods: Drive rods until tops are 2 inches (50 mm) below finished floor or final grade unless otherwise indicated.
   1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
   2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.

D. Test Wells: Ground rod driven through drilled hole in bottom of handhole. Handholes are specified in Section 260543 "Underground Ducts and Raceways for Electrical Systems," and shall be at least 12 inches (300 mm) deep, with cover.
   1. Test Wells: Install at least one test well for each service unless otherwise indicated. Install at the ground rod electrically closest to service entrance. Set top of test well flush with finished grade or floor.

E. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
   1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
   2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
   3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

F. Wiring Devices:
   1. Install a 6 inch (150mm) green insulated pigtail from grounding terminal of wiring device to device box and equipment grounding conductor.
   2. For lighting fixtures, install insulated grounding conductor and terminate to terminal on lighting fixture housing.
   3. For electric motors, install an insulated equipment grounding conductor in branch circuit serving each electric motor, and bond to motor frame.

G. Grounding and Bonding for Piping:
   1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
   2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
   3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

H. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install bonding jumper to bond across flexible duct connections to achieve continuity.

I. Grounding for Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 feet (18 m) apart.

J. Ground Ring: Install a grounding conductor, electrically connected to each building structure ground rod and to each steel column, extending around the perimeter of building.
   1. Install tinned-copper conductor not less than No. 2/0> AWG for ground ring and for taps to building steel.
   2. Bury ground ring not less than 24 inches (600 mm) from building's foundation.

K. Transformer Secondary Neutrals:
   1. Provide insulated copper grounding electrode conductor from transformer XO connection to grounding bus bar in electrical room. Grounding bus bar shall be bonded to common grounding electrode conductor and also metal piping systems and building steel in the area served by the transformer(s) (separately derived systems). Exothermically weld to building steel.
   2. Looping grounding conductors from transformer to transformer shall not be allowed.

L. Photovoltaic System:
   1. Provide all grounding in accordance with NEC 690 and photovoltaic manufacturer recommendations.
      a. The DC circuit grounding connection shall be made at a single point on the photovoltaic output circuit. Systems with a ground-fault protection device shall be permitted to instead have the required grounded conductor-to-ground bond made internally at the ground-fault protection device.
      b. Provide equipment grounding for all exposed, non-current-carrying metal parts of module frames, equipment, and conductor enclosures. For the metallic frames of PV modules, utilize only manufacturer-approved devices listed for grounding or bonding.
      c. Where photovoltaic power systems have both AC and DC grounding requirements, the DC grounding system shall be bonded to the AC grounding system.

M. Concrete-Encased Grounding Electrode (Ufer Ground): Fabricate according to NFPA 70; use a minimum of 20 feet (6 m) of bare copper conductor not smaller than No. 4 AWG.
   1. If concrete foundation is less than 20 feet (6 m) long, coil excess conductor within base of foundation.
   2. Bond grounding conductor to reinforcing steel in at least four locations and to anchor bolts. Extend grounding conductor below grade and connect to building's grounding grid or to grounding electrode external to concrete.

N. Concrete-Encased Grounding Electrode (Ufer Ground): Fabricate according to NFPA 70; using electrically conductive coated steel reinforcing bars or rods, at least 20 feet (6.0 m) long. If reinforcing is in multiple pieces, connect by the usual steel tie wires or exothermic welding to create the required length.

3.7 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.

2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, at ground test wells, and at individual ground rods. Make tests at ground rods before any conductors are connected.
   a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
   b. Perform tests by fall-of-potential method according to IEEE 81.
4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

B. Grounding system will be considered defective if it does not pass tests and inspections.

C. Report measured ground resistances that exceed the following values:

1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
2. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 ohms.
3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.
4. Power Distribution Units or Panelboards Serving Electronic Equipment: 3 ohm(s).
5. Substations and Pad-Mounted Equipment: 5 ohms.
6. Manhole Grounds: 10 ohms.

D. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION

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SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY
- A. Section Includes:
  - 1. Hangers and supports for electrical equipment and systems.
  - 2. Construction requirements for concrete bases.

1.3 DEFINITIONS
- A. EMT: Electrical metallic tubing.
- B. IMC: Intermediate metal conduit.
- C. RMC: Rigid metal conduit.

1.4 PERFORMANCE REQUIREMENTS
- A. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.5 SUBMITTALS
- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
    - a. Hangers.
    - b. Steel slotted support systems.
    - c. Nonmetallic support systems.
  - 2. Include rated capacities and furnished specialties and accessories.
- B. Provide submittals as required in section 26 00 10, “Submittal Process.”

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS
- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design hanger and support system.
- B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Flame Rating: Class 1.
  - 2. Self-extinguishing according to ASTM D 635.

2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS
- A. Steel Slotted Support Systems: Comply with MFMA-4 factory-fabricated components for field assembly.
  - 1. Material: **Galvanized steel**.
  - 2. Channel Width: 1-5/8 inches (41.25 mm).
  - 3. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
  - 4. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
  - 5. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.

6. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
7. Channel Dimensions: Selected for applicable load criteria.

B. Nonmetallic Slotted Support Systems: Structural-grade, factory-formed, glass-fiber-resin channels and angles with minimum 13/32-inch- (10-mm-) diameter holes at a maximum of 8 inches (200 mm) o.c., in at least one surface.
1. Channel Width: 1-5/8 inches (41.25 mm).
2. Fittings and Accessories: Products provided by channel and angle manufacturer and designed for use with those items.
3. Fitting and Accessory Materials: Same as those for channels and angles, except metal items may be stainless steel.
4. Rated Strength: Selected to suit applicable load criteria.
5. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be made of malleable iron.

E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M steel plates, shapes, and bars; black and galvanized.

F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
2. Mechanical-Expansion Anchors: Insert-wedge-type, [**zinc-coated steel**] [**stainless steel**], for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
3. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.

2.3 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

B. Materials: Comply with requirements in Section 055000 "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems unless requirements in this Section are stricter.

B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMTs, IMCs, and RMCs as scheduled in NECA 1, where its Table 1 lists maximum spacings that are less than those stated in NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.

C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
   1. Secure raceways and cables to these supports with clamps approved for the application by an agency acceptable to the authorities having jurisdiction.

D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch (38-mm) and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

E. Provide rooftop conduit supports for all photovoltaic system conduits located on the roof.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.

B. Raceway Support Methods: In addition to methods described in NECA 1, EMTs, IMCs, and RMCs may be supported by openings through structure members, according to NFPA 70.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
   1. To Wood: Fasten with lag screws or through bolts.
   2. To New Concrete: Bolt to concrete inserts.
   3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
   4. To Existing Concrete: Expansion anchor fasteners.
   5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches (100 mm) thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches (100 mm) thick.
   6. To Steel: Beam clamps (MSS SP-58, Type 19, 21, 23, 25, or 27), complying with MSS SP-69.
   7. To Light Steel: Sheet metal screws.
   8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that comply with seismic-restraint strength and anchorage requirements.

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Comply with installation requirements in Section 055000 "Metal Fabrications" for site-fabricated metal supports.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

A. Construct concrete bases of dimensions indicated but not less than 4 inches (100 mm) larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

B. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Section 033000 "Cast-in-Place Concrete."

C. Anchor equipment to concrete base as follows:

1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils (0.05 mm).

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION

SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Metal conduits, tubing, and fittings.
2. Nonmetal conduits, tubing, and fittings.
3. Metal wireways and auxiliary gutters.
4. Nonmetal wireways and auxiliary gutters.
5. Surface raceways.
6. Boxes, enclosures, and cabinets.

B. Related Requirements:

1. Section 260543 "Underground Ducts and Raceways for Electrical Systems" for exterior ductbanks, manholes, and underground utility construction.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.
B. FMC: Flexible metal conduit.
C. RNC: Rigid nonmetallic conduit.
D. IMC: Intermediate metal conduit.

1.4 SUBMITTALS

A. Provide submittals as required in section 26 00 10, “Submittal Process.”
B. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
C. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.
D. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:

1. Structural members in paths of conduit groups with common supports.
2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

E. Qualification Data: For professional engineer.
F. Source quality-control reports.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

A. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
B. GRC: Comply with ANSI C80.1 and UL 6.
C. ARC: Comply with ANSI C80.5 and UL 6A.
D. IMC: Comply with ANSI C80.6 and UL 1242.
E. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.

1. Comply with NEMA RN 1.
2. Coating Thickness: 0.040 inch (1 mm), minimum.

F. EMT: Comply with ANSI C80.3 and UL 797.
G. FMC: Comply with UL 1; zinc-coated steel.
H. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.
I. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
   1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
   2. Fittings for EMT:
      a. Material: Steel.
      b. Type: Setscrew.
   3. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
   4. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch (1 mm), with overlapping sleeves protecting threaded joints.
J. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS, TUBING, AND FITTINGS
A. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
B. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
C. Fittings for RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
D. Solvents and Adhesives: As recommended by conduit manufacturer.

2.3 OPTICAL FIBER/COMMUNICATIONS CABLE RACEWAY AND FITTINGS
A. Description: Comply with UL 2024; flexible type, approved for general-use installation.

2.4 METAL WIREWAYS
A. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 unless otherwise indicated, and sized according to NFPA 70.
   1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
B. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
C. Wireway Covers:
   1. Small size (4 inches by 4 inches or smaller)hinged type with fastening device.
   2. Large size (over 4 inches by 4 inches) screw cover type, flanged and gasketed.
D. Finish: Manufacturer's standard enamel finish.

2.5 NONMETALLIC WIREWAYS
A. Listing and Labeling: Nonmetallic wireways shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
B. Description: Fiberglass polyester, extruded and fabricated to required size and shape, without holes or knockouts. Cover shall be gasketed with oil-resistant gasket material and fastened with captive screws treated for corrosion resistance. Connections shall be flanged and have stainless-steel screws and oil-resistant gaskets.
C. Fittings and Accessories: Couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings shall match and mate with wireways as required for complete system.
D. Solvents and Adhesives: As recommended by conduit manufacturer.

2.6 SURFACE RACEWAYS

A. Listing and Labeling: Surface raceways and tele-power poles shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Surface Metal Raceways: Galvanized steel with snap-on covers complying with UL 5. Manufacturer's standard enamel finish in color selected by Architect.

C. Tele-Power Poles:

1. Material: Aluminum with clear anodized finish.
2. Fittings and Accessories: Dividers, end caps, covers, cutouts, wiring harnesses, devices, mounting materials, and other fittings shall match and mate with tele-power pole as required for complete system.

2.7 BOXES, ENCLOSURES, AND CABINETS

A. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

B. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

C. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

D. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.

E. Metal Floor Boxes:

1. Material: Cast metal or sheet metal.
2. Type: Fully adjustable.
3. Shape: Round.
4. Listing and Labeling: Metal floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

F. Nonmetallic Floor Boxes: Nonadjustable, round.

1. Listing and Labeling: Nonmetallic floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

G. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb (23 kg). Outlet boxes designed for attachment of luminaires weighing more than 50 lb (23 kg) shall be listed and marked for the maximum allowable weight.

H. Paddle Fan Outlet Boxes: Nonadjustable, designed for attachment of paddle fan weighing 70 lb (32 kg).

1. Listing and Labeling: Paddle fan outlet boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

I. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

J. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.

K. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

L. Device Box Dimensions: 4 inches square by 2-1/8 inches deep (100 mm square by 60 mm deep), 4 inches by 2-1/8 inches by 2-1/8 inches deep (100 mm by 60 mm by 60 mm deep).

M. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 with continuous-hinge cover with flush latch unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Nonmetallic Enclosures: Plastic.
3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

N. Cabinets:
1. NEMA 250, Type 1 galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.
3. Key latch to match panelboards.
4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.
6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
1. Exposed Conduit: IMC.
2. Concealed Conduit, Aboveground: IMC.
3. Underground Conduit: RNC, Type EPC-40-PVC, .
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
5. Boxes and Enclosures, Aboveground: NEMA 250, Type 4.

B. Indoors: Apply raceway products as specified below unless otherwise indicated:
1. Exposed, Not Subject to Physical Damage: EMT.
2. Exposed, Not Subject to Severe Physical Damage: EMT.
3. Exposed and Subject to Severe Physical Damage: IMC. Raceway locations include the following:
a. Loading dock.
b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
c. Mechanical rooms.
d. Gymnasiums.
4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
6. Damp or Wet Locations: IMC.
7. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel in institutional and commercial kitchens and damp or wet locations.
8. Corrosive or Harsh environments: PVC coated rigid metal conduit.

C. Elbows below grade, in or routed through concrete shall be PVC Coated Rigid Metal Conduit.

D. Minimum Raceway Size: 3/4-inch (21-mm) trade size.

E. Raceway Fittings: Compatible with raceways and suitable for use and location.
1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
3. EMT: Use compression, steel fittings. Comply with NEMA FB 2.10.
4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

F. Install nonferrous conduit or tubing for circuits operating above 60 Hz. Where aluminum raceways are installed for such circuits and pass-through concrete, install in nonmetallic sleeve.
G. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.
H. Install surface raceways only where indicated on Drawings.
I. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F (49 deg C).

3.2 INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
B. Keep raceways at least 8 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
C. Complete raceway installation before starting conductor installation.
D. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.
E. Arrange stub-ups so curved portions of bends are not visible above finished slab.
F. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches (300 mm) of changes in direction.
G. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
H. Support conduit within 12 inches (300 mm) of enclosures to which attached.
I. Stub-ups to Above Recessed Ceilings:
    1. Use EMT for raceways.
    2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
J. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
K. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.
L. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.
M. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch (35mm) trade size and insulated throat metal bushings on 1-1/2-inch (41-mm) trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
N. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
O. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.
P. Cut conduit perpendicular to the length. For conduits 2-inch (53-mm) trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.
Q. Install pull wires in empty raceways, whether indicated on plans or not. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

R. Surface Raceways:
   1. Install surface raceway with a minimum 2-inch (50-mm) radius control at bend points.
   2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches (1200 mm) and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.

S. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.

T. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
   1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
   2. Where an underground service raceway enters a building or structure.
   3. Where otherwise required by NFPA 70.

U. Expansion-Joint Fittings:
   1. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:
      a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F (70 deg C) temperature change.
      b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F (86 deg C) temperature change.
      c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F (70 deg C) temperature change.
      d. Attics: 135 deg F (75 deg C) temperature change.
   2. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F (0.06 mm per meter of length of straight run per deg C) of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F (0.0115 mm per meter of length of straight run per deg C) of temperature change for metal conduits.
   3. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
   4. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

V. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches (1830 mm) of flexible conduit for recessed and semirecessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
   1. Use LFMC in damp or wet locations.

W. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

X. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.

Y. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

Z. Locate boxes so that cover or plate will not span different building finishes.

AA. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
BB. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
CC. Set metal floor boxes level and flush with finished floor surface.
DD. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 FIRESTOPPING
A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.4 PROTECTION
A. Protect coatings, finishes, and cabinets from damage and deterioration.
1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION

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SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Identification for raceways.
2. Identification of power and control cables.
3. Identification for conductors.
4. Warning labels and signs.
5. Instruction signs.
6. Equipment identification labels, including arc-flash warning labels.
7. Miscellaneous identification products.

1.3 SUBMITTALS

A. Provide submittals as required in section 26 00 10, “Submittal Process.”

B. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for electrical identification products.

1.4 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in the Contract Documents, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual, and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

C. Coordinate installation of identifying devices with location of access panels and doors.

D. Install identifying devices before installing acoustical ceilings and similar concealment.

E. When identifying room numbers on labels or directories, coordinate with the Owner’s final room numbering system, as the architectural room numbers are generally arbitrary and may not be final.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with NFPA 70.

B. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

C. Comply with ANSI Z535.4 for safety signs and labels.

D. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

2.2 COLOR AND LEGEND REQUIREMENTS

A. Raceways and Cables Carrying Circuits at 600 V or Less:

1. Black letters on an orange field.
2. Legend: Indicate voltage and system or service type.

B. Warning labels and signs shall include, but are not limited to, the following legends:
   1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
   2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES (915 MM)."

2.3 LABELS
A. Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible labels laminated with a clear, weather- and chemical-resistant coating and matching wrap-around clear adhesive tape for securing label ends.
B. Snap-Around Labels for Raceways and Cables Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameters sized to suit diameters of raceways they identify, and that stay in place by gripping action.
C. Self-Adhesive Labels:
   1. Vinyl, thermal, transfer-printed, 3-mil- (0.08-mm-) thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.
      a. Nominal Size: 3.5-by-5-inch (76-by-127-mm).
   2. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
   3. Marker for Tags: Machine-printed, permanent, waterproof, black ink recommended by printer manufacturer.

2.4 BANDS AND TUBES:
A. Snap-Around, Color-Coding Bands for Raceways and Cables #12 - #3/0: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 2 inches (50 mm) long, with diameters sized to suit diameters of raceways or cables they identify, and that stay in place by gripping action.
   1. Brady SCN
B. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tubes with machine-printed identification labels, sized to suit diameters of and shrunk to fit firmly around cables they identify. Full shrink recovery occurs at a maximum of 200 deg F (93 deg C). Comply with UL 224.
   1. Brady HSA

2.5 Signs
A. Baked-Enamel Signs:
   1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
   2. 1/4-inch (6.4-mm) grommets in corners for mounting.
   3. Nominal Size: 7 by 10 inches (180 by 250 mm).
B. Metal-Backed Butyrate Signs:
   1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs, with 0.0396-inch (1-mm) galvanized-steel backing and with colors, legend, and size required for application.
   2. 1/4-inch (6.4-mm) grommets in corners for mounting.
   3. Nominal Size: 10 by 14 inches (250 by 360 mm).
C. Laminated Acrylic or Melamine Plastic Signs:
   1. Engraved legend.

2. Thickness:
   a. For signs up to 20 sq. inches (129 sq. cm), minimum 1/16-inch- (1.6-mm-).
   b. For signs larger than 20 sq. inches (129 sq. cm), 1/8 inch (3.2 mm) thick.
   c. Engraved legend with black letters on white face foe normal power, white letters on red face for emergency power.
   d. Punched or drilled for mechanical fasteners.
   e. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

PART 3 - EXECUTION

3.1 PREPARATION

A. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

3.2 INSTALLATION

A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.
B. Install identifying devices before installing acoustical ceilings and similar concealment.
C. Verify identity of each item before installing identification products.
D. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.
E. Apply identification devices to surfaces that require finish after completing finish work.
F. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
G. Painted Identification: Comply with requirements in painting Sections for surface preparation and paint application.
H. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (7.6-m) maximum intervals in congested areas.

3.3 IDENTIFICATION SCHEDULE

A. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits, More Than 30 A and 120 V to Ground: Identify with self-adhesive vinyl tape applied in bands. Install labels at 30-foot (10-m) maximum intervals.
B. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels containing the wiring system legend and system voltage. System legends shall be as follows:
   1. "EMERGENCY POWER."
   2. "POWER."

C. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.
   1. Color-Coding for Phase-and Voltage-Level Identification, 600 V or Less: Use colors listed below for ungrounded feeder and branch-circuit conductors.
      a. Color shall be factory applied.
      b. Colors for 208/120-V Circuits:
         1) Phase A: Black.
         2) Phase B: Red.
         3) Phase C: Blue.
      c. Colors for 480/277-V Circuits:
         1) Phase A: Brown.
         2) Phase B: Orange.
         3) Phase C: Yellow.

D. SPECIAL RACEWAY IDENTIFICATION
   1. Special Systems. Brady Series 55200, 2" wide, pipe banding tape or colored conduit. All covers for pull boxes shall be painted correlating color.
      a. Fire alarm: red
      b. Telephone: blue
      c. Data/Communications: blue
      d. Low voltage controls: black
      e. Sound systems: yellow
      f. Clock systems: green

E. Install instructional sign, including the color code for grounded and ungrounded conductors using adhesive-film-type labels.

F. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use self-adhesive vinyl labels with the conductor or cable designation, origin, and destination.

G. Control-Circuit Conductor Termination Identification: For identification at terminations, provide self-adhesive vinyl labels with the conductor designation.

H. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
   1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
   2. Use system of marker-tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
   3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.

I. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall comply with NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.

J. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Baked-enamel warning signs.
   1. Comply with 29 CFR 1910.145.
   2. Identify system voltage with black letters on an orange background.
   3. Apply to exterior of door, cover, or other access.
   4. For equipment with multiple power or control sources, apply to door or cover of equipment, including, but not limited to, the following:
      a. Power-transfer switches.
      b. Controls with external control power connections.

K. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.

L. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch- (10-mm-) high letters for emergency instructions at equipment used for power transfer.

M. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm unless equipment is provided with its own identification.

