

**REQUEST FOR PROPOSAL
MIDWESTERN STATE UNIVERSITY
PURCHASING & CONTRACT MANAGEMENT DEPARTMENT
3410 Taft Blvd., Daniel Bldg., Rm. 202
Wichita Falls, TX. 76308**

BID NUMBER

BID TITLE

735-18-8187

Dust Collector Installation FFA

**BIDS WILL BE RECEIVED BY SEALED BID OR EMAIL UNTIL:
2:00 P.M.,
November 17, 2017 to:
the office's of the Director of Purchasing & Contract Management,
3410 Taft Blvd., Daniel Bldg., Rm. 202
Wichita Falls, TX. 76308**

GENERAL TERMS AND CONDITIONS

These General Terms and Conditions apply to all offers made to Midwestern State University (herein after referred to as "University") by all prospective vendors (herein after referred to as "Bidders") on behalf of Solicitations including, but not limited to, Invitations to Bid and Request for Quotes.

INSTRUCTIONS FOR SUBMITTING BIDS

Review this document in its entirety. Be sure your bid is complete, and double check your bid for accuracy.

Questions requiring only clarification of instructions or specifications will be handled through the email process. If any questions results in a change or addition to this Bid, the change(s) and addition(s) will be addressed to all vendors involved as quickly as possible in the form of an addendum. It is the responsibility of the bidder to view the posting on the MSU purchasing web page located at <http://mwsu.edu/purchasing/>.

Sign the **Vendor's Affidavit Notice** and return with your bid.

BIDDERS SHALL SUBMIT BID ON THE FORM PROVIDED, SIGN THE VENDOR AFFIDAVIT, AND RETURN ENTIRE BID PACKET. In the event of inclement weather and the University Offices are officially closed on a bid opening day, bids will be received until 2:00 p.m. of the next business day. At which time said bids will be privately opened.

BIDS SUBMITTED AFTER THE SUBMISSION DEADLINE SHALL BE RETURNED UNOPENED AND WILL BE CONSIDERED VOID AND UNACCEPTABLE.

SUCCESSFUL VENDOR WILL BE NOTIFIED BY EMAIL OR MAIL. All responding vendors will receive written notification regarding the outcome of the award. Bid tabulations will be posted to the MSU Purchasing we page.

PLEASE NOTE CAREFULLY

THIS IS THE ONLY APPROVED INSTRUCTION FOR THIS BID. ITEMS BELOW APPLY TO AND BECOME PART OF TERMS AND CONDITIONS OF BID. ANY EXCEPTIONS THERETO MUST BE IN WRITING.

1. Each bid shall be emailed or placed in a separate envelope completely and properly identified with the name and number of bid. Bids must be in the Purchasing Office **BEFORE** the hour and date specified.
2. **QUOTE F.O.B. DESTINATION.** If otherwise, show exact cost to deliver. Bid unit price on quantity specified – extend and show total. In case of errors in extension, UNIT prices shall govern. Bids subject to unlimited price increase will not be considered.
3. Bids **MUST** give full firm name and address of the bidder. Failure to manually sign bid will disqualify it. Person signing bid should show TITLE or AUTHORITY TO BIND HIS FIRM IN A CONTRACT.
4. Bids **CANNOT** be altered or amended after opening time. Any alterations made before opening time must be initialed by bidder or his authorized agent. No bid can be withdrawn after opening without the approval by the Vice-President of Administration & Finance based on a written acceptable reason.
5. The University is exempt from State Sales Tax and Federal Excise Tax. **DO NOT INCLUDE TAX IN BID.**
6. Any catalog, brand name or manufacturer's reference used in a bid invitation is descriptive-**NOT** restrictive-it is to indicate type and quality desired unless otherwise indicated. Bids on brand of like nature and quality will be considered. If bid is based on other than referenced specifications, proposal must show manufacturer, brand or trade name, lot number, etc., of article offered. If other than brand(s) specified is offered, illustrations and complete description should be made part of the bid. If bidder takes no exception to specifications or reference data, he will be required to furnish brand names, numbers, etc., as specified.
7. Samples, when requested, must be furnished free of expense to the University. If not destroyed in examination, they will be returned to the bidder on request, at his

expense. Each sample should be marked with bidder's name, address, and University bid number. **DO NOT ENCLOSE OR ATTACH SAMPLE TO BID.**