1. Labeling Instructions:
   a. Indoor Equipment: Engraved, laminated acrylic or melamine plastic label, punched or drilled for mechanical fasteners. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where two lines of text are required, use labels 2 inches (50 mm) high.
   b. Outdoor Equipment: Engraved, laminated acrylic or melamine label.
   c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
   d. Unless labels are provided with self-adhesive means of attachment, fasten them with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.
2. Equipment To Be Labeled:
   a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be in the form of a engraved, laminated acrylic or melamine label.
   b. Enclosures and electrical cabinets.
   c. Access doors and panels for concealed electrical items.
   d. Enclosed switches.
   e. Enclosed circuit breakers.
   f. Enclosed controllers.
   g. Variable-speed controllers.
   h. Push-button stations.

END OF SECTION

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SECTION 26 06 20 - DISCONNECT SWITCHES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
- A. The General Provisions of the Contract, including General and Supplementary Conditions, apply to the Work specified in this Section.

1.2 RELATED WORK SPECIFIED ELSEWHERE
- A. All other Sections of Division 26.
- B. All other Divisions of the Contract Documents. Refer to each Division's Specifications and Drawings for requirements.

1.3 SCOPE
- A. Provide all equipment, materials, labor, supervision, and services necessary for or incidental to the installation of disconnect switches as shown or indicated on the Drawings and/or as specified.
- B. Work Included:
  1. Circuit disconnects
  2. Motor disconnects

1.4 SUBMITTALS
- A. **Provide submittals as required in section 26 00 10, "Submittal Process."**

1.5 QUALITY ASSURANCE
- A. Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Without additional cost to the Owner, provide such other labor and materials as are required to complete the work of this Section in accordance to the requirements of governmental agencies having jurisdiction, regardless of whether such materials and associated labor are called for elsewhere in these Contract Documents.
- C. When requested, provide the Architect with manufacturer's certificate that materials meet or exceed minimum requirements as specified.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS
- A. Provide disconnect switches manufactured by one of the following:
  1. General Electric Company
  2. Siemens Energy and Automation
  3. Square D Schneider Electric
  4. Eaton, Cutler Hammer

2.2 HEAVY-DUTY SAFETY SWITCHES
- A. Provide surface-mounted, heavy-duty type, sheet-steel enclosed safety switches, of types, sizes and electrical characteristics indicated; fusible type, rated 600 volts, and incorporating quick-make, quick-break type switches; construct so that switch blades are visible in OFF position with door open. Equip with operating handle which is pad lockable in OFF position; construct current carrying parts of high-conductivity copper, with silver-tungsten type switch contacts, and positive pressure type reinforced fuse clips. Provide NEMA Type 3R enclosures at exterior equipment. Provide class RK-1 current limiting and time delay fuses.

2.3 COMPONENTS

A. Motor and circuit disconnects shall have an Underwriters' Laboratory label.

B. Single Phase Disconnect Switches: Two pole toggle switch equal to Square D Type F with thermal overloads in appropriate enclosure.

C. Three Phase Motor Disconnect Switches: 3 pole heavy duty 250 or 600 volt as required in NEMA Type 1 or 3 enclosures as indicated and as required.

D. Enclosures

1. Normal indoor locations – heavy duty NEMA 1
2. Outdoor or wet locations – heavy duty NEMA 3R

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install circuit and motor disconnect switches as indicated, complying with manufacturer's written instructions, applicable requirements of NEC, NEMA, and NECA's "Standard of Installation", and in accordance with recognized industry practices.

END OF SECTION

SECTION 262816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Fusible switches.
   2. Nonfusible switches.
   3. Receptacle switches.
   4. Molded-case circuit breakers (MCCBs).
   5. Molded-case switches.
   6. Enclosures.

1.3 DEFINITIONS

A. NC: Normally closed.
B. NO: Normally open.
C. SPDT: Single pole, double throw.

1.4 SUBMITTALS

A. Provide submittals as required in section 26 00 10, “Submittal Process.”
B. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include nameplate ratings, dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.
   1. Enclosure types and details for types other than NEMA 250, Type 1.
   2. Current and voltage ratings.
   3. Short-circuit current ratings (interrupting and withstand, as appropriate).
   4. Include evidence of a nationally recognized testing laboratory (NRTL) listing for series rating of installed devices.
   5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.
   6. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device. Provide in PDF electronic format.
C. Qualification Data: For qualified testing agency.
D. Field quality-control reports.
E. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals.
   1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
      a. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.
      b. Time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device. Provide in PDF electronic format.

1.5 MAINTENANCE MATERIAL

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
   2. Fuse Pullers: Two for each size and type.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:
   1. Ambient Temperature: Not less than minus 22 deg F (minus 30 deg C) and not exceeding 104 deg F (40 deg C).
   2. Altitude: Not exceeding 6600 feet (2010 m).

1.7 WARRANTY

A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace components that fail in materials or workmanship within specified warranty period.

1.8 Warranty Period: One year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single manufacturer.
B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.
C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
D. Comply with NFPA 70.

2.2 FUSIBLE SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
   2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
   3. Square D; a brand of Schneider Electric.
B. Type HD, Heavy Duty:
   1. Single throw.
   2. Three pole.
   3. 600-V ac.
   4. 200 A and smaller.
   5. UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate indicated fuses.
   6. Lockable handle with capability to accept three padlocks and interlocked with cover in closed position.
C. Accessories:
   1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.

2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Lugs: Compression type, suitable for number, size, and conductor material.

2.3 NONFUSIBLE SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Square D; a brand of Schneider Electric.

B. Type HD, Heavy Duty, Three Pole, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Accessories:
1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Lugs: Compression type, suitable for number, size, and conductor material.

2.4 MOLDED-CASE CIRCUIT BREAKERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Square D; a brand of Schneider Electric.

B. Circuit breakers shall be constructed using glass-reinforced insulating material. Current carrying components shall be completely isolated from the handle and the accessory mounting area.

C. Circuit breakers shall have a toggle operating mechanism with common tripping of all poles, which provides quick-make, quick-break contact action. The circuit-breaker handle shall be over center, be trip free, and reside in a tripped position between on and off to provide local trip indication. Circuit-breaker escutcheon shall be clearly marked on and off in addition to providing international I/O markings. Equip circuit breaker with a push-to-trip button, located on the face of the circuit breaker to mechanically operate the circuit-breaker tripping mechanism for maintenance and testing purposes.

D. Lugs shall be suitable for 194 deg F (90 deg C) rated wire, sized according to the 167 deg F (75 deg C) temperature rating in NFPA 70.

E. Standard: Comply with UL 489 with interrupting capacity to comply with available fault currents.

F. Thermal-Magnetic Circuit Breakers: Inverse time-current thermal element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

G. Adjustable, Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.

H. Electronic Trip Circuit Breakers: Field-replaceable rating plug, rms sensing, with the following field-adjustable settings:
1. Instantaneous trip.
2. Long- and short-time pickup levels.
3. Long- and short-time time adjustments.
4. Ground-fault pickup level, time delay, and I-squared t response.

I. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller, and let-through ratings less than NEMA FU 1, RK-5.

J. Integrally Fused Circuit Breakers: Thermal-magnetic trip element with integral limiter-style fuse listed for use with circuit breaker and trip activation on fuse opening or on opening of fuse compartment door.
K. Ground-Fault Circuit-Interrupter (GFCI) Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).
L. Ground-Fault Equipment-Protection (GFEP) Circuit Breakers: With Class B ground-fault protection (30-mA trip).
M. Features and Accessories:
    1. Standard frame sizes, trip ratings, and number of poles.
    2. Lugs: Compression type, suitable for number, size, trip ratings, and conductor material.

2.5 MOLDED-CASE SWITCHES
A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
    2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
    3. Square D; a brand of Schneider Electric.
B. Description: MCCB with fixed, high-set instantaneous trip only, and short-circuit withstand rating equal to equivalent breaker frame size interrupting rating.
C. Standard: Comply with UL 489 with interrupting capacity to comply with available fault currents.
D. Features and Accessories:
    1. Standard frame sizes and number of poles.
    2. Lugs:
        a. Compression type, suitable for number, size, trip ratings, and conductor material.
        b. Lugs shall be suitable for 194 deg F (90 deg C) rated wire, sized according to the 167 deg F (75 deg C) temperature rating in NFPA 70.
    3. Ground-Fault Protection: Comply with UL 1053; remote-mounted and powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.

2.6 ENCLOSURES
A. Enclosed Switches and Circuit Breakers: UL 489, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
    1. Enclosure Finish: The enclosure shall be finished with gray baked enamel paint, electrodeposited on cleaned, phosphatized steel (NEMA 250 Type 1), gray baked enamel paint, electrodeposited on cleaned, phosphatized galvannealed steel (NEMA 250 Types 3R, 12), a brush finish on Type 304 stainless steel (NEMA 250 Type 4-4X stainless steel), copper-free cast aluminum alloy (NEMA 250 Types 7, 9).
B. NEMA 250 Type 7/9 enclosures shall be furnished with a breather and drain kit to allow their use in outdoor and wet location applications.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.
   1. Commencement of work shall indicate Installer's acceptance of the areas and conditions as satisfactory.

3.2 PREPARATION

A. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:
   1. Notify Construction Manager and Owner no fewer than seven days in advance of proposed interruption of electric service.
   2. Indicate method of providing temporary electric service.
   3. Do not proceed with interruption of electric service without Construction Manager's and Owner's] written permission.
   4. Comply with NFPA 70E.ENCLOSURE ENVIRONMENTAL RATING APPLICATIONS

B. Enclosed Switches and Circuit Breakers: Provide enclosures at installed locations with the following environmental ratings.
   1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
   2. Outdoor Locations: NEMA 250, Type 3R.
   3. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.
   4. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

3.3 INSTALLATION

A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

C. Temporary Lifting Provisions: Remove temporary lifting of eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

D. Install fuses in fusible devices.

E. Comply with NFPA 70 and NECA 1.

3.4 IDENTIFICATION

A. Comply with requirements in Section 260553 "Identification for Electrical Systems."
   1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
   2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.5 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections for Switches:
   1. Visual and Mechanical Inspection:
      a. Inspect physical and mechanical condition.
      b. Inspect anchorage, alignment, grounding, and clearances.
      c. Verify that the unit is clean.
      d. Verify blade alignment, blade penetration, travel stops, and mechanical operation.
      e. Verify that fuse sizes and types match the Specifications and Drawings.
      f. Verify that each fuse has adequate mechanical support and contact integrity.

g. Inspect bolted electrical connections for high resistance using one of the two following methods:
   1) Use a low-resistance ohmmeter.
      a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.
   2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.
      a) Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.
h. Verify that operation and sequencing of interlocking systems is as described in the Specifications and shown on the Drawings.
i. Verify correct phase barrier installation.
j. Verify lubrication of moving current-carrying parts and moving and sliding surfaces.

2. Electrical Tests:
   a. Perform resistance measurements through bolted connections with a low-resistance ohmmeter. Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
   b. Measure contact resistance across each switchblade fuseholder. Drop values shall not exceed the high level of the manufacturer's published data. If manufacturer's published data are not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
   c. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with switch closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, use Table 100.1 from the NETA ATS. Investigate values of insulation resistance less than those published in Table 100.1 or as recommended in manufacturer's published data.
   d. Measure fuse resistance. Investigate fuse-resistance values that deviate from each other by more than 15 percent.
   e. Perform ground fault test according to NETA ATS 7.14 "Ground Fault Protection Systems, Low-Voltage."

C. Tests and Inspections for Molded Case Circuit Breakers:
   1. Visual and Mechanical Inspection:
      a. Verify that equipment nameplate data are as described in the Specifications and shown on the Drawings.
      b. Inspect physical and mechanical condition.
      c. Inspect anchorage, alignment, grounding, and clearances.
      d. Verify that the unit is clean.
      e. Operate the circuit breaker to ensure smooth operation.

f. Inspect bolted electrical connections for high resistance using one of the two following methods:
   1) Use a low-resistance ohmmeter.
      a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.
   2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.
      a) Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.

g. Inspect operating mechanism, contacts, and chutes in unsealed units.

D. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports.
   1. Test procedures used.
   2. Include identification of each enclosed switch and circuit breaker tested and describe test results.
   3. List deficiencies detected, remedial action taken, and observations after remedial action.

3.6 ADJUSTING

A. Adjust moving parts and operable components to function smoothly and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit-breaker trip ranges to values indicated on the Drawings.

END OF SECTION

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COMcheck Software Version 4.1.5.3

Mechanical Compliance Certificate

Project Information

Energy Code:	90.1 (2016) Standard
Project Title:	Collin Co. HVAC Replacement
Location:	Plano, Texas
Climate Zone:	3a
Project Type:	Alteration

Construction Site:
900 Park Blvd. Building
Plano, TX 75074

Owner/Agent:

Designer/Contractor:
MD Engineering
1255 W. 15th Street, Suite 300
Plano, TX 75075
469-467-0200
mdengca@md-eng.com

Mechanical Systems List

Quantity	System Type & Description
6	CU-11/19/23/31/32/37 Heating: 1 each - Central Furnace, Electric, Capacity = 51 kBtu/h Cooling: 1 each - Split System, Capacity = 54 kBtu/h, Air-Cooled Condenser Fan System: 5 TON | TENANT FINISH OUT -- Compliance (Motor nameplate HP method) : Passes Fans: FAN 1 Supply, Constant Volume, 1750 CFM, 0.8 motor nameplate hp, 0.0 fan efficiency grade SYSTEM COMPLIANCE EXEMPTION APPLIES Exemption: Extensive ancillary requirements.
4	CU-17/21/24/30 Heating: 1 each - Central Furnace, Electric, Capacity = 61 kBtu/h Cooling: 1 each - Split System, Capacity = 43 kBtu/h, Air-Cooled Condenser Fan System: 4 TON | TENANT FINISH OUT -- Compliance (Motor nameplate HP method) : Passes Fans: FAN 2 Supply, Constant Volume, 1400 CFM, 0.8 motor nameplate hp, 0.0 fan efficiency grade SYSTEM COMPLIANCE EXEMPTION APPLIES Exemption: Extensive ancillary requirements.
1	CU-18 Heating: 1 each - Central Furnace, Electric, Capacity = 34 kBtu/h Cooling: 1 each - Split System, Capacity = 32 kBtu/h, Air-Cooled Condenser Fan System: 3 TON | TENANT FINISH OUT -- Compliance (Motor nameplate HP method) : Passes Fans: FAN 3 Supply, Constant Volume, 1050 CFM, 0.5 motor nameplate hp, 0.0 fan efficiency grade SYSTEM COMPLIANCE EXEMPTION APPLIES Exemption: Extensive ancillary requirements.
1	CU-34 Heating: 1 each - Central Furnace, Electric, Capacity = 51 kBtu/h Cooling: 1 each - Split System, Capacity = 43 kBtu/h, Air-Cooled Condenser Fan System: 4 TON | TENANT FINISH OUT -- Compliance (Motor nameplate HP method) : Passes

Quantity	System Type & Description
	Fans: FAN 2 Supply, Constant Volume, 1400 CFM, 0.8 motor nameplate hp, 0.0 fan efficiency grade SYSTEM COMPLIANCE EXEMPTION APPLIES Exemption: Extensive ancillary requirements.
1	CU-48 Heating: 1 each - Central Furnace, Electric, Capacity = 51 kBtu/h Cooling: 1 each - Split System, Capacity = 26 kBtu/h, Air-Cooled Condenser Fan System: 2.5 TON | TENANT FINISH OUT -- Compliance (Motor nameplate HP method) : Passes Fans: FAN 4 Supply, Constant Volume, 875 CFM, 0.5 motor nameplate hp, 0.0 fan efficiency grade SYSTEM COMPLIANCE EXEMPTION APPLIES Exemption: Extensive ancillary requirements.
2	CU-49/50 Heating: 1 each - Central Furnace, Electric, Capacity = 13 kBtu/h Cooling: 1 each - Split System, Capacity = 26 kBtu/h, Air-Cooled Condenser Fan System: 2.5 TON | TENANT FINISH OUT -- Compliance (Motor nameplate HP method) : Passes Fans: FAN 4 Supply, Constant Volume, 875 CFM, 0.5 motor nameplate hp, 0.0 fan efficiency grade SYSTEM COMPLIANCE EXEMPTION APPLIES Exemption: Extensive ancillary requirements.

Mechanical Compliance Statement

Compliance Statement: The proposed mechanical alteration project represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed mechanical systems have been designed to meet the 90.1 (2016) Standard requirements in COM*check* Version 4.1.5.3 and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Blake Leo - P.E.		08/17/2021
Name - Title	Signature	Date

COM*check* Software Version 4.1.5.3

Inspection Checklist

Energy Code: 90.1 (2016) Standard

Requirements: 0.0% were addressed directly in the COM*check* software

Text in the "Comments/Assumptions" column is provided by the user in the COMcheck Requirements screen. For each requirement, the user certifies that a code requirement will be met and how that is documented, or that an exception is being claimed. Where compliance is itemized in a separate table, a reference to that table is provided.

Section # & Req.ID	Plan Review	Complies?	Comments/Assumptions
4.2.2, 6.4.4.2.1, 6.7.2 [PR2][1]	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the mechanical systems and equipment and document where exceptions to the standard are claimed. Load calculations per acceptable engineering standards and handbooks.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
4.2.2, 8.4.1.1, 8.4.1.2, 8.7 [PR6][2]	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the electrical systems and equipment and document where exceptions are claimed. Feeder connectors sized in accordance with approved plans and branch circuits sized for maximum drop of 3%.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.7.2.4 [PR5][1]	Detailed instructions for HVAC systems commissioning included on the plans or specifications for projects >=50,000 ft2.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Footing / Foundation Inspection	Complies?	Comments/Assumptions
6.4.3.7 [FO9][3]	Freeze protection and snow/ice melting system sensors for future connection to controls.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Mechanical Rough-In Inspection	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumptions
6.4.1.4, 6.4.1.5 [ME1][2]	HVAC equipment efficiency verified. Non-NAECA HVAC equipment labeled as meeting 90.1.	Efficiency:____	Efficiency:____	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Mechanical Systems list for values.*
6.4.3.4.1 [ME3][3]	Stair and elevator shaft vents have motorized dampers that automatically close.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.4.3.4.5 [ME39][3]	Enclosed parking garage ventilation has automatic contaminant detection and capacity to stage or modulate fans to 50% or less of design capacity.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.4.3.4.4 [ME5][3]	Ventilation fans >0.75 hp have automatic controls to shut off fan when not required.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.4.3.8 [ME6][1]	Demand control ventilation provided for spaces >500 ft2 and >25 people/1000 ft2 occupant density and served by systems with air side economizer, auto modulating outside air damper control, or design airflow >3,000 cfm.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.5.3.2.1 [ME40][2]	DX cooling systems >= 75 kBtu/h (>= 65 kBtu/h effective 1/2016) and chilled-water and evaporative cooling fan motor hp >= ¼ designed to vary supply fan airflow as a function of load and comply with operational requirements.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Mechanical Systems list for values.*
6.4.4.1.1 [ME7][3]	Insulation exposed to weather protected from damage. Insulation outside of the conditioned space and associated with cooling systems is vapor retardant.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.4.4.1.2 [ME8][2]	HVAC ducts and plenums insulated per Table 6.8.2. Where ducts or plenums are installed in or under a slab, verification may need to occur during Foundation Inspection.	R-____	R-____	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.4.4.1.3 [ME9][2]	HVAC piping insulation thickness. Where piping is installed in or under a slab, verification may need to occur during Foundation Inspection.	_____ in.	_____ in.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.4.4.1.4 [ME41][3]	Thermally ineffective panel surfaces of sensible heating panels have insulation >= R-3.5.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.4.4.2.1 [ME10][2]	Ducts and plenums having pressure class ratings are Seal Class A construction.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Mechanical Rough-In Inspection	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumptions
6.8.1-15, 6.8.1-16 [ME110][2]	Electrically operated DX-DOAS units meet requirements per Tables 6.8.1-15 or 6.8.1-16.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.4.4.2.2 [ME11][3]	Ductwork operating >3 in. water column requires air leakage testing.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.4.4.2.2 [ME11][3]	Ductwork operating >3 in. water column requires air leakage testing.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.4.4.2.2 [ME11][3]	Ductwork operating >3 in. water column requires air leakage testing.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.4.4.2.2 [ME11][3]	Ductwork operating >3 in. water column requires air leakage testing.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.4.4.2.2 [ME11][3]	Ductwork operating >3 in. water column requires air leakage testing.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.4.4.2.2 [ME11][3]	Ductwork operating >3 in. water column requires air leakage testing.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.5.2.3 [ME19][3]	Dehumidification controls provided to prevent reheating, recooling, mixing of hot and cold airstreams or concurrent heating and cooling of the same airstream.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.5.2.4.1 [ME68][3]	Humidifiers with airstream mounted preheating jackets have preheat auto-shutoff value set to activate when humidification is not required.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.5.2.4.2 [ME69][3]	Humidification system dispersion tube hot surfaces in the airstreams of ducts or air-handling units insulated >= R-0.5.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.5.2.5 [ME70][3]	Preheat coils controlled to stop heat output whenever mechanical cooling, including economizer operation, is active.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Mechanical Rough-In Inspection	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumptions
6.5.2.6 [ME106][3]	Units that provide ventilation air to multiple zones and operate in conjunction with zone heating and cooling systems are prevented from using heating or heat recovery to warm supply air above 60°F when representative building loads or outdoor air temperature indicate that most zones demand cooling.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.5.3.6 [ME72][2]	Motors for fans >= 1/12 hp and < 1 hp are electronically-commutated motors or have a minimum motor efficiency of 70%. These motors are also speed adjustable for either balancing or remote control.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.5.3.6 [ME72][2]	Motors for fans >= 1/12 hp and < 1 hp are electronically-commutated motors or have a minimum motor efficiency of 70%. These motors are also speed adjustable for either balancing or remote control.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.5.3.6 [ME72][2]	Motors for fans >= 1/12 hp and < 1 hp are electronically-commutated motors or have a minimum motor efficiency of 70%. These motors are also speed adjustable for either balancing or remote control.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.5.3.6 [ME72][2]	Motors for fans >= 1/12 hp and < 1 hp are electronically-commutated motors or have a minimum motor efficiency of 70%. These motors are also speed adjustable for either balancing or remote control.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.5.3.6 [ME72][2]	Motors for fans >= 1/12 hp and < 1 hp are electronically-commutated motors or have a minimum motor efficiency of 70%. These motors are also speed adjustable for either balancing or remote control.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.5.3.6 [ME72][2]	Motors for fans >= 1/12 hp and < 1 hp are electronically-commutated motors or have a minimum motor efficiency of 70%. These motors are also speed adjustable for either balancing or remote control.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Mechanical Rough-In Inspection	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumptions
6.5.3.4 [ME108][2]	Parallel-flow fan-powered VAV air terminals have automatic controls to a) turn off the terminal fan except when space heating is required or if required for ventilation; b) turn on the terminal fan as the first stage of heating before the heating coil is activated; and c) during heating for warmup or setback temperature control, either operate the terminal fan and heating coil without primary air or reverse the terminal damper logic and provide heating from the central air handler through primary air.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.5.3.4 [ME108][2]	Parallel-flow fan-powered VAV air terminals have automatic controls to a) turn off the terminal fan except when space heating is required or if required for ventilation; b) turn on the terminal fan as the first stage of heating before the heating coil is activated; and c) during heating for warmup or setback temperature control, either operate the terminal fan and heating coil without primary air or reverse the terminal damper logic and provide heating from the central air handler through primary air.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
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1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Mechanical Rough-In Inspection	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumptions
6.5.3.4 [ME108][2]	Parallel-flow fan-powered VAV air terminals have automatic controls to a) turn off the terminal fan except when space heating is required or if required for ventilation; b) turn on the terminal fan as the first stage of heating before the heating coil is activated; and c) during heating for warmup or setback temperature control, either operate the terminal fan and heating coil without primary air or reverse the terminal damper logic and provide heating from the central air handler through primary air.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
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6.5.3.4 [ME108][2]	Parallel-flow fan-powered VAV air terminals have automatic controls to a) turn off the terminal fan except when space heating is required or if required for ventilation; b) turn on the terminal fan as the first stage of heating before the heating coil is activated; and c) during heating for warmup or setback temperature control, either operate the terminal fan and heating coil without primary air or reverse the terminal damper logic and provide heating from the central air handler through primary air.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Mechanical Rough-In Inspection	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumptions
6.5.3.7 [ME109][2]	Required minimum outdoor air rate is the larger of minimum outdoor air rate or minimum exhaust air rate required by Standard 62.1, Standard 170, or applicable codes or accreditation standards. Outdoor air ventilation systems shall comply with one of the following: a) design minimum system outdoor air provided < 135% of the required minimum outdoor air rate, b) dampers, ductwork, and controls allow the system to supply <= the required minimum outdoor air rate with a single set-point adjustment., or c) system includes exhaust air energy recovery complying with Section 6.5.6.1.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.5.3.7 [ME109][2]	Required minimum outdoor air rate is the larger of minimum outdoor air rate or minimum exhaust air rate required by Standard 62.1, Standard 170, or applicable codes or accreditation standards. Outdoor air ventilation systems shall comply with one of the following: a) design minimum system outdoor air provided < 135% of the required minimum outdoor air rate, b) dampers, ductwork, and controls allow the system to supply <= the required minimum outdoor air rate with a single set-point adjustment., or c) system includes exhaust air energy recovery complying with Section 6.5.6.1.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.5.3.7 [ME109][2]	Required minimum outdoor air rate is the larger of minimum outdoor air rate or minimum exhaust air rate required by Standard 62.1, Standard 170, or applicable codes or accreditation standards. Outdoor air ventilation systems shall comply with one of the following: a) design minimum system outdoor air provided < 135% of the required minimum outdoor air rate, b) dampers, ductwork, and controls allow the system to supply <= the required minimum outdoor air rate with a single set-point adjustment., or c) system includes exhaust air energy recovery complying with Section 6.5.6.1.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Mechanical Rough-In Inspection	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumptions
6.5.3.7 [ME109][2]	Required minimum outdoor air rate is the larger of minimum outdoor air rate or minimum exhaust air rate required by Standard 62.1, Standard 170, or applicable codes or accreditation standards. Outdoor air ventilation systems shall comply with one of the following: a) design minimum system outdoor air provided < 135% of the required minimum outdoor air rate, b) dampers, ductwork, and controls allow the system to supply <= the required minimum outdoor air rate with a single set-point adjustment., or c) system includes exhaust air energy recovery complying with Section 6.5.6.1.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
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6.5.3.3 [ME42][3]	Multiple zone VAV systems with DDC of individual zone boxes have static pressure setpoint reset controls.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Mechanical Systems list for values.*

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Mechanical Rough-In Inspection	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumptions
6.5.3.3 [ME42][3]	Multiple zone VAV systems with DDC of individual zone boxes have static pressure setpoint reset controls.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Mechanical Systems list for values.*
6.5.3.3 [ME42][3]	Multiple zone VAV systems with DDC of individual zone boxes have static pressure setpoint reset controls.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Mechanical Systems list for values.*
6.5.3.3 [ME42][3]	Multiple zone VAV systems with DDC of individual zone boxes have static pressure setpoint reset controls.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Mechanical Systems list for values.*
6.5.3.3 [ME42][3]	Multiple zone VAV systems with DDC of individual zone boxes have static pressure setpoint reset controls.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Mechanical Systems list for values.*
6.5.3.3 [ME42][3]	Multiple zone VAV systems with DDC of individual zone boxes have static pressure setpoint reset controls.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Mechanical Systems list for values.*
6.5.4.2 [ME25][3]	HVAC pumping systems with >= 3 control values designed for variable fluid flow (see section details).			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.5.6.1 [ME56][1]	Exhaust air energy recovery on systems meeting Tables 6.5.6.1-1, and 6.5.6.1-2.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.5.7.1 [ME100][2]	Conditioned supply air to space with mechanical exhaust <= the greater of criteria of supply flow, required ventilation rate, exhaust flow minu the available transffer air (see section details).			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.5.7.1 [ME100][2]	Conditioned supply air to space with mechanical exhaust <= the greater of criteria of supply flow, required ventilation rate, exhaust flow minu the available transffer air (see section details).			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
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6.5.7.1 [ME100][2]	Conditioned supply air to space with mechanical exhaust <= the greater of criteria of supply flow, required ventilation rate, exhaust flow minu the available transffer air (see section details).			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.5.7.1 [ME100][2]	Conditioned supply air to space with mechanical exhaust <= the greater of criteria of supply flow, required ventilation rate, exhaust flow minu the available transffer air (see section details).			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Mechanical Rough-In Inspection	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumptions
6.5.7.1 [ME100][2]	Conditioned supply air to space with mechanical exhaust <= the greater of criteria of supply flow, required ventilation rate, exhaust flow minu the available transffer air (see section details).			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.5.7.2.1 [ME32][2]	Kitchen hoods >5,000 cfm have make up air >=50% of exhaust air volume.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.5.7.2.4 [ME49][3]	Approved field test used to evaluate design air flow rates and demonstrate proper capture and containment of kitchen exhaust systems.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.5.8.1 [ME34][2]	Unenclosed spaces that are heated use only radiant heat.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.5.9 [ME35][1]	Hot gas bypass limited to: <=240 kBtu/h – 15% >240 kBtu/h – 10%			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.5.9 [ME35][1]	Hot gas bypass limited to: <=240 kBtu/h – 15% >240 kBtu/h – 10%			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.5.9 [ME35][1]	Hot gas bypass limited to: <=240 kBtu/h – 15% >240 kBtu/h – 10%			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
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6.5.9 [ME35][1]	Hot gas bypass limited to: <=240 kBtu/h – 15% >240 kBtu/h – 10%			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.5.9 [ME35][1]	Hot gas bypass limited to: <=240 kBtu/h – 15% >240 kBtu/h – 10%			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.4.3.9 [ME63][2]	Heating for vestibules and air curtains with integral heating include automatic controls that shut off the heating system when outdoor air temperatures > 45F. Vestibule heating and cooling systems controlled by a thermostat in the vestibule with heating setpoint <= 60F and cooling setpoint >= 80F.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Mechanical Rough-In Inspection	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumptions
6.5.10 [ME73][3]	Doors separating conditioned space from the outdoors have controls that disable/reset heating and cooling system when open.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Rough-In Electrical Inspection	Complies?	Comments/Assumptions
8.4.2 [EL10][2]	At least 50% of all 125 volt 15- and 20-Amp receptacles are controlled by an automatic control device.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
8.4.3 [EL11][2]	New buildings have electrical energy use measurement devices installed. Where tenant spaces exist, each tenant is monitored separately. In buildings with a digital control system the energy use is transmitted to to control system and displayed graphically.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
10.4.1 [EL9][2]	Electric motors meet requirements where applicable.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Final Inspection	Complies?	Comments/Assumptions
6.4.3.1.2 [FI3][3]	Thermostatic controls have a 5 °F deadband.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.4.3.2 [FI20][3]	Temperature controls have setpoint overlap restrictions.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.4.3.3.1 [FI21][3]	HVAC systems equipped with at least one automatic shutdown control.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.4.3.3.2 [FI22][3]	Setback controls allow automatic restart and temporary operation as required for maintenance.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.4.3.6 [FI6][3]	When humidification and dehumidification are provided to a zone, simultaneous operation is prohibited. Humidity control prohibits the use of fossil fuel or electricity to produce RH > 30% in the warmest zone humidified and RH < 60% in the coldest zone dehumidified.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.7.2.1 [FI7][3]	Furnished HVAC as-built drawings submitted within 90 days of system acceptance.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.7.2.2 [FI8][3]	Furnished O&M manuals for HVAC systems within 90 days of system acceptance.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.7.2.3 [FI9][1]	An air and/or hydronic system balancing report is provided for HVAC systems serving zones >5,000 ft2 of conditioned area.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.7.2.4 [FI10][1]	HVAC control systems have been tested to ensure proper operation, calibration and adjustment of controls.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
10.4.3 [FI24][2]	Elevators are designed with the proper lighting, ventilation power, and standby mode.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

COLLIN COUNTY

HVAC REPLACEMENT

C O N S T R U C T I O N D O C U M E N T S

INDEX OF DRAWINGS

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PROJECT NUMBER: 211350

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MEP ABBREVIATIONS

ABV.	ABOVE
AC	ALTERNATING CURRENT
A/C	AIR CONDITIONER
AFC	ABOVE FINISHED CEILING
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AG	ABOVE GRADE AND GFI
AHAP	AS HIGH AS POSSIBLE
AHU	AIR HANDLING UNIT
ALT.	ALTERNATE
AMB.	AMBIENT TEMPERATURE (F. DEGREE)
AMP.	AMPERE
APPROX.	APPROXIMATELY
ARCH.	ARCHITECTURAL
AVG.	AVERAGE
B	BOILER
B.G.	BELOW GRADE
BMS	BUILDING MANAGEMENT SYSTEM
BRD	BAROMETRIC RELIEF DAMPER
BTU	BRITISH THERMAL UNIT
CD	CONSTRUCTION DOCUMENTS
CFH	CUBIC FEET PER HOUR
CFM	CUBIC FEET PER MINUTE
CH.	CHILLER
CHEM.	CHEMICAL
CHP	CHILLED WATER PUMP
CKT.	CIRCUIT
CLG.	CEILING
CMPR.	COMPRESSOR
CT	COOLING TOWER
CWP	CONDENSER WATER PUMP
CU	CONDENSING UNIT
DB	DRY BULB
DEFL.	DEFLECTION
DEG. F	DEGREES FAHRENHEIT
DET.	DETAIL
DD	DESIGN DEVELOPMENT
DIA.	DIAMETER
DISC.	DISCONNECT SWITCH
DIM.	DIMENSION
EA	EXHAUST AIR
EDB	ENTERING DRY BULB
EF	EXHAUST FAN
ELEC.	ELECTRICAL
ELEV.	ELEVATION
EMCS.	ENERGY MGMT. CONTROL SYSTEM
E.S.P.	EXTERNAL STATIC PRESS. (IN. W.G.)
EWB	ENTERING WET BULB
EWT	ENTERING WATER TEMPERATURE
EXH.	EXHAUST
EXIST.	EXISTING
F/A	FREE AREA OPENING (SQ. FT.)
FCU	FAN COIL UNIT
FHP	FRACTIONAL HORSE POWER
FLR.	FLOOR
FPI	COIL FINS PER INCH.
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FT.	FOOT OR FEET
GFI	GROUND FAULT INTERRUPTER
GPM	GALLONS PER MINUTE
HD.	HEAD
HOA	HANDS/OFF/AUTO. MOTOR STARTER
HP	HORSE POWER
HPU	HEAT PUMP UNIT
HR.	HOUR(S)
HT.	HEIGHT
HTG.	HEATING
HTR.	HEATER
HVAC	HEAT,VENT AND AIR CONDITIONING
HWP	HOT WATER PUMP
HX	HEAT EXCHANGER
HZ	FREQUENCY (HERTZ)
ID	INSIDE DIAMETER OR DIMENSION
IN.	INCHES
KW	KILOWATT
KWH	KILOWATT HOUR
LAT	LEAVING AIR TEMPERATURE
LWT	LEAVING WATER TEMPERATURE
MAX.	MAXIMUM
MCA	MINIMUM CURRENT AMPS.
MOCP	MAX. OVER CURRENT PROTECTION
MBH	1000 BTU PER HOUR
MECH.	MECHANICAL
MFR.	MANUFACTURER
MIN.	MINIMUM
MVD	MANUAL VOLUME DAMPER
N/A	NOT APPLICABLE
NC	NOISE CRITERIA
NIC	NOT IN CONSTRUCTION
NK	NECK DIMENSION
NO.	NUMBER
OA	OUTSIDE AIR
OAR	OWNERS AUTHORIZED REPRESENTATIVE
OBD	OPPOSED BLADE DAMPER
OD	OUTSIDE DIAMETER
OFCI	OWNER FURNISHED CONTRACTOR INSTALLED
ORIG.	ORIGINAL
P.D.	PRESSURE DROP (FT)
PH.	PHASE
PMB	POWERED MIXING BOX
PLBG.	PLUMBING
PNL.	PANEL
PRESS.	PRESSURE
RA	RETURN AIR
RAG.	RETURN AIR GRILLE
RD.	RADIUS
RE.	REFERENCE
RPM	REVOLUTIONS PER MINUTE
RTU	ROOF TOP UNIT
S/S	SINGLE SPEED MOTOR
S/S/S	START/STOP/STATUS
SA	SUPPLY AIR
SAG	SUPPLY AIR GRILLE
SDC	STAND ALONE DIGITAL CONTROLLER
SEER	SEASON ENERGY EFFICIENCY RATIO
SENS.	SENSIBLE
SP	STATIC PRESSURE
SQ.	SQUARE
STR.	MOTOR STARTER
TEMP.	TEMPERATURE
T.S.P.	TOTAL STATIC PRESSURE (IN. W.G.)
UH	UNIT HEATER
UNO	UNLESS NOTED OTHERWISE
V	VOLT
VAV	VARIABLE AIR VALVE
VEL.	VELOCITY
W	WATT
W/	WITH
W/O	WITHOUT
W.G.	WATER GUAGE
WB	WET BULB
WP.	WEATHERPROOF
WPD	WATER PRESSURE DROP
WPG	WEATHERPROOF GFI
XFMR.	TRANSFORMER

DUCTWORK LEGEND

16X12	SHEET METAL DUCT	16"x12"
	DIRECTION OF FLOW	
	INTERNALLY INSULATED SHEET METAL DUCT	16"x12"
	HIDDEN SHEET METAL DUCT	16"x12"
	ROUND ELBOW DOWN (R/A SIMILAR)	
	ROUND ELBOW UP (R/A SIMILAR)	
	RADIUS ELBOW (R=1.5 MIN.)	
	45 DEGREE ELBOW (R=1.5 MIN.)	
	SIZE OR SHAPE TRANSITION	
	TURNING VANES (RECTANGULAR), SMOOTH RADIUS	
	FLEXIBLE DUCT CONN. WITH DAMPER	
	BRANCH TAKE-OFF	
	WYE JUNCTION	
	SUPPLY DUCT SECTION UP	
	SUPPLY DUCT SECTION DOWN	
	RETURN DUCT SECTION UP	
	RETURN DUCT SECTION DOWN	
	EXHAUST DUCT SECTION UP	
	90 DEGREE S/A ELBOW DOWN	
	90 DEGREE S/A ELBOW UP	
	90 DEGREE R/A ELBOW DOWN	
	EXHAUST DUCT SECTION DOWN	
	90 DEGREE R/A ELBOW UP	
	RADIUS ELBOW (R=1.5 MIN.)	
	SQUARE ELBOW WITH DOUBLE WALL TURNING VANES	
	BRANCH TAKE-OFF WITH VANED EXTRACTOR	
	SPIN-IN TAP WITH DAMPER	
	TEE WITH SQUARE ELBOWS, TURNING VANES & SPLITTER DAMPER	
	SIDEWALL SUPPLY GRILLE OR REGISTER WITH AIR EXTRACTOR	
	S/A GRILLE/REGISTER W/ ROUND NECK & FLEX CONNECTION. 4-WAY THROW (U.N.O.)	
	S/A GRILLE/REGISTER W/ SQUARE NECK. 4-WAY THROW (U.N.O.)	
	R/A GRILLE OR REGISTER	
	VOLUME DAMPER	
BD	COUNTER WEIGHTED BACKDRAFT DAMPER	BD
FD	FIRE DAMPER	FD
FSD	FIRE/SMOKE DAMPER (WITH SM. DET.)	FSD
SD	SMOKE DAMPER (WITH SM. DET.)	SD
M	MOTORIZED DAMPER (WITH END SW.)	M
SP	STATIC PRESSURE SENSOR	SP
AF	AIRFLOW MEASURE STATION	AF
AI	AIRFLOW IONIZER STATION	AI
T / H / C	THERMOSTAT OR TEMP SENSOR)/ HUMIDISTAT/CARBON DIOXIDE SENSOR	T / H / C
AD	ACCESS DOOR	AD
P	DUCT MOUNTED SMOKE DETECTOR (TUBE SENSING TYPE)	P

ALL SYMBOLS ON THIS LIST ARE NOT NECESSARILY USED ON THIS PROJECT.

HVAC & PLUMBING, VALVE & FITTINGS SYMBOLS

	TEE
	TEE, UP
	TEE, DOWN
	SINGLE SWEEP TEE
	CROSS
	LATERAL
	45 DEGREE ELBOW
	90 DEGREE ELBOW
	90 DEGREE ELBOW UP
	90 DEGREE ELBOW DOWN
	CAP
	SINGLE W.F. LATERAL STUB
	DOUBLE W.F. LATERAL STUB
	SINGLE W.F. LAT. & TRAP
	DOUBLE W.F. LAT & TRAP
	FLOOR DRAIN RISER W/TRAP
CO	FLOOR CLEAN OUT
CO	CLEAN OUT
	FLOOR DRAIN
	HUB DRAIN
D.S.	DOWN SPOUT
F.H.C.	FIRE HOSE CABINET
V.T.R.	VENT THRU ROOF
O.D.	OVERFLOW ROOF DRAIN
R.D.	ROOF DRAIN
	GAS PRESSURE REDUCING VALVE
	WATER PRESSURE REDUCING VALVE
	OS & Y VALVE
	GLOBE VALVE
	GATE VALVE
B.V.	BALANCING VALVE (WITH PETE'S PLUG EITHER SIDE)
	BUTTERFLY VALVE
	BALL VALVE
	SOLENOID VALVE
	PLUG VALVE
	CHECK VALVE
	PRESSURE RELIEF VALVE
	CONTROL, 2 WAY VALVE
	CONTROL, 3 WAY VALVE
	MOTORIZED ISOLATION VALVE (2-POSITION-24v)
	MOTORIZED CONTROL VALVE (MODULATING-24v)
	FLOOR CONTROL VALVE
	ANGLE GATE VALVE
	ANGLE GLOBE VALVE
	MANUALLY CALIBRATED BALANCING VALVE
	AUTOMATIC FLOW CONTROL VALVE
	STRAINER & BLOW OFF VALVE
	PRESSURE GAUGE & COCK
OR	UNION OR COMPANION FLANGES
	THERMOMETER
	PRESSURE & TEMPERATURE TAP (PETES PLUG)
T	THERMOSTAT
H	HUMIDISTAT
F	FLOW METER
	ANCHOR (PIPE)
	EXPANSION JOINT
	PIPE GUIDE
	MANUAL AIR VENT
	AUTOMATIC AIR VENT
	HOSE END DRAIN
	HOSE BIBB
	THERMOMETER & WELL
TS	TEMPERATURE SENSOR
P F	FLOW SWITCH
	PRESSURE SENSOR
	COMPRESSED AIR TAP
	FLOAT AND THERM. TRAP
	BUCKET STEAM TRAP
	PIPE SIZE REDUCER (CONCENTRIC)
	PIPE SIZE REDUCER (ECCENTRIC)

ALL SYMBOLS ON THIS LIST ARE NOT NECESSARILY USED ON THIS JOB.