8. **Delivery:** Bid must show number of days required to make delivery to place material in receiving agency's designated location under normal conditions. Failure to state delivery time obligates bidder to complete delivery in 14 calendar days. A five-day difference in delivery promise may break a tie. Unrealistically short or long delivery promises may cause bid to be disregarded. Consistent failure to meet delivery promises without valid reason may cause removal from bidder list. Delivery shall be made during normal working hours only, 8:00 a.m. to 5:00 p.m., unless prior approval for late delivery has been obtained from the Director of Purchasing.
9. If delay is foreseen, contractor shall give written notice to Director of Purchasing. The University has the right to extend delivery date if reasons appear valid. Contractor must keep University advised at all times of status of order. Default in promised delivery (without accepted reasons) or failure to meet specifications, authorizes the University to purchase supplies elsewhere and charge full increase in cost and handling to defaulting contractor.
10. All items proposed shall be new, in first class condition suitable for shipment and storage (Midwestern State University prefers recycled packaging whenever possible), unless otherwise indicated in bid. Verbal agreements to the University will not be recognized. All materials and services shall be subject to Purchaser's approval. Unsatisfactory materials will be returned at Seller's expense.
11. Written and verbal inquiries pertaining to bids must give Bid Number and Commodity.
12. No substitutions or cancellations permitted without written approval of Director of Purchasing.
13. The University reserves the right to accept or reject all or any part of any bid, waive minor technicalities and award to the Bidder that bids to the Best Value to the University. The University reserves the right to award by item or by total bid. Prices should be itemized.
14. Consistent and continued tie bidding could cause rejection of bids by the University and/or investigation for Anti-Trust violations.
15. The contractor agrees to protect the University from claims involving infringement of patents or copyrights.
16. This is a Quotation inquiry only and implies no obligation on the part of the University. All cost quotations must include all the various features needed to satisfy the requirements. Note: No amounts will be paid for the items in this BID in excess of the amounts quoted.

17. **Award:** A written purchase order or notice of award mailed or otherwise furnished to the successful bidder within the time of acceptance specified in this package results in a binding contract without further action by either party.
18. **Variation in Quantity:** The University assumes no liability for commodities produced, processed or shipped in excess of the amount specified herein.
19. **Invoicing:** Bidder shall submit two (2) copies of an itemized invoice showing bid number and purchase order number to:

**Midwestern State University
Accounts Payable
3410 Taft Blvd.
Wichita Falls, TX. 76308**

20. **Payments:** The University, after receipt of completed order will make payment to the contractor within 30 days from the receipt of goods or invoice whichever is later. All partial shipment must be pre-approved by the Director of Purchasing. In the event of partial shipments the University is not required to make payments until the order is complete. Acceptance of and final payment for the item will be contingent upon satisfactory performance of the product received by the University.
21. **Discrimination:** In order to comply with the provisions of fair employment practices, the contractor agrees as follows; 1.) the contractor will not discriminate against any employee or applicant for employment because of race, sex, religion, handicap, or national origin; 2.) in all solicitations or advertisements for employees, the contractor will state that all qualified applicants will receive consideration without regard to race, color, sex, age, religion, handicap or national origin; 3.) the contractor will furnish such relevant information and reports as requested by the University for the purpose of determining compliance with these regulations; and 4.) failure of the contractor to comply with these laws will be deemed a breach of contract and it may be cancelled, terminated or suspended in whole or in part.
22. **Assignment:** Any contract entered into pursuant to this request is not assignable, nor the duties thereunder, by either party without the written consent of the other party in the contract.
23. **Other Remedies:** In addition to the remedies stated herein, the University has the right to pursue other remedies permitted by law or in equity.
24. **E-Verify:** Contractor is responsible to verify all employees are approved by The Homeland Security E-Verify program.