GENERAL HVAC NOTES:

1. WITHOUT PRIOR APPROVAL FROM ENGINEER AND OWNER, ALL MECHANICAL EQUIPMENT SHALL NOT BE OPERATED DURING CONSTRUCTION OF THE BUILDING PER MANUFACTURER RECOMMENDATIONS. MECHANICAL CONTRACTOR IS RESPONSIBLE TO PROVIDE TEMPORARY HEATING OR COOLING AS NEEDED TO CLIMATIZE THE BUILDING.
2. ALL PIPING AND DUCTS IN FINISHED ROOMS OR SPACES SHALL BE CONCEALED WITHIN FURRED CHASES OR ABOVE SUSPENDED CEILINGS.
3. ALL DUCTWORK SIZES ARE PROVIDED IN CLEAR INSIDE AIRSTREAM DIMENSIONS. INCREASE DUCT SIZES TO ACCOMMODATE ANY INTERNAL INSULATION REQUIREMENTS (AS SPECIFIED). PROVIDE A MINIMUM OF 15 LINEAR FT. OF INTERNAL ACOUSTIC LINER ON SUPPLY AND RETURN AIR DUCTWORK FROM ANY FCU, AHU, AC, OR RTU (UNO). PROVIDE 8LF INTERNAL LINER FOR MIXING OR VAV BOXES.
4. PROVIDE FLEXIBLE CONNECTIONS ON AT THE INTAKE AND DISCHARGE OF ALL MOTOR DRIVEN EQUIPMENT.
5. PROVIDE VIBRATION ISOLATORS FOR MOTOR-DRIVEN MECHANICAL EQUIPMENT.
6. ALL FLEXIBLE DUCTWORK SHALL HAVE A MAXIMUM DEVELOPED LENGTH OF OF (5) FIVE FT.
7. CONTRACTOR SHALL REFER TO THE ARCHITECTURAL REFLECTED CEILING PLANS FOR THE EXACT LOCATION OF ALL CEILING MOUNTED M/E/P DEVICES INCLUDING BUT NOT LIMITED TO LIGHTS, DIFFUSERS, GRILLES ETC..
8. CONTRACTOR SHALL VERIFY THE EQUIPMENT CLEARANCE REQUIREMENTS WITH THE MANUFACTURER'S RECOMMENDATIONS. EXACT LOCATION OF SELECTED EQUIPMENT SHALL BE COORDINATED WITH THE STRUCTURE TO PROVIDE RECOMMENDED CLEARANCES FOR MAINTENANCE.
9. PROVIDE FIRE DAMPERS, FIRE/SMOKE DAMPERS AND FIRE STOP AS REQUIRED BY CODE AUTHORITIES FOR DUCT PENETRATIONS THROUGH FIRE OR SMOKE RATED WALL AND CEILINGS. REFER TO ARCHITECTURAL DRAWINGS FOR WALL TYPES.
10. LOCATE ALL MECHANICAL EQUIPMENT FOR UNOBSTRUCTED MAINTENANCE ACCESS FOR ALL UNIT ACCESS PANELS, CONTROLS AND VALVING.
11. SMOKE DETECTORS SHALL BE FURNISHED BY THE FIRE ALARM CONTRACTOR AND WIRED BY THE ELECTRICAL CONTRACTOR. THE MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR MOUNTING THE SMOKE DETECTOR IN THE DUCTWORK AS SHOWN ON THE DRAWINGS AND IN ACCORDANCE WITH THE MANUFACTURER'S PRINTED INSTRUCTIONS. DETECTORS SHALL BE PROVIDED IN THE SUPPLY AND THE RETURN DUCTWORK (PRIOR TO MIXING WITH THE OUTSIDE AIR) FOR ANY AIR HANDLING UNIT SYSTEM 2000 CFM SUPPLY AIR AND ABOVE. THE DETECTOR SHALL BE HARDWIRED TO THE UNITS STARTER TO SHUT DOWN THE FAN UPON DETECTION OF PRODUCTS OF COMBUSTION AS WELL AS SEND A SUPERVISORY ALARM SIGNAL TO THE FIRE ALARM PANEL (IF PROVIDED - IF NOT PROVIDE VISUAL/ AUDIBLE ALARM IN A SUPERVISORY/ APPROVED LOCATION).
12. UNLESS OTHERWISE SHOWN, LOCATE ALL ROOM THERMOSTATS AND SENSORS 4'-0" (CENTERLINE) ABOVE FINISHED FLOOR IN EXISTING THERMOSTAT LOCATIONS. NOTIFY THE ARCHITECT/ ENGINEER OF ANY ROOMS WHERE THE ABOVE LOCATION CAN NOT BE MAINTAINED OR WHERE THERE IS A QUESTION ON PROPER LOCATION.
13. DUCTWORK AND ITS CONSTRUCTION WILL BE GALVANIZED SHEET METAL AND CONSTRUCTED ACCORDING TO THE LATEST SMACNA STANDARDS.
14. ALL DUCTWORK IS SHOWN IN SCHEMATIC FORM. DUCT RISES AND DROPS ARE NOT SHOWN. PROVIDE OFFSETS AS REQUIRED TO MEET SPACE REQUIREMENTS AND TO AVOID INTERFERENCE WITH OTHER TRADES. EACH TRADE SHALL BE RESPONSIBLE FOR COORDINATION WITH OTHER TRADES.
15. DOUBLE NUT LOCK DOWN FOR MULTI-VANE DAMPERS INSTALLED IN HIGH VELOCITY DUCTWORK DUCTWORK.
16. ALL RADIUS TURNS SHALL BE SMOOTH WALL WITH A RADIUS OF R = 1.5D.
17. CONNECT TO EXISTING SUPPLY AND RETURN DUCTWORK. SEAL AIRTIGHT. CONNECT NEW INSIDE FAN COIL UNITS TO EXISTING CONDENSATE DRAIN LINE. CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS PRIOR TO BIDDING THE PROJECT AND PROVIDE ANY REQUIRED MATERIALS / APPURTENANCES FOR PROPER INSTALLATION OF THE NEW MECHANICAL EQUIPMENT. ALL NEW EQUIPMENT SHALL BE INSTALLED ON LEVEL FM APPROVED CURBS.

GENERAL PROJECT NOTES:

1. PROVIDE ALL MATERIALS AND EQUIPMENT AND PERFORM ALL LABOR REQUIRED TO INSTALL COMPLETE AND OPERABLE MECHANICAL SYSTEM AS INDICATED ON THE DRAWINGS, AS SPECIFIED AND AS REQUIRED BY ALL NATIONAL, STATE AND LOCAL CODES.
2. CONTRACT DRAWINGS FOR MECHANICAL WORK (HVAC AND PLUMBING) ARE DIAGRAMMATIC AND ARE INTENDED TO CONVEY SCOPE AND GENERAL ARRANGEMENT ONLY. IT IS THE CONTRACTORS RESPONSIBILITY FOR INSTALLING ALL MATERIALS PER SMACNA STANDARDS AND THE MANUFACTURER'S STANDARDS.
3. ALL EXISTING SYSTEM INFORMATION AND/OR LOCATIONS ARE PROVIDED BY THE OWNER OR BY A 3RD PARTY. IT IS THE CONTRACTORS RESPONSIBILITY TO VERIFY ALL MEP SERVICES ARE LOCATED AS DESIGNED BEFORE BIDDING THE PROJECT. IN OCCURRENCES WHERE EXISTING DOES NOT MATCH DESIGNED, IT IS THE CONTRACTORS RESPONSIBILITY TO NOTIFY THE OWNER, ARCHITECT, & ENGINEER BEFORE PROCEEDING. IF ANY DISCREPANCIES ARE NOT IDENTIFIED AT BIDDING, THE COST SHALL BE ABSORBED BY THE CONTRACTOR AND NOT PASSED ONTO THE OWNER OR ENGINEER OF RECORD.
4. COORDINATE CONSTRUCTION OF ALL MECHANICAL WORK WITH ARCHITECTURAL, STRUCTURAL, CIVIL, ELECTRICAL WORK, ETC., SHOWN ON THE OTHER CONTRACT DRAWINGS.
5. WHEN TWO OR MORE ITEMS OF THE SAME TYPE OF EQUIPMENT ARE REQUIRED, THE PRODUCT OF ONE MANUFACTURE SHALL BE USED.
6. ALL CONTROL WIRE AND CONDUIT SHALL COMPLY WITH THE LATEST EDITION NATIONAL ELECTRIC CODE AND DIVISION 23 OF THE SPECIFICATION.
7. ALL MISCELLANEOUS STEEL REQUIRED TO ENSURE PROPER INSTALLATION AND AS SHOWN IN DETAILS FOR PIPING, DUCTWORK, AND EQUIPMENT (UNLESS OTHERWISE NOTED) SHALL BE FURNISHED AND INSTALLED BY THE MECHANICAL CONTRACTOR.
8. MECHANICAL EQUIPMENT, DUCTWORK, AND PIPING SHALL NOT BE SUPPORTED FROM METAL DECK.
9. LOCATION AND SIZES OF ALL FLOOR, WALL, AND ROOF OPENINGS SHALL BE COORDINATED WITH ALL OTHER TRADES.
10. ALL FC FANS SHALL OPERATE CONTINUOUSLY DURING THE OCCUPIED MODE OF OPERATION WITH ASSOCIATED OUTSIDE AIR MOTORIZED DAMPERS IN THE FULL OPEN POSITION. DAMPER SHALL BE CLOSED WITH THE FANS OPERATIONAL IN THE MORNING WARM UP OR COOL DOWN MODES.
11. CONTRACTOR SHALL MAINTAIN A MINIMUM CLEARANCE OF 10'-0" BETWEEN OUTSIDE AIR INTAKE POINTS AND ANY EXHAUST AIR, CONTAMINATED RELIEF AIR OR PLUMBING VENT TERMINATION POINTS.
12. CONDENSATE PIPING DOWN TO A PLUMBING FIXTURE SHALL BE FULLY INSULATED WITHIN WALL. PROVIDE ESCUTCHEON PLATE AT WALL. PIPING SHALL NOT BE ROUTED EXPOSED TO VIEW.
13. PRESSURIZED LIQUID, GAS, AIR SYSTEM PIPE AND ELECTRICAL CONDUIT SHALL NOT BE ROUTED BENEATH ANY SUSPENDED EQUIPMENT. FIRE PROTECTION, ELECTRICAL AND MECHANICAL CONTRACTORS SHALL COORDINATE TRADES.
14. ALL REMOTE MOUNTED DISCONNECT SWITCHES FOR MECHANICAL EQUIPMENT SHALL HAVE I.D. NAME PLATES.
15. PIPING ON ROOF - CONTRACTOR SHALL PROVIDE ROOF PIPE SUPPORTS ON 10'-0" CENTERS, EACH CHANGE IN DIRECTION, EACH ROOFTOP UNIT AND EACH PIPE PENETRATION THROUGH ROOF. REFER TO MECHANICAL SPECIFICATIONS FOR REQUIRED OFFSETS OR LOOPS FOR PIPE EXPANSION.
17. ALL DEMOLITION ACTIVITIES SHALL BE PERFORMED SO AS TO PROVIDE MINIMAL DISRUPTION TO THE NEIGHBORING TENANTS.
18. ALL SAW CUTTING SHALL BE PERFORMED AFTER HOURS SO THAT OPERATION DOES NOT DISTURB NEIGHBORING TENANTS. THERE SHALL BE NO GAS POWERED EQUIPMENT IN TENANT AREAS.
19. THE EXISTING CEILING TILE BRAND - ARMSTRONG 755B. PROVIDE WHEN EXISTING TILES ARE DAMAGED.
20. SLOPE ALL DRAIN PIPING 2-1/2" AND SMALLER @ 1/4"/FT. AND ALL DRAIN PIPING 3" AND LARGER @ 1/8"/FT.
21. ALL PIPING (DRAIN) MATERIAL SHALL NOT BE CONSTRUCTED FROM PVC IN THE AREA ABOVE THE SCHEDULED CEILING, WHICH IS UTILIZED AS A RETURN AIR PLENUM. ALL WIRE THAT IS NOT IN CONDUIT SHALL BE PLENUM RATED WITHIN THIS AREA.

PIPING DESIGNATIONS

(ALL DESIGNATIONS MAY NOT APPEAR ON DRAWINGS.)

SYMBOL	DESCRIPTION
G	LOW PRESSURE NATURAL GAS LINE
RL	REFRIGERANT LIQUID LINE
RS	REFRIGERATED SUCTION LINE
CD	CONDENSATE DRAIN LINE (HVAC)
PC	PUMPED CONDENSATE
RS/L	REFRIGERANT SUCTION & LIQUID LINES
RS/L/H	REFRIG. SUCTION, LIQUID, HOT GAS LINES
	DIRECTION OF FLOW
D	EQUIP. OR FIXTURE DRAIN LINE
PR	PRESSURE RELIEF DISCHARGE
	EXISTING PIPING
X X X	EXISTING PIPING TO BE REMOVED
	UNDERFLOOR
	CONNECT TO NEW OR EXISTING

THE GENERAL CONTRACTOR SHALL COORDINATE THE ROOF DEMOLITION AND RE-ROOFING CONSTRUCTION WITH THE EXISTING AND NEW MEP EQUIPMENT / PIPING / CONDUIT LOCATED ON THE ROOF. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THAT THE FINAL ELEVATION OF THE CURBS SHALL BE A MINIMUM OF 8" ABOVE THE FINISHED BUILT-UP ROOF LEVEL OR CURB EXTENSIONS WILL BE PROVIDED ALONG WITH LEVELING AND RESETTING THE EQUIPMENT. THIS SHALL INCLUDE BUT NOT BE LIMITED TO DUCTWORK, CONDUIT/WIRING AND PIPING EXTENSIONS. IF DEMOLITION REQUIRES THE REMOVAL OF THE EXISTING CURBS THEN NEW CURBS SHALL BE PROVIDED FOR ALL THE EXISTING EQUIPMENT PRIOR TO NEW ROOF BEING PROVIDED. PROVIDE NEW ROOF SUPPORTS FOR EXISTING AND NEW PIPING PER SPECIFICATIONS AND DOCUMENTS. ALL ROOF CURBS AND PIPING SUPPORT INSTALLATION SHALL CONFORM TO THE FM APPROVED ROOF SYSTEM REQUIREMENTS.

ROOF CURBS SHALL BE A MINIMUM OF 12" HEIGHT.

DRAWING SYMBOLS

(ALL SYMBOLS MAY NOT APPEAR ON DRAWINGS)

SUBTITLE — NUMBER — DESCRIPTION — SCALE

NOTE BY SYMBOL

DETAIL SYMBOL — DETAIL # — DRAWING NO. TO REFER TO

SECTION — SECTION NUMBER — DRAWING NUMBER WHERE SECTION IS LOCATED

ELEVATION/ RISER DIAGRAM SYMBOL — ELEVATION/ RISER # — DRAWING NUMBER — POINTS TO ELEVATION/ RISER AREA

AIR DISTRIBUTION DEVICE — AIR QUANTITY — ARROWS INDICATE THROW PATTERN — G-R-D DESIGNATION

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STATE OF TEXAS
BLAKE JOSEPH LEO
141161
LICENSED
PROFESSIONAL ENGINEER
07/10/21

Revisions:

LEGEND AND GENERAL NOTES - MECHANICAL

Sheet No.

M0.0

FAN COIL UNIT SCHEDULE

DESIG.	FLOOR	SERVES	NOM. TONS	SUPPLY FAN DATA					COOLING CAPACITY			ELECTRIC HEAT		ELECTRICAL DATA			MANUF.	MOD NO	OP. WEIGHT (>200 LBS.)	REMARKS
				CFM	O/A CFM	E.S.P.(IN)	HP	DRIVE	EAT (DB/WB)	TOTAL MBH	SENS MBH	AUX. KW	STEPS	MCA	MOCP	V / PH				
FC-11	1	EXISTING TENANT FINISH OUT	5.0	1,750	EXISTING TO REMAIN	0.9	0.75	DIRECT	80 / 67	53.7	39.3	15	2	47.7	50	208 / 3	CARRIER	FV4CNB006	225	NOTES 1 - 14
FC-17	1	EXISTING TENANT FINISH OUT	4.0	1,400	EXISTING TO REMAIN	0.9	0.75	DIRECT	80 / 67	43.4	30.3	18	3	55.5	60	208 / 3	CARRIER	FV4CNB006	225	NOTES 1 - 14
FC-18	2	EXISTING TENANT FINISH OUT	3.0	1,050	EXISTING TO REMAIN	0.7	0.5	DIRECT	80 / 67	31.6	24.9	10	1	53.8	60	208 / 1	CARRIER	FV4CNB003	-	NOTES 1 - 14
FC-19	2	EXISTING TENANT FINISH OUT	5.0	1,750	EXISTING TO REMAIN	0.9	0.75	DIRECT	80 / 67	53.7	39.3	15	2	47.7	50	208 / 3	CARRIER	FV4CNB006	225	NOTES 1 - 14
FC-21	1	EXISTING TENANT FINISH OUT	4.0	1,400	EXISTING TO REMAIN	0.9	0.75	DIRECT	80 / 67	43.4	30.3	18	3	55.5	60	208 / 3	CARRIER	FV4CNB006	225	NOTES 1 - 14
FC-23	2	EXISTING TENANT FINISH OUT	5.0	1,750	EXISTING TO REMAIN	0.9	0.75	DIRECT	80 / 67	53.7	39.3	15	2	47.7	50	208 / 3	CARRIER	FV4CNB006	225	NOTES 1 - 14
FC-24	1	EXISTING TENANT FINISH OUT	4.0	1,400	EXISTING TO REMAIN	0.9	0.75	DIRECT	80 / 67	43.4	30.3	18	3	55.5	60	208 / 3	CARRIER	FV4CNB006	225	NOTES 1 - 14
FC-30	1	EXISTING TENANT FINISH OUT	4.0	1,400	EXISTING TO REMAIN	0.9	0.75	DIRECT	80 / 67	43.4	30.3	18	3	55.5	60	208 / 3	CARRIER	FV4CNB006	225	NOTES 1 - 14
FC-31	2	EXISTING TENANT FINISH OUT	5.0	1,750	EXISTING TO REMAIN	0.9	0.75	DIRECT	80 / 67	53.7	39.3	15	2	47.7	50	208 / 3	CARRIER	FV4CNB006	225	NOTES 1 - 14
FC-32	1	EXISTING TENANT FINISH OUT	5.0	1,750	EXISTING TO REMAIN	0.9	0.75	DIRECT	80 / 67	53.7	39.3	15	2	47.7	50	208 / 3	CARRIER	FV4CNB006	225	NOTES 1 - 14
FC-34	1	EXISTING TENANT FINISH OUT	4.0	1,400	EXISTING TO REMAIN	0.9	0.75	DIRECT	80 / 67	43.4	30.3	15	2	47.7	50	208 / 3	CARRIER	FV4CNB006	225	NOTES 1 - 14
FC-37	2	EXISTING TENANT FINISH OUT	5.0	1,750	EXISTING TO REMAIN	0.9	0.75	DIRECT	80 / 67	53.7	39.3	15	2	47.7	50	208 / 3	CARRIER	FV4CNB006	225	NOTES 1 - 14
FC-48	3	EXISTING TENANT FINISH OUT	2.5	875	EXISTING TO REMAIN	0.7	0.5	DIRECT	80 / 67	25.9	19.3	15	2	47.7	50	208 / 3	CARRIER	FV4CNB003	-	NOTES 1 - 14
FC-49	2	EXISTING TENANT FINISH OUT	2.5	875	EXISTING TO REMAIN	0.7	0.5	DIRECT	80 / 67	25.7	19.6	3.8	1	21.5	25	208 / 1	CARRIER	FV4CNF002	-	NOTES 1 - 14
FC-50	1	EXISTING TENANT FINISH OUT	2.5	875	EXISTING TO REMAIN	0.7	0.5	DIRECT	80 / 67	25.7	19.6	3.8	1	21.5	25	208 / 1	CARRIER	FV4CNF002	-	NOTES 1 - 14

ACCEPTABLE MANUFACTURERS: ICP, CARRIER.

SUBSTITUTIONS MUST BE PRE-APPROVED BY COLLIN COUNTY TO BE INCLUDED IN THE BID.

NOTES:
1. SUPPORT WITH VIBRATION ISOLATORS.
2. PROVIDE UNIT MOUNTED DISCONNECT SWITCH.
3. UTILIZE EXISTING THERMOSTATS.
4. PROVIDE HORIZONTAL SUPPORT FRAME KIT.
5. PROVIDE 2" PLEATED, MERV 8 FILTERS. PROVIDE SPARE SET.
6. CONNECT TO EXISITING CONDENSATE DRAIN LINE.
7. REUSE EXISTING CONDENSATE PUMP IF PROVIDED.
8. PROVIDE WET CONTACT IN PRIMARY CONDENSATE DRAIN PAN. UNIT OFF ON WATER DETECTION.
9. EXTERNAL STATIC PRESSURE (E.S.P.) IS DUCTWORK AND GRILLES ONLY. BHP SHOULD INCLUDE TWICE THE INITIAL FILTER LOSSES.
10. PROVIDE RELAYS, XFMRS, CONTROLS, ETC. FOR A SINGLE POINT ELECTRICAL CONNECTION.
11. PROVIDE CONTROL PANEL LABEL LISTING THE SHORT CIRCUIT RATING (SCR IN KAIC) REFER TO ELEC. POWER TO MECH. SCHEDULE FOR RATING REQMTS.
12. CONTRACTOR SHALL NOTE EXISTING OUTSIDE AIR DUCT SIZE AND PERCENT OF DAMPER ON EXISTING UNIT PRIOR TO REMOVING UNIT. NEW UNIT SHALL HAVE SAME OUTSIDE AIR DUCT SIZE AND AIR FLOW.
13. CONTRACTOR SHALL VERIFY EXISTING CONTROL WIRING IS COMPATABLE WITH NEW CONDENSING UNIT AND UTILIZE EXISTING CONDITIONS WHERE APPLICABLE.
14. CONTRACTOR SHALL TRAVERSE SUPPLY AIR FLOW ON EXISTING UNIT PRIOR TO REMOVING UNIT. NEW UNIT SHALL BE BALANCED TO EXISTING CONDITIONS.

CONDENSING UNIT SCHEDULE

DESIG.	SERVES	NOMINAL CAP (TONS)	CAPACITY (MBH)	COND. AMB.(F) SUM	ELECTRICAL DATA			MIN SEER/EER @AHRI	MFG.	MODEL NUMBER	OP. WEIGHT (>200 LBS.)	REMARKS
					V / PH	MCA	MOCP					
CU-11	FC-11	5.0	53.7	105	208 / 3	21.4	35	14.5 / 12.0	CARRIER	24AHA460	300	NOTES 1 - 12
CU-17	FC-17	4.0	43.4	105	208 / 3	17.8	30	14.5 / 12.0	CARRIER	24ABB348	250	NOTES 1 - 12
CU-18	FC-18	3.0	31.6	105	208 / 1	18.1	30	15.0 / 13.0	CARRIER	24ACC436	-	NOTES 1 - 12
CU-19	FC-19	5.0	53.7	105	208 / 3	21.4	35	14.5 / 12.0	CARRIER	24AHA460	300	NOTES 1 - 12
CU-21	FC-21	4.0	43.4	105	208 / 3	17.8	30	14.5 / 12.0	CARRIER	24ABB348	250	NOTES 1 - 12
CU-23	FC-23	5.0	53.7	105	208 / 3	21.4	35	14.5 / 12.0	CARRIER	24AHA460	300	NOTES 1 - 12
CU-24	FC-24	4.0	43.4	105	208 / 3	17.8	30	14.5 / 12.0	CARRIER	24ABB348	250	NOTES 1 - 12
CU-30	FC-30	4.0	43.4	105	208 / 3	17.8	30	14.5 / 12.0	CARRIER	24ABB348	250	NOTES 1 - 12
CU-31	FC-31	5.0	53.7	105	208 / 3	21.4	35	14.5 / 12.0	CARRIER	24AHA460	300	NOTES 1 - 12
CU-32	FC-32	5.0	53.7	105	208 / 3	21.4	35	14.5 / 12.0	CARRIER	24AHA460	300	NOTES 1 - 12
CU-34	FC-34	4.0	43.4	105	208 / 3	17.8	30	14.5 / 12.0	CARRIER	24ABB348	250	NOTES 1 - 12
CU-37	FC-37	5.0	53.7	105	208 / 3	21.4	35	14.5 / 12.0	CARRIER	24AHA460	300	NOTES 1 - 12
CU-48	FC-48	2.5	25.9	105	208 / 3	11.2	20	14.5 / 12.0	CARRIER	24ABB330	-	NOTES 1 - 12
CU-49	FC-49	2.5	25.7	105	208 / 1	16.8	25	15.5 / 13.0	CARRIER	24ACC430	200	NOTES 1 - 12
CU-50	FC-50	2.5	25.68	105	208 / 1	16.80	25	15.5 / 13.0	CARRIER	24ACC430	200	NOTES 1 - 12

ACCEPTABLE MANUFACTURERS: ICP, CARRIER.

SUBSTITUTIONS MUST BE PRE-APPROVED BY COLLIN COUNTY TO BE INCLUDED IN THE BID.

NOTES:
1. INSTALL ON EXISITING RAIL TYPE ROOF CURB FOR ROOF MOUNTED UNITS - 14" HIGH ABOVE FINISHED ROOF.
2. SIZE AND INSTALL REFRIGERANT LINES IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. CONTRACTOR SHALL VERIF EXISTING LINE SET SIZES AND UTILIZE EXISTING CONDITIONS WHERE APPLICABLE.
3. PROVIDE NEMA 3R RATED DISCONNECT SWITCH FOR EACH UNIT OR MODULE.
4. PROVIDE MANUFACTURERS 5 YEAR COMPRESSOR WARRANTY.
5. PROVIDE MANUFACTURERS RECOMMENDED SERVICE AND OPERATIONAL CLEARANCES - NOT LESS THAN 24" CLEAR.
6. PROVIDE MANUFACTURERS LOW AMBIENT CONTROL KIT FOR OPERATION DOWN TO 17 DEG F.
7. PROVIDE ANTI-SHORT CYCLE TIMER AND HARD START KIT.
8. PROVIDE CONTROL PANEL LABEL LISTING THE SHORT CIRCUIT RATING (SCCR IN KAIC) REFER TO ELEC. POWER TO MECH. SCHEDULE FOR RATING REQMTS.
10. PROVIDE HAIL GUARDS.
11. EXISTING CONTROLS SYSTEM FOR HVAC IS HONEYWELL JACE WEBS 800 WITH LON CARD CONTROLLER SYSTEM. NEW EQUIPMENT SHALL BE INTEGRATED INTO THIS EXISTING CONTROL SYSTEM.
12. CONTRACTOR SHALL VERIFY EXISTING CONTROL WIRING IS COMPATABLE WITH NEW CONDENSING UNIT AND UTILIZE EXISTING CONDITIONS WHERE APPLICABLE.

CITY OF PLANO ADDITIONAL REQUIREMENTS:

EQUIPMENT WEIGHT: IF THE INSTALLED WEIGHT OF THE NEW CONDENSING UNITS ARE EQUAL TO OR GREATER THAN 10% OVER THE INSTALLED WEIGHT OF THE EXISTING UNITS, STRUCTURAL EVALUATION IS REQUIRED. THE ESTIMATED WEIGHT OF THE ROOF MOUNTED UNITS AS INSTALLED, BASED ON THE BEST AVAILABLE INFORMATION, IS APPROXIMATELY 3,000 LBS.

THE CALCULATED WEIGHT OF THE SCHEDULED NEW ROOF MOUNTED CONDENSING UNITS PER CATALOG DATA, IS A COMBINED 3,775 LBS.

CONTRACTOR SHALL ADVISE OWNER IF THE SUBMITTED EQUIPMENT WEIGHT IS 10% OR MORE THAN THE ESTIMATED EXISTING EQUIPMENT WEIGHT.

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STATE OF TEXAS
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141161
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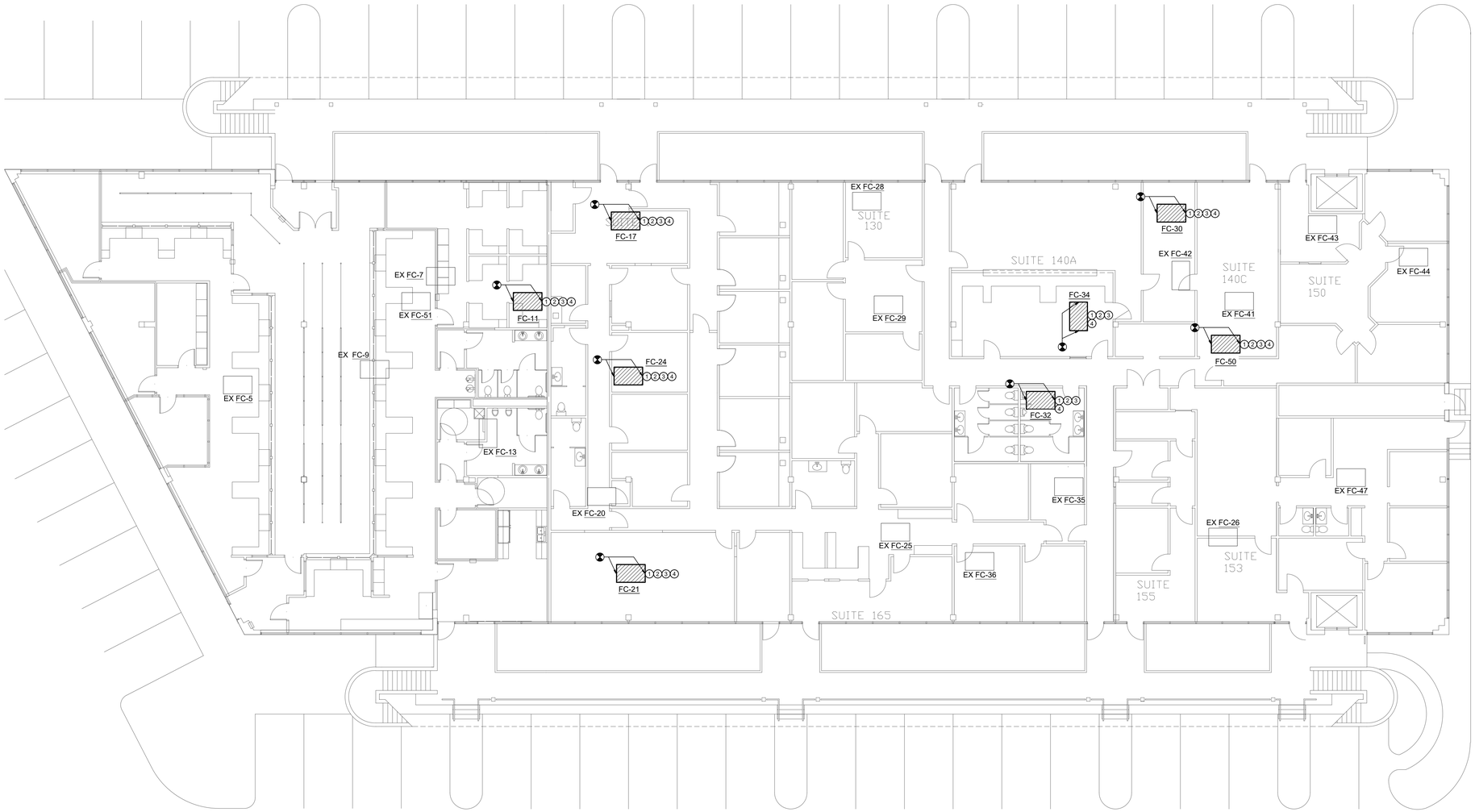
PROFESSIONAL ENGINEER
09/10/21

Revisions:

SCHEDULES - MECHANICAL

Sheet No.
M0.1



01 FIRST FLOOR PLAN - HVAC
SCALE: 3/32"=1'-0"

GENERAL NOTES

1. SEE PLAN SHEET MP0.0 FOR NOTES, SYMBOLS, AND ABBREVIATIONS. REFER TO SPECIFICATIONS FOR ADDITIONAL PROJECT REQUIREMENTS.
2. CONTRACT DRAWINGS ARE DIAGRAMMATIC. CONTRACTOR SHALL INSTALL ALL MECHANICAL MATERIAL PER SMACNA STANDARDS.
3. COORDINATE WITH ALL TRADES BEFORE INSTALLING ANY EQUIPMENT OR DUCTWORK.
4. ALL SHEET METAL DUCTWORK PENETRATING FIRE RATED WALLS SHALL BE MINIMUM OF 26 GAUGE. ALL OTHER DUCT SHALL BE CONSTRUCTED AS SPECIFIED IN ACCORDANCE WITH THE LATEST EDITION OF SMACNA "HVAC DUCT CONSTRUCTION STANDARDS."
5. SIZE REFRIGERANT LINES PER MANUFACTURERS RECOMMENDATIONS.

NOTES BY SYMBOL "◯"

1. CONTRACTOR SHALL UTILIZE EXISTING REFRIGERANT PIPING WHERE APPLICABLE. IF EXISTING CONDITIONS DO NOT MATCH NEW EQUIPMENT, REPLACE WITH APPROPRIATE DX LINES THROUGH EXISTING ROOF PENETRATION. CONTRACTOR SHALL FULLY INSULATE & WEATHER TIGHT SEAL NEW/EXISTING DX LINES AT ROOF PENETRATION. DO NOT SEGMENT PIPE INSULATION AT PENETRATION POINT. PROVIDE 2 COATS OF UV RESISTIVE PAINT ON EXTERIOR PIPE INSULATION.
2. CONNECT FULLY INSULATED CONDENSATE DRAIN LINE TO EXISTING PIPING TO APPROVED TERMINATION. CONTRACTOR SHALL VERIFY EXISTING DRAIN LINE IS SLOPED AS REQUIRED PER CODE.
3. CONNECT NEW UNIT TO EXISTING DUCTWORK. PROVIDE TRANSITIONS AS REQUIRED
4. CONTRACTOR SHALL NOTE EXISTING CONTROL POINTS FOR COLLIN COUNTY'S HVAC CONTROL NETWORK AND MATCH POINTS WITH NEW UNIT BY UTILIZING EXISTING CONTROLS ON SITE. TYPICAL U.N.O.

SCOPE OF WORK

THIS PROJECT WILL CONSIST OF REPLACEMENT OF ROOF MOUNTED AND ASSOCIATED INDOOR UNITS TO SERVE EXISTING SPACES.

NEW UNITS SHALL BE BALANCED TO EXISTING CONDITIONS NOTED.

THE EXISTING WALL MOUNTED SENSORS ARE TO BE UTILIZED WITH NEW EQUIPMENT.

LEGEND

FC-22	DESIGNATES EQUIPMENT TO REMAIN - NOT IN CONTRACT.
FC-47	DESIGNATES EQUIPMENT WHICH SHALL BE REPLACED UNDER THIS CONTRACT.

NOTE:
UTILIZE EXISTING CONTROL WIRING FOR ASSOCIATED INDOOR AND CONDENSING UNITS. CONTRACTOR TO VERIFY EXISTING CONTROL WIRING IS COMPATIBLE WITH NEW UNITS.

GRAPHIC SCALE:
3/32"=1'-0"
0 5' 10' 20'

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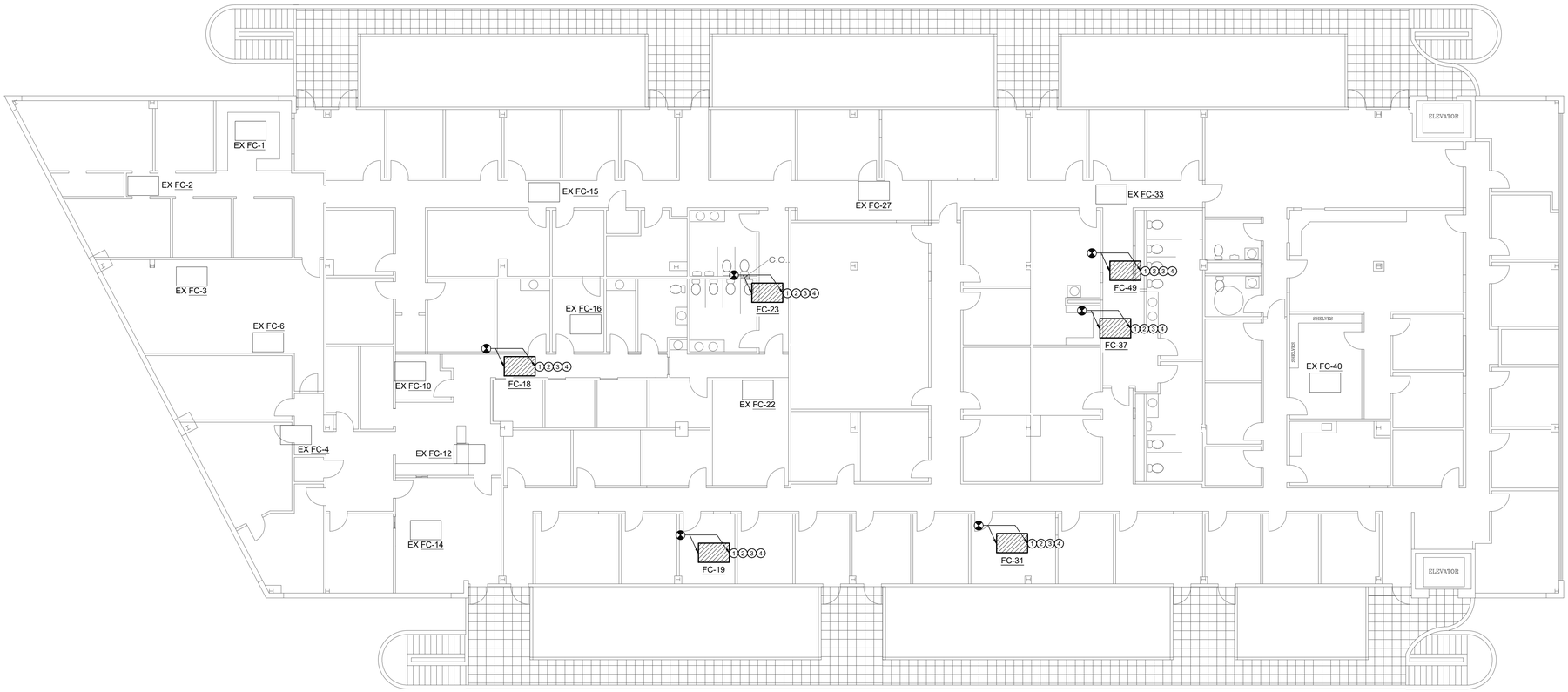
07.16.21

Revisions:

FIRST FLOOR PLAN - HVAC

Sheet No.
M2.1



01 SECOND FLOOR PLAN - HVAC
SCALE: 3/32"=1'-0"

GENERAL NOTES

1. SEE PLAN SHEET MP0.0 FOR NOTES, SYMBOLS, AND ABBREVIATIONS. REFER TO SPECIFICATIONS FOR ADDITIONAL PROJECT REQUIREMENTS.
2. CONTRACT DRAWINGS ARE DIAGRAMMATIC. CONTRACTOR SHALL INSTALL ALL MECHANICAL MATERIAL PER SMACNA STANDARDS.
3. COORDINATE WITH ALL TRADES BEFORE INSTALLING ANY EQUIPMENT OR DUCTWORK.
4. ALL SHEET METAL DUCTWORK PENETRATING FIRE RATED WALLS SHALL BE MINIMUM OF 26 GAUGE. ALL OTHER DUCT SHALL BE CONSTRUCTED AS SPECIFIED IN ACCORDANCE WITH THE LATEST EDITION OF SMACNA "HVAC DUCT CONSTRUCTION STANDARDS."
5. SIZE REFRIGERANT LINES PER MANUFACTURERS RECOMMENDATIONS.

NOTES BY SYMBOL "◯"

1. CONTRACTOR SHALL UTILIZE EXISTING REFRIGERANT PIPING WHERE APPLICABLE. IF EXISTING CONDITIONS DO NOT MATCH NEW EQUIPMENT, REPLACE WITH APPROPRIATE DX LINES THROUGH EXISTING ROOF PENETRATION. CONTRACTOR SHALL FULLY INSULATE & WEATHER TIGHT SEAL NEW/EXISTING DX LINES AT ROOF PENETRATION. DO NOT SEGMENT PIPE INSULATION AT PENETRATION POINT. PROVIDE 2 COATS OF UV RESISTIVE PAINT ON EXTERIOR PIPE INSULATION.
2. CONNECT FULLY INSULATED CONDENSATE DRAIN LINE TO EXISTING PIPING TO APPROVED TERMINATION. CONTRACTOR SHALL VERIFY EXISTING DRAIN LINE IS SLOPED AS REQUIRED PER CODE.
3. CONNECT NEW UNIT TO EXISTING DUCTWORK. PROVIDE TRANSITIONS AS REQUIRED
4. CONTRACTOR SHALL NOTE EXISTING CONTROL POINTS FOR COLLIN COUNTY'S HVAC CONTROL NETWORK AND MATCH POINTS WITH NEW UNIT BY UTILIZING EXISTING CONTROLS ON SITE. TYPICAL U.N.O.

SCOPE OF WORK

THIS PROJECT WILL CONSIST OF REPLACEMENT OF ROOF MOUNTED AND ASSOCIATED INDOOR UNITS TO SERVE EXISTING SPACES.

NEW UNITS SHALL BE BALANCED TO EXISTING CONDITIONS NOTED.

THE EXISTING WALL MOUNTED SENSORS ARE TO BE UTILIZED WITH NEW EQUIPMENT.

LEGEND

FC-22	DESIGNATES EQUIPMENT TO REMAIN - NOT IN CONTRACT.
FC-47	DESIGNATES EQUIPMENT WHICH SHALL BE REPLACED UNDER THIS CONTRACT.

NOTE:
UTILIZE EXISTING CONTROL WIRING FOR ASSOCIATED INDOOR AND CONDENSING UNITS. CONTRACTOR TO VERIFY EXISTING CONTROL WIRING IS COMPATIBLE WITH NEW UNITS.

GRAPHIC SCALE:
3/32"=1'-0"
0 5' 10' 20'

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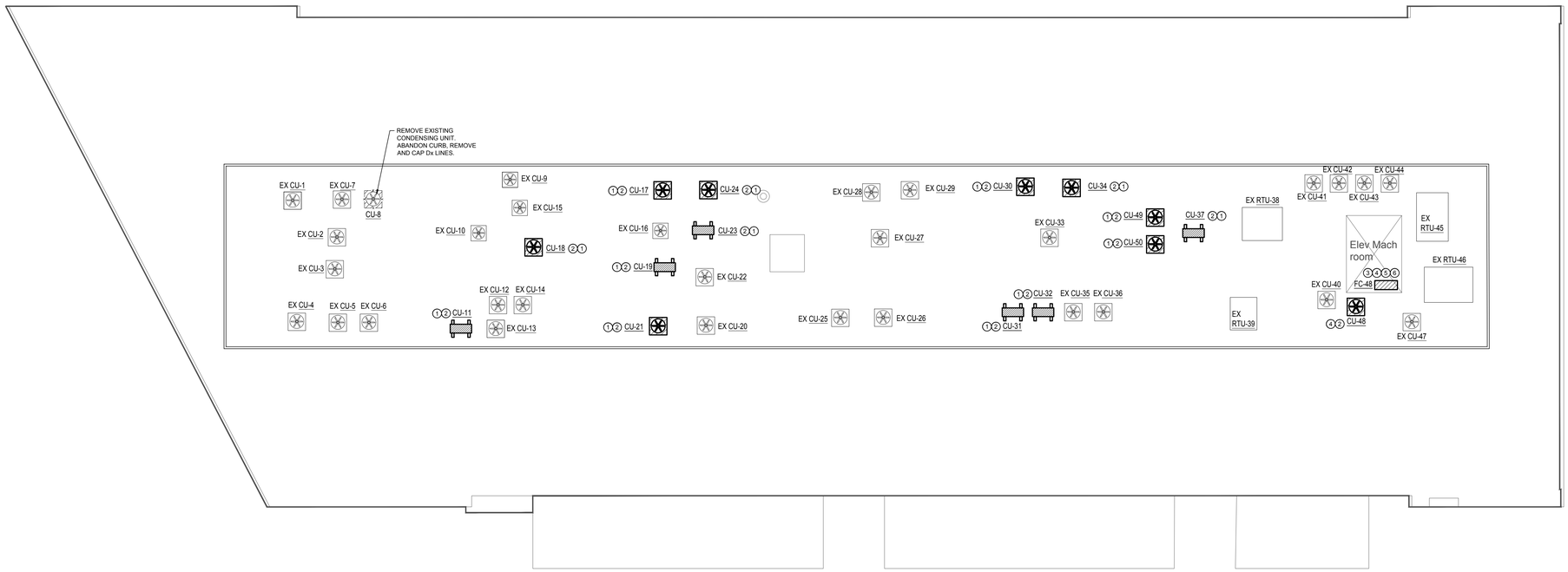
07/10/21

Revisions:

SECOND FLOOR PLAN - HVAC

Sheet No.
M2.2

02 EX. FC-48
SCALE: NTS



01 ROOF LEVEL PLAN - HVAC
SCALE: 3/32"=1'-0"

GENERAL NOTES

1. SEE PLAN SHEET MP0.0 FOR NOTES, SYMBOLS, AND ABBREVIATIONS. REFER TO SPECIFICATIONS FOR ADDITIONAL PROJECT REQUIREMENTS.
2. SIZE REFRIGERANT LINES PER MANUFACTURERS RECOMMENDATIONS.
3. PROVIDE 'CHEM-CURB' IN LIEU OF PITCH PANS FOR ANY REQUIRED PIPE / CONDUIT PENETRATIONS INTO THE EXISTING ROOFING.

NOTES BY SYMBOL "◯"

1. CONTRACTOR SHALL UTILIZE EXISTING REFRIGERANT PIPING WHERE APPLICABLE. IF EXISTING CONDITIONS DO NOT MATCH NEW EQUIPMENT, REPLACE WITH APPROPRIATE DX LINES THROUGH EXISTING ROOF PENETRATION. CONTRACTOR SHALL FULLY INSULATE & WEATHER TIGHT SEAL NEW/EXISTING DX LINES AT ROOF PENETRATION. DO NOT SEGMENT PIPE INSULATION AT PENETRATION POINT. PROVIDE 2 COATS OF UV RESISTIVE PAINT ON EXTERIOR PIPE INSULATION.
2. INSTALL UNIT ON EXISTING RAIL TYPE ROOF CURB A MINIMUM OF 14" HIGH ABOVE FINISHED ROOF.
3. INSTALL UNIT IN SAME LOCATION AS DEMOLISHED UNIT. PROVIDE HARDWARE CLOTH ON UNIT'S SUPPLY AND RETURN OPENINGS. HARDWARE CLOTH SHALL BE SIZED FOR SUPPLY/ RETURN OPENING AND BE A MINIMUM OF 23 GAUGE. REFER TO 02 / M2.3 FOR EXISTING INSTALLATION.
4. CONTRACTOR SHALL UTILIZE EXISTING REFRIGERANT PIPING WHERE APPLICABLE. IF EXISTING CONDITIONS DO NOT MATCH NEW EQUIPMENT, REPLACE WITH APPROPRIATE DX LINES THROUGH EXISTING WALL PENETRATION. CONTRACTOR SHALL FULLY INSULATE & WEATHER TIGHT SEAL NEW/EXISTING DX LINES AT ROOF PENETRATION. DO NOT SEGMENT PIPE INSULATION AT PENETRATION POINT. PROVIDE 2 COATS OF UV RESISTIVE PAINT ON EXTERIOR PIPE INSULATION.
5. CONNECT FULLY INSULATED CONDENSATE DRAIN LINE TO EXISTING PIPING TO APPROVED TERMINATION. CONTRACTOR SHALL VERIFY EXISTING DRAIN LINE IS SLOPED AS REQUIRED PER CODE.
6. CONTRACTOR SHALL NOTE EXISTING CONTROL POINTS FOR COLLIN COUNTY'S HVAC CONTROL NETWORK AND MATCH POINTS WITH NEW UNIT BY UTILIZING EXISTING CONTROLS ON SITE.

SCOPE OF WORK

THIS PROJECT WILL CONSIST OF REPLACEMENT OF ROOF MOUNTED AND ASSOCIATED INDOOR UNITS TO SERVE EXISTING SPACES.

NEW UNITS SHALL BE BALANCED TO EXISTING CONDITIONS NOTED.

THE EXISTING WALL MOUNTED SENSORS ARE TO BE UTILIZED WITH NEW EQUIPMENT.

LEGEND

- DESIGNATES EQUIPMENT TO REMAIN - NOT IN CONTRACT.
- DESIGNATES EQUIPMENT WHICH SHALL BE REPLACED UNDER THIS CONTRACT.
- FC-47 — DESIGNATES EQUIPMENT WHICH SHALL BE REPLACED UNDER THIS CONTRACT.

NOTE:
UTILIZE EXISTING CONTROL WIRING FOR ASSOCIATED INDOOR AND CONDENSING UNITS. CONTRACTOR TO VERIFY EXISTING CONTROL WIRING IS COMPATIBLE WITH NEW UNITS.

GRAPHIC SCALE:
3/32"=1'-0"
0 5' 10' 20'

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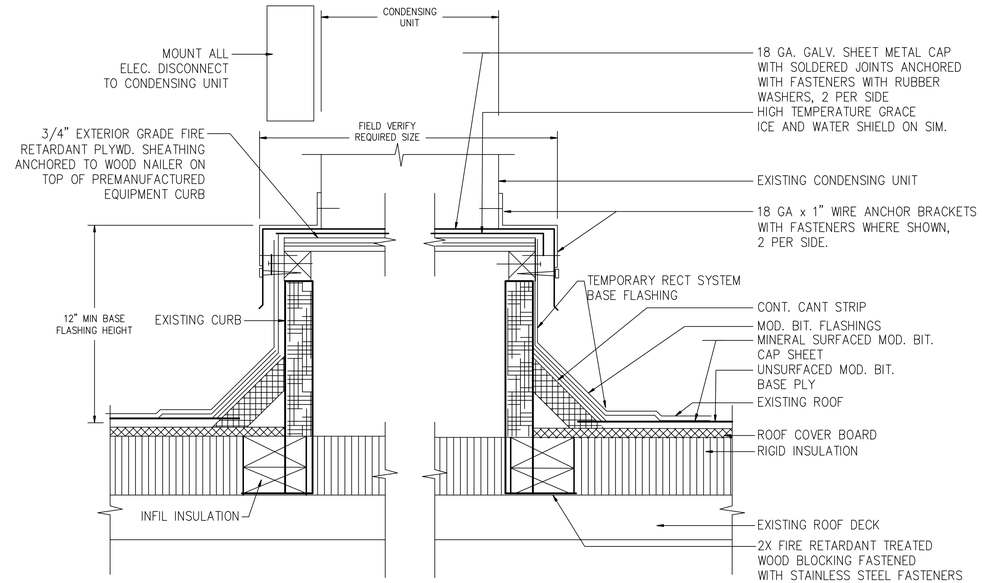
Revisions:

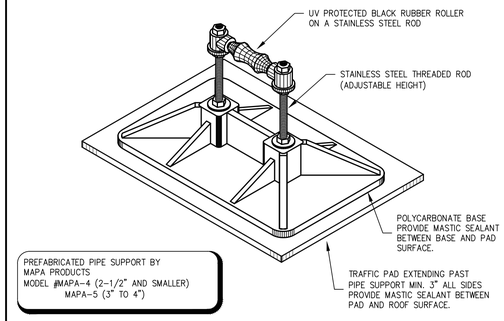
ROOF LEVEL PLAN - HVAC

Sheet No.
M2.3

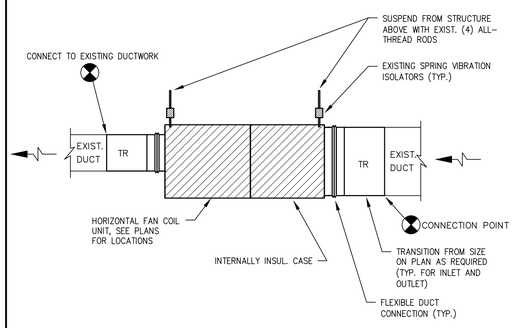


BASE CURB FOR B900 ONLY

01 CONDENSING UNIT CURB DETAIL — SCALE: NTS



02 ROOF PIPE SUPPORT — SCALE: NTS



03 HORIZ. FAN COIL UNIT DETAIL — SCALE: NTS

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07/10/21

Revisions:

MECHANICAL DETAILS

Sheet No.
M4.1

ELECTRICAL SYMBOLS

(ALL SYMBOLS MAY NOT APPEAR ON DRAWINGS.)

- SINGLE RECEPTACLE; NEMA 5-20R AT 18" ABOVE FINISHED FLOOR UNO.
- DUPLEX RECEPTACLE; NEMA 5-20R AT 18" ABOVE FINISHED FLOOR UNO.
- QUADRAPLEX RECEPTACLE; NEMA 5-20R AT 18" ABOVE FINISHED FLOOR UNO.
- WP — RECEPTACLE W/WEATHERPROOF COVERPLATE; DUPLEX NEMA 5-20R 18" ABOVE FINISHED GRADE OR FLOOR UNO.
- S — DUPLEX RECEPTACLE WITH DETENTION PLATE
- GFI — GROUND-FAULT CIRCUIT INTERRUPTER RECEPTACLE; DUPLEX NEMA 5-20R 18" ABOVE FINISHED GRADE OR FLOOR UNO.
- IG — ISOLATED GROUND RECEPTACLE; DUPLEX NEMA 5-20R AT 18" ABOVE FINISHED FLOOR UNO
- n — RECEPTACLE MOUNTED n INCHES ABOVE FINISHED FLOOR OR GRADE; NEMA 5-20R UNO
- RECEPTACLE 208 VOLT.
- B — SPECIAL-PURPOSE RECEPTACLE; SEE SPECIAL-PURPOSE RECEPTACLE, CONNECTION AND FLOOR BOX SCHEDULE ON DRAWING.
- B — HARDWIRE CONNECTION OR PROVISION FOR CONNECTION; SEE SPECIAL-PURPOSE RECEPTACLE, CONNECTION AND FLOOR BOX SCHEDULE ON DRAWING.
- MULTIOUTLET ASSEMBLY
- FLOOR-MOUNTED DUPLEX RECEPTACLE AND DATA CONNECTION.
- 2 — MOTOR SYMBOL; THE NUMBER INSIDE INDICATES HP.
- COMBINATION DISCONNECT SWITCH/MOTOR STARTER.
- NON FUSED DISCONNECT SWITCH
- FUSED DISCONNECT SWITCH
- LOW VOLTAGE PANEL
- HIGH VOLTAGE PANEL
- FACP — FIRE ALARM CONTROL PANEL
- J — JUNCTION BOX
- PUSHBUTTON
- D — ELECTRIC DOOR OPENER
- D — DUCT SMOKE DETECTOR
- CIRCUIT BREAKER
- TRANSFORMER

LIGHTING SYMBOLS

(ALL SYMBOLS MAY NOT APPEAR ON DRAWINGS.)

- 2' x 4' SURFACE MOUNTED LUMINARE
- CEILING-MOUNTED SURFACE OR SUSPENDED SINGLE-FACE EXIT SIGN WITH DIRECTIONAL ARROW AS INDICATED; SHADED QUADRANT INDICATES FACE OF SIGN.
- CEILING-MOUNTED SURFACE OR SUSPENDED DOUBLE-FACE EXIT SIGN WITH DIRECTIONAL ARROWS AS INDICATED; SHADED QUADRANT INDICATES FACES OF SIGN.
- WALL-MOUNTED EXIT SIGN WITH DIRECTIONAL ARROW(S) AS INDICATED; SHADED QUADRANT(S) INDICATE FACE(S) OF SIGN.
- EMERGENCY LIGHT FIXTURE
- $S — SINGLE POLE SWITCH AT 48" ABOVE FINISHED FLOOR WITH SECURITY DETENTION PLATE.
- $ — SINGLE-POLE SWITCH AT 48" ABOVE FINISHED FLOOR UNO.
- $D — SINGLE-POLE DIMMING SWITCH AT 48" ABOVE FINISHED FLOOR UNO.
- $2 — TWO-POLE SWITCH AT 48" ABOVE FINISHED FLOOR UNO.
- $3 — THREE-WAY SWITCH AT 48" ABOVE FINISHED FLOOR UNO.
- $4 — FOUR-WAY SWITCH AT 48" ABOVE FINISHED FLOOR UNO.
- $K — KEY-OPERATED SWITCH AT 48" ABOVE FINISHED FLOOR UNO.
- $P — SINGLE-POLE SWITCH AND PILOT LIGHT AT 48" ABOVE FINISHED FLOOR UNO.
- $T — TIME SWITCH AT 48" ABOVE FINISHED FLOOR UNO.
- $WP — SINGLE-POLE SWITCH WITH WEATHERPROOF COVERPLATE AT 48" ABOVE FINISHED GRADE OR FLOOR UNO

DATA SYMBOLS

(ALL SYMBOLS MAY NOT APPEAR ON DRAWINGS.)

- DATA SYSTEM JACK; SINGLE GANG BOX AT 18" AFF WITH 1" CONDUIT TO ABOVE NEAREST ACCESSIBLE CEILING; SUBSCRIPTED NUMBER MOUNTING HEIGHT AFF
- TELEPHONE SYSTEM VOICE JACK; SINGLE GANG BOX AT 18" AFF WITH 1" CONDUIT TO ABOVE NEAREST ACCESSIBLE CEILING; SUBSCRIPTED NUMBER INDICATES MOUNTING HEIGHT AFF
- COMBINATION VOICE AND DATA JACK; 1-GANG BOX AT 18" AFF WITH 1" CONDUIT TO ABOVE NEAREST ACCESSIBLE CEILING; SUBSCRIPTED NUMBER INDICATES MOUNTING HEIGHT AFF
- F0 — DATA SYSTEM FIBER OPTIC JACK; SINGLE GANG BOX AT 18" AFF WITH 1" CONDUIT TO ABOVE NEAREST ACCESSIBLE CEILING; SUBSCRIPTED NUMBER MOUNTING HEIGHT AFF
- WP — WALL PHONE. VOICE AND DATA JACK; 1-GANG BOX AT 48" AFF WITH 1" CONDUIT TO ABOVE NEAREST ACCESSIBLE CEILING; SUBSCRIPTED NUMBER INDICATES MOUNTING HEIGHT AFF
- REMOTE DOOR UNLOCK PUSH BUTTON
- W — CEILING MOUNTED WIRELESS WIFI ANTENNA
- SP — OCCUPANCY SENSOR "SWITCH PACK" OR "POWER PACK" REFER TO DETAIL 8 ON SHEET E3
- CONTROLLED DOOR
- CR — CARD READER
- OVERHEAD DOOR CONTROLLER
- SECURITY CAMERA
- CLOCK SYSTEM SINGLE RECEPTACLE; NEMA 5-15R AT 80" ABOVE FINISHED FLOOR UNO.
- SOUND SYSTEM DEVISE; SEE SOUND SYSTEM DEVICE SCHEDULE ON DRAWINGS.
- S — SOUND SYSTEM SPEAKER; CEILING-MOUNTED 2-GANG, 4" DEEP BOX WITH 1" CONDUIT TO ABOVE NEAREST ACCESSIBLE CEILING
- TV — TELEVISION DATA OUTLET; SINGLE GANG 2.5" DEEP BOX AT 72" AFF, UNLESS NOTED OTHERWISE, (WITH 1" CONDUIT TO ABOVE NEAREST CEILING) AND ADJACENT NEMA 5-20R DUPLEX RECEPTACLE.

ELECTRICAL CONVENTIONS

(ALL CONVENTIONS MAY NOT APPEAR ON DRAWINGS.)

GENERAL NOTES APPLY TO ELECTRICAL DRAWING SET.

DRAWING NOTES APPLY TO DRAWING ON WHICH NOTE APPEARS.

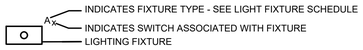
NOTES BY SYMBOL APPLY TO DRAWING ON WHICH AND WHERE SYMBOL APPEARS.

WIRE SIZES ARE INDICATED BY AMERICAN WIRE GAGE OR CIRCULAR MILS.

LB-3,5 — PANELBOARD, SWITCHBOARD OR MOTOR CONTROL CENTER CIRCUIT DESIGNATION

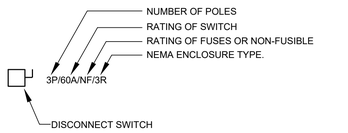
— – — CENTER LINE

TYPICAL LIGHTING NOTATIONS SHOWN ON LIGHTING PLAN:



LA-1 — INDICATES PANEL CIRCUIT

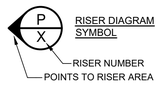
TYPICAL POWER NOTATIONS SHOWN ON POWER PLAN:

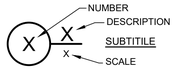


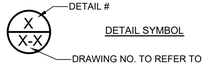
ALL DIMENSIONS GIVEN SHALL BE INTERPRETED AS DIMENSION TO THE TOP OF THE ELECTRICAL BOX IN ACCORDANCE WITH ADA.

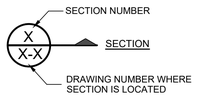
DRAWING SYMBOLS

(ALL SYMBOLS MAY NOT APPEAR ON DRAWINGS.)



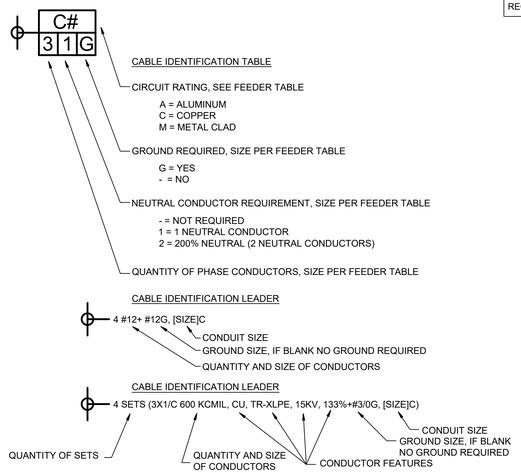






WIRING METHOD NOTES:

1. DO NOT COMBINE NEUTRALS AND GROUNDS OF SEPARATE BRANCH CIRCUITS.
2. WIRE SHALL BE COPPER THWN - SOLID FOR SIZES 12, 10, 8; STRANDED FOR SIZES 6 AND LARGER.



ELECTRICAL ABBREVIATIONS

(ALL ABBREVIATIONS MAY NOT APPEAR ON DRAWINGS.)

2SCP	2-SPEED, CONSEQUENT POLE
2SSW	2-SPEED, SEPARATE WINDING
A	AMPERE(S)
AC	ALTERNATING CURRENT
ACCU	AIR-COOLED CONDENSING UNIT
ADA	AMERICANS WITH DISABILITIES ACT
AFF	ABOVE FINISHED FLOOR
AFC	ABOVE FINISHED CEILING
AFG	ABOVE FINISHED GRADE
AHU	AIR HANDLING UNIT
AIC	AMPERE INTERRUPTING CAPACITY(ROOT MEAN SQUARE SYMMETRICAL)
ALT	ALTERNATE
APPROX	APPROXIMATE OR APPROXIMATELY
ARCH	ARCHITECT
ATS	AUTOMATIC TRANSFER SWITCH
AUX	AUXILIARY
AWG	AMERICAN WIRE GAGE
BFC	BELOW FINISHED CEILING
BFG	BELOW FINISHED GRADE
BLDG	BUILDING
C	CONDUIT OR TUBING
CATV	CABLE TELEVISION
CB	CIRCUIT BREAKER
CCTV	CLOSED-CIRCUIT TELEVISION
CKT	CIRCUIT
CLG	CEILING
COMM	COMMUNICATIONS
CT(S)	CURRENT TRANSFORMER(S)
DC	DIRECT CURRENT
DISC	DISCONNECT
DPDT	DOUBLE-POLE, DOUBLE THROW
DPST	DOUBLE POLE, SINGLE THROW
DWG(S)	DRAWING(S)
EC	EMPTY CONDUIT OR TUBING
EGS	ENGINE-GENERATOR SET
EHH	ELECTRICAL HANDHOLE
ELEV	ELEVATION
EMERG	EMERGENCY
EMH	ELECTRICAL MANHOLE
EMT	ELECTRICAL METALLIC TUBING
E/R	EXISTING TO BE REMOVED AND REINSTALLED AFTER MODIFICATION
EWC	ELECTRICAL WATER COOLER
EX	EXISTING
F	FUSE(S)
FAAP	FIRE ALARM ANNUNCIATOR PANEL
FACP	FIRE ALARM CONTROL PANEL
FBO	FURNISHED BY OWNER
FL	FLOOR
FLA	FULL LOAD AMPERE(S)
FLEX	FLEXIBLE
FS	FUSIBLE SAFETY SWITCH OR FUSIBLE SWITCH
FVNR	FULL VOLTAGE, NON-REVERSING
FVR	FULL VOLTAGE, REVERSING
G	GROUND
GFCI	GROUND FAULT CIRCUIT INTERRUPT
HACR	HEATING AND AIR CONDITIONING RATING
HID	HIGH INTENSITY DISCHARGE
HOA	HAND-OFF-AUTOMATIC
HP	HORSEPOWER
HPS	HIGH PRESSURE SODIUM
HVAC	HEATING, VENTILATION AND AIR CONDITIONING
HZ	HERTZ
IES	ILLUMINATING ENGINEERING SOCIETY OF NORTH AMERICA
IG	ISOLATED GROUND
IMC	INTERMEDIATE METALLIC CONDUIT
JBOX	JUNCTION BOX
KA	KILOAMPERE(S)
KW	KILOWATTS(S)
KWH	KILOWATT-HOUR(S)
KV	KILOVOLT(S)
KVA	KILOVOLT-AMPERE(S)
KVAR	KILOVOLT-AMPERE(S) REACTIVE
LPS	LOW PRESSURE SODIUM
LTG	LIGHTING
m	METER(S)
MAX	MAXIMUM
MCA	MAXIMUM CURRENT AMPACITY
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MCP	MOTOR CIRCUIT PROTECTOR
MH	METAL HALIDE
MIC	MICROPHONE
MIN	MINIMUM
MLO	MAIN LUGS ONLY
mm	MILLIMETER(S)
MMS	MANUAL MOTOR STARTER
MOCP	MAXIMUM OVER-CURRENT PROTECTION
MTS	MANUAL TRANSFER SWITCH
MVA	MEGAVOLT-AMPERE(S)
MVAR	MEGAVOLT-AMPERE(S) REACTIVE
MW	MEGAWATT(S)
NC	NORMALLY CLOSED
NEC	NATIONAL ELECTRICAL CODE
NEMA	NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION
NF	NON-FUSIBLE SAFETY SWITCH
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NIC	NOT IN CONTRACT
NL	NIGHT LIGHT
NO	NORMALLY OPEN
NTS	NOT TO SCALE
OH	OVERHEAD
P	POLE(S)
PA	PUBLIC ADDRESS SYSTEM
PF	POWER FACTOR
PL	PILOT LIGHT
PNL	PANELBOARD
PVC	POLYVINYL CHLORIDE
RC	REMOTE CONTROL
RCP	REFLECTED CEILING PLAN
RCPT	RECEPTACLES(S)
RGS	RIGID GALVANIZED STEEL
RVSS	REDUCED VOLTAGE, SOLID STATE
SF	SQUARE FOOT OR FEET
SPDT	SINGLE-POLE, DOUBLE-THROW
SPST	SINGLE-POLE, SINGLE-THROW
SS	START-STOP
SW	SWITCH
SWBD	SWITCHBOARD
TA	TRIP AMPERE(S)
TAS	TEXAS ACCESSIBILITY STANDARDS
TEL	TELEPHONE
TEMP	TEMPORARY
TU	TEXAS UTILITIES ELECTRIC
TV	TELEVISION
TYP	TYPICAL
UG	UNDERGROUND
UL	UNDERWRITERS LABORATORIES, INC.
UPS	UNINTERRUPTIBLE POWER SUPPLY
UNO	UNLESS NOTED OTHERWISE
V	VOLTAGE OR VOLT(S)
VA	VOLT-AMPERE(S)
VFD	VARIABLE FREQUENCY DRIVE
W	WATT(S)
WP	WEATHERPROOF
W/	WITH
W/O	WITHOUT
XFMR	TRANSFORMER
XP	EXPLOSION-PROOF
△	DELTA
#	NUMBER

FIRE ALARM REQUIREMENTS

TBPE POLICY ADVISORY: PER THE POLICY ADVISORY OPINION 04-04-FA PLANNING OF FIRE ALARM SYSTEMS ISSUED BY THE TEXAS BOARD OF PROFESSIONAL ENGINEERS AND LAND SURVEYORS (TBPELS), THE FOLLOWING STATEMENT IS MADE: THE LICENSED ENGINEER OF RECORD FOR THIS PROJECT WILL NOT PREPARE FIR ALARM SYSTEM DRAWINGS NOR SHOW FIRE ALARM SYSTEM DEVICES ON THE ELECTRICAL DRAWINGS. PROVIDE A COMPLETE AND AUTOMATIC BUILDING FIRE ALARM SYSTEM. THE FIRE ALARM PLANNER SHALL BE LICENSED BY THE STATE FIRE MARSHALL'S OFFICE. THE PLANNING OF THE FIRE ALARM SYSTEM SHALL MEET ALL CRITERIA STATED IN THE TBPE POLICY ADVISORY OPINION. SUGGESTED LOCATION OF FIRE ALARM AND ALARM ANNUNCIATOR PANEL ARE SHOWN ON THESE PLANS BASED ON OWNER PREFERENCE. CONTRACTOR SHALL CONFIRM EXACT LOCATION AND QUANTITIES WITH THE FIRE MARSHALL. REFER TO SPECIFICATION 283111 FOR REQUIREMENTS.

GENERAL NOTES

(ALL CONVENTIONS MAY NOT APPEAR ON DRAWINGS.)

A. THE ELECTRICAL CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS FROM AUTHORITY HAVING JURISDICTION AND PAY ALL ASSOCIATED FEES.
B. LOCATE JUNCTION AND PULL BOXES AS REQUIRED TO ALLOW ACCESS AFTER EQUIPMENT AND APPURTENANCES ARE INSTALLED. COORDINATE LOCATIONS AND ELEVATIONS OF ELECTRICAL DEVICES WITH DRAWINGS AND OTHER TRADES PRIOR TO INSTALLATION.
C. PROTECT PERMANENT BUILDING FIXTURES FROM DAMAGE DURING CONSTRUCTION PERIOD. PROVIDE PLYWOOD OR SIMILAR MATERIAL UNDER EQUIPMENT OR MATERIALS STORED ON FLOORS AND IN AREAS WHERE CONSTRUCTION MAY DAMAGE FINISHES. SURFACES OR FINISHES DAMAGED DURING CONSTRUCTION SHALL BE REPLACED AT THE COST OF THE CONTRACTOR.
D. PROPERLY SUPPORT LOW VOLTAGE WIRING CABLING NOT IN CONDUIT PER CODE. IN AREAS SUCH AS CORRIDORS DESIGNATED FOR NEW CEILINGS AND FINISHES, SUPPORT EXISTING ELECTRICAL DEVICES AND EQUIPMENT IN AND ABOVE THE CEILING, INCLUDING CONDUIT AND CABLING. PROVIDE PROPER PERMANENT SUPPORT AS NEEDED TO COMPLY WITH CODE AND TAKE WEIGHT OFF CEILING SUPPORTS. REMOVE AND REINSTALL ELECTRICAL DEVICES AND EQUIPMENT AS NEEDED FOR PAINTING, WALL COVERINGS, CEILINGS, AND FINISH WORK. REFER TO ARCHITECTURAL DRAWINGS.
E. BRANCH CIRCUITS OVER 75 FEET (25 METERS) IN LENGTH (TOTAL ONE WAY) FROM THE PANEL, THE ELECTRICAL CONTRACTOR SHALL CALCULATE THE VOLTAGE DROP AND PROVIDE AN APPROPRIATE CONDUCTOR SIZE TO ACHIEVE NO MORE THAN 3% MAXIMUM ALLOWABLE VOLTAGE DROP.
F. DO NOT SCALE THE DRAWINGS. BECAUSE OF THE SCALE OF THE DRAWINGS, IT IS NOT POSSIBLE TO INDICATE ALL OFFSETS, FITTINGS OR OTHER SIMILAR ITEMS WHICH MAY BE REQUIRED TO MAKE A COMPLETE OPERATING SYSTEM. CAREFULLY INVESTIGATE CONDITION AFFECTING WORK AND INSTALL WORK IN SUCH A MANNER THAT INTERFERENCES BETWEEN PIPES, CONDUIT, DUCT, EQUIPMENT, ARCHITECTURAL AND STRUCTURAL FEATURES SHALL BE AVOIDED.
G. ALL DEVICES, EQUIPMENT, FIXTURES AND THE LIKE MUST BE GROUNDED BY USE OF A PROPERLY SIZED GROUNDING CONDUCTOR. MECHANICAL AND ELECTRICAL BONDS OF METALLIC RACEWAY SYSTEMS SHALL BE MAINTAINED.
H. PROVIDE CIRCUIT, CONDUIT, WIRE, DISCONNECT SWITCH, OVERCURRENT AND SHORT CIRCUIT PROTECTION FOR ALL EQUIPMENT, WHETHER SHOWN ON THE DRAWINGS OR NOT, INCLUDING, MOTORIZED DAMPERS, SMOKE DAMPERS, ELECTRIC HEAT TRACE, POWER FOR ENERGY MANAGEMENT SYSTEM, WATER SOFTENING EQUIPMENT, WATER TREATMENT SYSTEMS, AIR DRYERS, ELECTRIC FLUSH VALVES, ELECTRIC TRAP PRIMERS, ELECTRIC SOLENOIDS, SHOWER VALVES, AND OTHER MISCELLANEOUS EQUIPMENT. WITH NO ADDITIONAL COST TO THE OWNER.
I. REFER TO MECHANICAL PLANS FOR EXACT LOCATION OF MECHANICAL EQUIPMENT AND LOCATE DISCONNECT SWITCHES IN ACCORDANCE WITH THE N.E.C.
J. REFER TO MECHANICAL SPECIFICATIONS, HVAC PLANS AND PLUMBING PLANS FOR ADDITIONAL ELECTRICAL WORK AND REQUIREMENTS.
K. REFER TO CONTROL SCHEMATICS ON THE MECHANICAL DRAWINGS FOR ADDITIONAL CONTROL WIRING AND CONTROL CONNECTIONS.
L. UNLESS OTHERWISE NOTED, ALL DEVICE ELEVATIONS REFER TO THE CENTERLINE OF BACK BOX. THE CONTRACTOR SHALL COORDINATE ALL BOX LOCATIONS WITH OTHER TRADES.
M. PROVIDE 'SEAL-OFFS' WHEN CONDUIT PASSES THROUGH AREAS OF DIFFERENT AMBIENT TEMPERATURES AND/OR HAZARDOUS AREAS.
N. IF MORE THAN THREE CURRENT-CARRYING CONDUCTORS ARE ROUTED IN THE SAME CONDUIT, DERATING SHALL BE TAKEN INTO ACCOUNT. INCREASING THE CONDUCTOR AMPACITY (BY INCREASING WIRE SIZE) TO COMPENSATE AS FOLLOWS:

NO. OF CONDUCTORS	AMPACITY INCREASE
4 THRU 6	125%
7 THRU 9	145%
10 THRU 20 (MAX)	200%

THE CONDUIT SIZE (CAPACITY) SHALL ALSO BE INCREASED TO CONFORM TO N.E.C., CHAPTER 9.

O. PROVIDE PHASE-LOSS RELAYS ON ALL NEW THREE PHASE MECHANICAL EQUIPMENT 1 HP AND LARGER TO PREVENT SINGLE PHASING. COORDINATE WITH MECHANICAL EQUIPMENT CONTRACTOR.
P. ALL BREAKERS USED TO FEED MECHANICAL EQUIPMENT SHALL BE 'HACR' TYPE.
Q. ALL EQUIPMENT TO BE CONSIDERED 'AS-EQUAL' MUST BE SUBMITTED TO THE ENGINEER FOR APPROVAL NO LATE THAN ONE (1) WEEK PRIOR TO BID DATE.
R. IT IS THE CONTRACTORS RESPONSIBILITY TO COORDINATE WITH ALL TRADES FOR SUBSTITUTED EQUIPMENT FROM THIS DESIGN. UNCOORDINATED CHANGES THAT OCCUR FROM A SUBSTITUTION WILL BE THE CONTRACTORS RESPONSIBILITY TO ABSORB THE COST AND NOT PASS ONTO THE OWNER.
S. PROVIDE PROTECTION IN FIRE RATED WALL MEMBRANE PENETRATIONS. PROTECTION SHALL WRAP THE OUTSIDE OF THE BOX OR ENCLOSURE TO MAINTAIN WALL FIRE RATING. DO NOT USE PENETRATION PROTECTION ON THE INTERIOR OF BOX/ENCLOSURE OR COVER PLATE TYPE PROTECTION. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.
T. ALL LOW VOLTAGE CABLING (FIRE ALARM, DATA, TEMPERATURE CONTROLS, ETC.) LOCATED IN EXPOSED STRUCTURAL AREAS SHALL BE INSTALLED IN CONDUIT AND ROUTED TIGHT TO DECK. INSTALLATIONS NOT IN COMPLIANCE WITH THIS REQUIREMENT SHALL BE REMOVED AND REINSTALLED AT THE CONTRACTORS EXPENSE.
U. CONTRACTOR SHALL COMPLY WITH APPLICABLE ENERGY CODE.
U.A. ALL MECHANICAL EQUIPMENT AND MOTOR CONTROLLERS SHALL BE PROVIDED WITH AN APPROPRIATE SHORT CIRCUIT CURRENT RATING (SCCR) FACTORY INSTALLED LABEL. THE LABEL SHALL INDICATE THE AVAILABLE SHORT CIRCUIT CURRENT AT THAT PIECE OF EQUIPMENT AS REQUIRED BY N.E.C. 440.10 AND N.E.C. 430.8.
U.B. PER DIVISION 26 SPECIFICATIONS, THE CONTRACTOR SHALL PERFORM A SHORT CIRCUIT STUDY AND PROVIDE A SUMMARY OF THE CALCULATIONS TO THE MECHANICAL CONTRACTOR. THIS INFORMATION SHALL BE INCLUDED WITH THE MECHANICAL EQUIPMENT SUBMITTALS. SUBMITTALS WILL NOT BE ACCEPTED WITHOUT SCCR INFORMATION AND EQUIPMENT ORDERED PRIOR TO REVIEW OF THE SCCR DATA IS DONE SO AT THE CONTRACTORS RISK. CONTRACTOR SHALL COORDINATE BETWEEN TRADES AS REQUIRED.

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09.10.21

Revisions:

LEGEND AND GENERAL NOTS - ELECTRICAL

Sheet No.

E0.0

CONDENSING UNIT SCHEDULE - BUILDING 900

ITEM	ELECTRICAL			CIRCUIT	C/B	WIRE & CONDUIT	DISCONNECT SWITCH	NOTES
	V/PH	MCA	MOCP					
CU-11	208 / 3	21.4	35	P2-13/15/17	**35/3**	EXIST #10 TO REMAIN	60A/35F/3/NEMA 3R	**2**
CU-17	208 / 3	17.8	30	P5-25/27/29	**30/3**	EXIST #10 TO REMAIN	30A/30F/3/NEMA 3R	**2**
CU-18	**208 / 1**	18.1	30	LB3-35/37	60/2	EXIST #8 TO REMAIN	30A/30F/2/NEMA 3R	**1**
CU-19	208 / 3	21.4	35	LB6-11/13/15	**35/3**	EXIST #8 TO REMAIN	60A/35F/3/NEMA 3R	**1, 2**
CU-21	208 / 3	17.8	30	P5-31/33/35	**30/3**	EXIST #10 TO REMAIN	60A/30F/3/NEMA 3R	**2**
CU-23	208 / 3	21.4	35	LB6-8/10/12	50/3	EXIST #8 TO REMAIN	60A/35F/3/NEMA 3R	**1**
CU-24	208 / 3	17.8	30	P5-19/21/23	**30/3**	EXIST #10 TO REMAIN	30A/30F/3/NEMA 3R	**2**
CU-30	208 / 3	17.8	30	B-2/4/6	60/3	EXIST #10 TO REMAIN	30A/30F/3/NEMA 3R	**1**
CU-31	208 / 3	21.4	35	LB6-1/3/5	50/3	EXIST #8 TO REMAIN	60A/35F/3/NEMA 3R	**1**
CU-32	208 / 3	21.4	35	P7-1/3/5	**35/3**	EXIST #10 TO REMAIN	60A/35F/3/NEMA 3R	**2**
CU-34	208 / 3	17.8	30	B-8/10/12	50/3	EXIST #12 TO REMAIN	30A/30F/3/NEMA 3R	**1**
CU-37	208 / 3	21.4	35	LB7-1/3/5	50/3	EXIST #8 TO REMAIN	60A/35F/3/NEMA 3R	**1**
CU-48	208 / 3	11.2	20	H1-8/10/12	**20/3**	EXIST #8 TO REMAIN	30A/20F/3/NEMA 3R	**2**
CU-49	**208 / 1**	16.8	25	E1-14/16	**25/2**	EXIST #10 TO REMAIN	30A/25F/2/NEMA 3R	**1, 2**
CU-50	**208 / 1**	16.8	25	E1-18/20	**25/2**	EXIST #10 TO REMAIN	30A/25F/2/NEMA 3R	**2**

NOTES:

1. THE INDICATED CONDENSING UNITS ARE INTERLOCKED WITH THE FAN COIL UNITS SO THAT THE ELECTRIC HEATING AND THE CONDENSING UNIT CANNOT RUN SIMULTANEOUSLY. THE FAN COIL UNIT AND THE CONDENSING UNIT ARE SERVED BY THE SAME BRANCH CIRCUIT, SIZED FOR THE MAXIMUM LOAD.
2. REPLACE THE EXISTING BREAKER WITH THE BREAKER SCHEDULED .
3. REPLACE THE EXISTING WIRE WITH NEW WIRE AS SCHEDULED.

FAN COIL UNIT SCHEDULE - BUILDING 900

ITEM	ELECTRICAL			CIRCUIT	C/B	WIRE & CONDUIT	DISCONNECT SWITCH	NOTES
	V/PH	MCA	MOCP					
FC-11	208 / 3	47.7	50	P2-1/3/5	50/3	**3#6, 1#10G. 1"C**	60A/50F/3/NEMA 1	**3**
FC-17	208 / 3	55.5	60	P5-24/26/28	60/3	**3#6, 1#10G. 1"C**	60A/60F/3/NEMA 1	**3**
FC-18	**208 / 1**	53.8	60	LB3-35/37	60/2	**3#6, 1#10G. 1"C**	60A/60F/3/NEMA 1	**1, 3**
FC-19	208 / 3	47.7	50	LB6-11/13/15	50/3	**3#6, 1#10G. 1"C**	60A/50F/3/NEMA 1	**1, 3**
FC-21	208 / 3	55.5	60	P5-20/22/24	60/3	**3#6, 1#10G. 1"C**	60A/60F/3/NEMA 1	**3**
FC-23	208 / 3	47.7	50	LB6-8/10/12	50/3	**3#6, 1#10G. 1"C**	60A/50F/3/NEMA 1	**1, 3**
FC-24	208 / 3	55.5	50	P5-38/40/42	**60/3**	**3#6, 1#10G. 1"C**	60A/50F/3/NEMA 1	**2, 3**
FC-30	208 / 3	55.5	60	B-2/4/6	60/3	**3#6, 1#10G. 1"C**	60A/60F/3/NEMA 1	**1,3**
FC-31	208 / 3	47.7	50	LB6-1/3/5	50/3	**3#6, 1#10G. 1"C**	60A/50F/3/NEMA 1	**1,3**
FC-32	208 / 3	47.7	50	P7-10/12/14	50/3	**3#6, 1#10G. 1"C**	60A/50F/3/NEMA 1	**3**
FC-34	208 / 3	47.7	50	B-8/10/12	50/3	**3#6, 1#10G. 1"C**	60A/50F/3/NEMA 1	**1,3**
FC-37	208 / 3	47.7	50	LB7-1/3/5	50/3	**3#6, 1#10G. 1"C**	60A/50F/3/NEMA 1	**1,3**
FC-48	208 / 3	47.7	50	H1-7/9/11	50/3	**3#6, 1#10G. 1"C**	60A/50F/3/NEMA 1	**3**
FC-49	**208 / 1**	21.5	25	E1-14/16	**25/2**	3#10, 1#10G. 3/4"C.	30A/25F/2/NEMA 1	**1, 2**
FC-50	**208 / 1**	21.5	25	E1-13/15	**25/2**	3#10, 1#10G. 3/4"C.	30A/25F/2/NEMA 1	**2**

NOTES:

1. THE INDICATED FAN COIL UNITS ARE INTERLOCKED WITH THE CONDENSING UNITS SO THAT THE ELECTRIC HEATING AND THE CONDENSING UNIT CANNOT RUN SIMULTANEOUSLY. THE FAN COIL UNIT AND THE CONDENSING UNIT ARE SERVED BY THE SAME BRANCH CIRCUIT, SIZED FOR THE MAXIMUM LOAD.
2. REPLACE THE EXISTING BREAKER WITH THE BREAKER SCHEDULED .
3. REPLACE THE EXISTING WIRE WITH NEW WIRE AS SCHEDULED.

01 POWER TO MECHANICAL SCHEDULES

SCALE: NTS

ELECTRICAL SCOPE OF WORK

SELECTED ITEMS OF HVAC EQUIPMENT ARE SCHEDULED TO BE REPLACED WITH NEW EQUIPMENT OF A SIMILAR TYPE. THE INTENT IS TO CONNECT THE NEW EQUIPMENT TO THE EXISTING BRANCH CIRCUIT. THE ELECTRICAL SCHEDULES SHOW THE REQUIRED BREAKER AND WIRE SIZE. WHERE EXISTING BREAKERS ARE THE CORRECT SIZE, THEY MAY BE RE-USED. OTHERWISE, THE BREAKER SHALL BE REPLACED WITH A BREAKER OF THE CORRECT SIZE. WHERE EXISTING WIRES ARE THE CORRECT SIZE OR ARE LARGER, THEY MAY BE RE-USED. OTHERWISE THE WIRE SHALL BE REPLACED WITH THE CORRECT SIZE. THE SCHEDULES ALSO SHOW THE PANEL NAME AND CIRCUIT NUMBER OF THE EXISTING BRANCH CIRCUIT. VERIFY THE ACCURACY OF THE CIRCUIT DESIGNATIONS WITH FIELD OBSERVATIONS, BEFORE COMMENCING WORK. PREPARE NEW EQUIPMENT NAMEPLATES AS SPECIFIED. UPDATE THE PANELBOARD DIRECTORIES TO REFLECT ANY CHANGES MADE.

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Revisions:

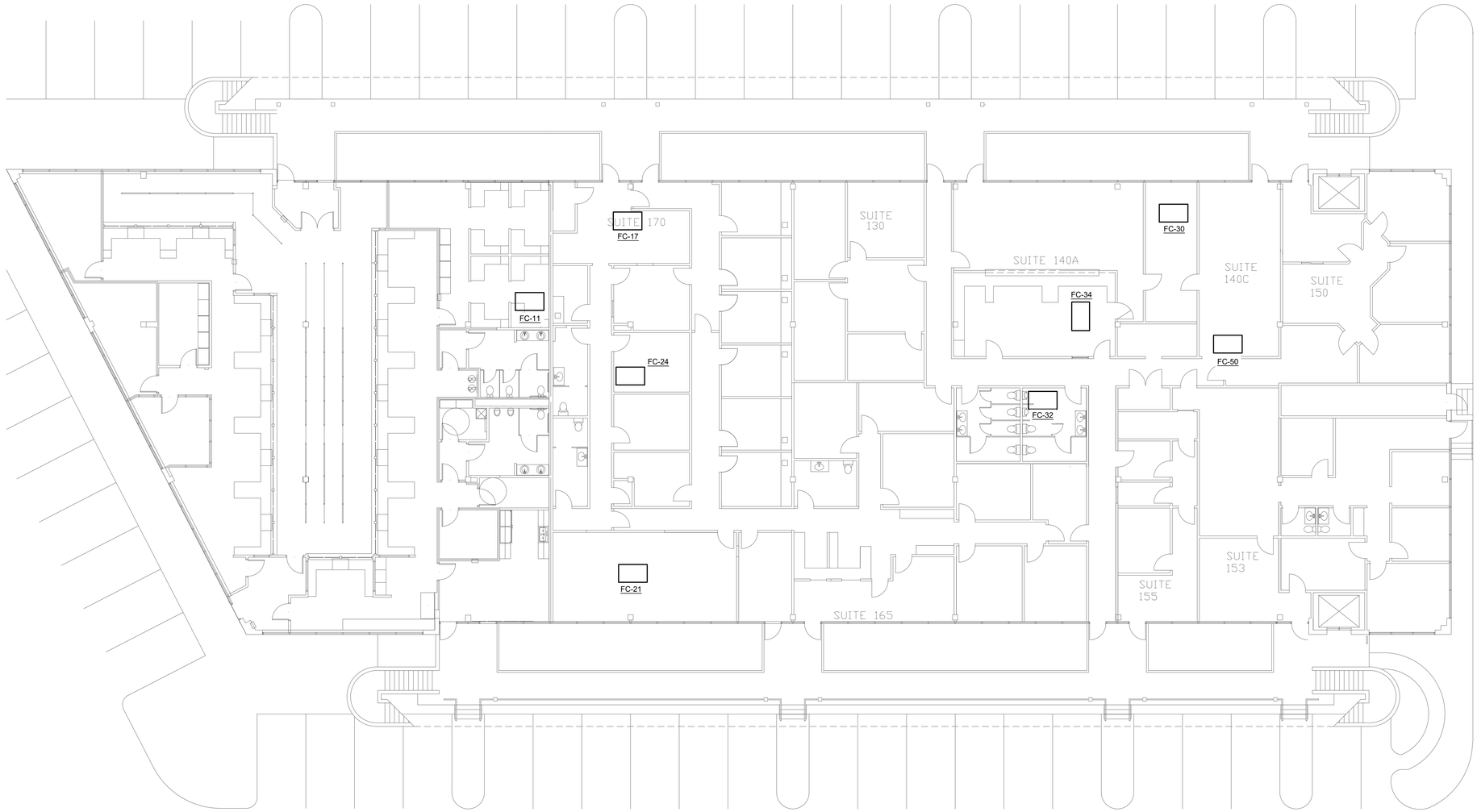
ELECTRICAL
- SCHEDULES

Sheet No.

E0.1

GENERAL NOTES

1. ALL EXISTING SYSTEM INFORMATION AND/OR LOCATIONS ARE PROVIDED BY THE OWNER OR BY A 3RD PARTY. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY ALL MEP EQUIPMENT & SERVICES ARE LOCATED AS DESIGNED BEFORE BIDDING THE PROJECT. WHERE EXISTING DOES NOT MATCH DESIGNED, IT IS THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY OWNER, ARCHITECT & ENGINEER BEFORE PROCEEDING. IF A DISCREPANCIES ARE NOT IDENTIFIED AT BIDDING, THE COST SHALL BE ABSORBED BY THE CONTRACTOR AND NOT PASSED ONTO THE OWNER OR ENGINEER OF RECORD.
2. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS AND COORDINATE WITH ALL OTHER TRADES. IN CASE OF DISCREPANCIES OR ANY POTENTIAL CONFLICTS, INFORM THE ARCHITECT AND ENGINEER IN WRITING PRIOR TO START OF WORK.
3. CONTRACTOR SHALL FIELD VERIFY AND COORDINATE WITH MECHANICAL DRAWINGS FOR EXACT LOCATION OF EQUIPMENT AND REQUIREMENTS PRIOR TO START OF WORK.



01 FIRST FLOOR PLAN - POWER TO MECH
SCALE: 3/32"=1'-0"

GRAPHIC SCALE:
3/32"=1'-0"
0 5' 10' 20'

NORTH

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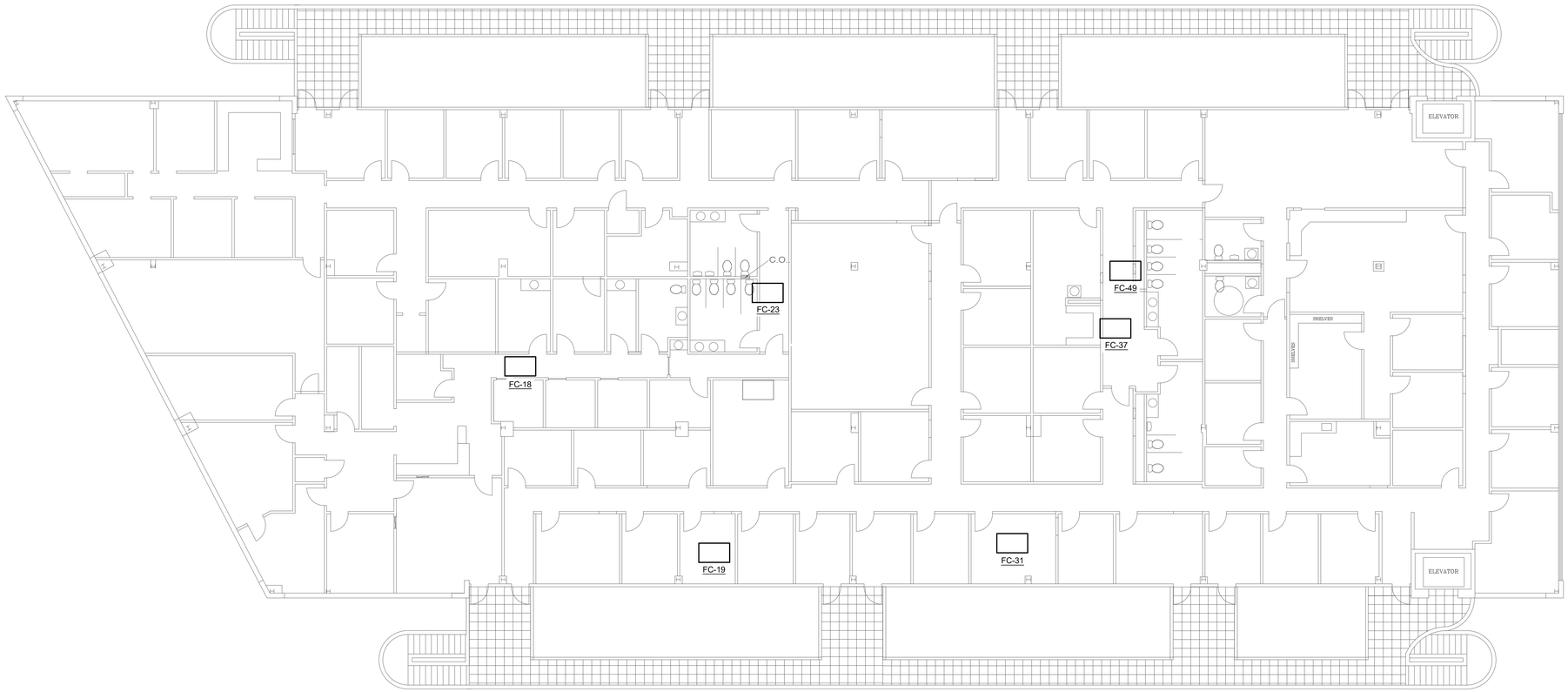
Revisions:

FIRST FLOOR - POWER TO MECHANICAL

Sheet No.
E4.1

GENERAL NOTES

1. ALL EXISTING SYSTEM INFORMATION AND/OR LOCATIONS ARE PROVIDED BY THE OWNER OR BY A 3RD PARTY. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY ALL MEP EQUIPMENT & SERVICES ARE LOCATED AS DESIGNED BEFORE BIDDING THE PROJECT. WHERE EXISTING DOES NOT MATCH DESIGNED, IT IS THE CONTRACTORS' RESPONSIBILITY TO NOTIFY OWNER, ARCHITECT & ENGINEER BEFORE PROCEEDING. IF A DISCREPANCIES ARE NOT IDENTIFIED AT BIDDING, THE COST SHALL BE ABSORBED BY THE CONTRACTOR AND NOT PASSED ONTO THE OWNER OR ENGINEER OF RECORD.
2. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS AND COORDINATE WITH ALL OTHER TRADES. IN CASE OF DISCREPACIES OR ANY POTENTIAL CONFLICTS, INFORM THE ARCHITECT AND ENGINEER IN WRITING PRIOR TO START OF WORK.
3. CONTRACTOR SHALL FIELD VERIFY AND COORDINATE WITH MECHANICAL DRAWINGS FOR EXACT LOCATION OF EQUIPMENT AND REQUIREMENTS PRIOR TO START OF WORK.



01 SECOND FLOOR PLAN - POWER TO MECH
SCALE: 3/32"=1'-0"

GRAPHIC SCALE:
3/32"=1'-0"
0 5' 10' 20'

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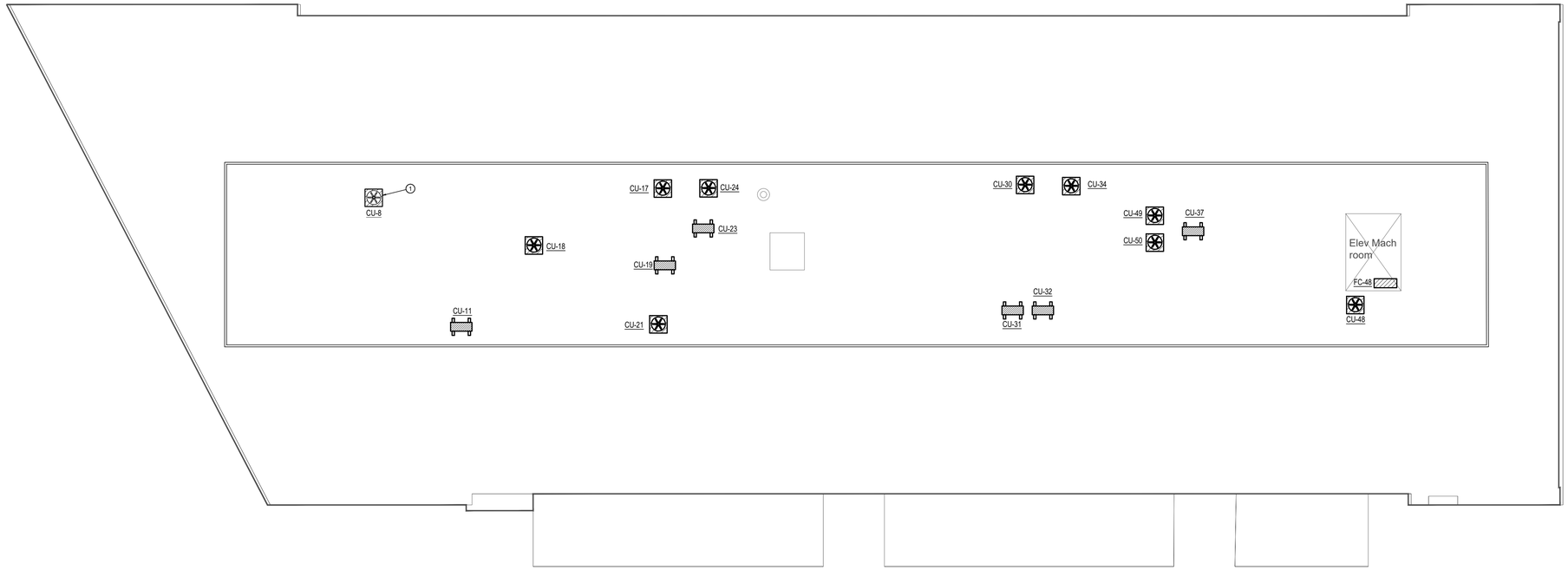
Revisions:

SECOND FLOOR - POWER TO MECHANICAL

Sheet No.
E4.2



GENERAL NOTES

1. REFER TO THE "POWER TO MECHANICAL EQUIPMENT" SCHEDULE ON DRAWING E0.1 FOR BRANCH CIRCUIT REQUIREMENTS OF MECHANICAL EQUIPMENT. VERIFY VOLTAGE, PHASE, MCA AND MOCP OF EQUIPMENT SUBMITTALS WITH THIS SCHEDULE.
2. PROVIDE DISCONNECT SWITCHES FOR ALL NEW EQUIPMENT AS SCHEDULED.
3. WHERE EQUIPMENT IS SCHEDULED BUT NOT SHOWN ON THESE DRAWINGS, REFER TO THE MECHANICAL DRAWINGS FOR LOCATION.
4. COORDINATE WITH MECHANICAL, TRADE AND IDENTIFY ALL MISCELLANEOUS MECHANICAL EQUIPMENT REQUIRING POWER. PROVIDE CONDUIT, WIRE, DISCONNECT SWITCH, OVERCURRENT AND SHORT CIRCUIT PROTECTION FOR ALL EQUIPMENT, WHETHER SHOWN OR NOT, INCLUDING MOTORIZED DAMPERS, ELECTRIC HEAT TRACE, POWER FOR ENERGY MANAGEMENT SYSTEM,WATER SOFTENING EQUIPMENT, WATER TREATMENT SYSTEMS, AND ANY OTHER MISCELLANEOUS EQUIPMENT.

LEGEND

DESIGNATES EQUIPMENT TO REMAIN - NOT IN CONTRACT.

DESIGNATES EQUIPMENT WHICH SHALL BE REPLACED UNDER THIS CONTRACT.

NOTES BY SYMBOL "1"

1. DISCONNECT POWER PRIOR TO DEMOLITION. REMOVE CONDUIT AND WIRE BACK TO PANEL. LABEL BREAKER AS SPARE.

01 ROOF PLAN - POWER TO MECH

SCALE: 3/32"=1'-0"

GRAPHIC SCALE:
3/32"=1'-0"
0 5' 10' 20'

NORTH

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09.10.21

Revisions:

ROOF PLAN - POWER TO MECHANICAL

Sheet No.

E4.3