REQUEST FOR PROPOSAL

DUST COLLECTOR INSTALLATION FFA MIDWESTERN STATE UNIVERSITY

It is the intent of these specifications to describe the minimum requirements for **the above titled project** at Midwestern State University in sufficient detail to secure comparable bids.

Each bidder must confirm he fully understands these specifications and the University's needs and satisfies himself that he is cognizant of all factors relating to requirements contained in these specifications.

The bid analysis will include compliance to bid specifications, past performance with vendor, references, delivery time, which will have a weighted average of 30 percent and the overall cost to the university, which will have a weighted average of 70 percent. Midwestern State University reserves the right to consider deviations from these specifications.

Award of this bid will be contingent on availability of Midwestern State University funds.

References shall be included on this bid form. Three current customers with a comparable purchase shall be listed with complete name, address, telephone number and contact person.

Bids must be submitted on this form and the bidder shall return the entire bid/specification package which will constitute a contract equally binding between the bidder and Midwestern State University if bids accepted by the University. Each bid shall be placed in a sealed envelope or emailed, signed by a person having the authority to bind his/her firm in a contract.

This contract shall remain in effect until completion and acceptance by the University. Midwestern State University reserves the right to enforce the performance of this contract in any manner prescribed by law or deemed to be in the best interest of the University in the event of breach or default if this contract. Midwestern State University reserves the right to terminate the contract immediately in the event the successful bidder fails to make delivery in accordance with the specifications.

Questions concerning these specifications should be directed via email no later than November 8, 2017 to:

Stephen Shelley, Director of Purchasing and Contract Management
3410 Taft Blvd. Daniel Bldg. Rm. 202
Wichita Falls, TX. 76308
stephen.shelley@mwsu.edu
(940) 397-4110

Midwestern State University may in its sole discretion respond in writing to questions concerning this bid request. Only MSU responses made by formal written addendum to this proposal shall be binding and shall be posted on the MSU purchasing web site located at <http://mwsu.edu/purchasing/>. Oral or other written interpretations or clarifications shall be without legal effect.

All bids meeting the intent of this invitation to bid will be considered for award. Bidders taking exception to the specifications, or offering substitutions, shall state these exceptions by attachment as part of the bid. The absence of such a list shall indicate that the bidder has not taken exception and shall hold the bidder responsible to perform in strict accordance with the specifications of the invitation. Midwestern State University reserves the right to accept any and all or none of the exception(s) / substitution(s) deemed to be in the best interest of the University.

PRE-BID MEETING: A NON MANDATORY pre-bid meeting will be held at 10:00 a.m. on November 3, 2017 in the ceramics lab in Fain Fine Arts Building, Midwestern State University, 3410 Taft Blvd., Wichita Falls, Texas.

Proposals are to be sent via email or hand delivered to:

Stephen Shelley, Director of Purchasing and Contract Management
3410 Taft Blvd. Daniel Bldg. Rm. 202
Wichita Falls, TX. 76308
stephen.shelley@mwsu.edu
(940) 397-4110

SPECIFICATIONS
RFP #735-18-8187
DUST COLLECTOR INSTALLATION FFA

Please see specifications and drawing at the below Link under current bid opportunities listed under the RFP number:

<http://mwsu.edu/purchasing/>

Please supply a HUB Subcontracting Plan with your bid, which can be found at the below listed link:

<http://www.window.state.tx.us/procurement/prog/hub/hub-subcontracting-plan/>

Supply an insurance certificate with your Bid.

Supply a W-9 With your Bid if new to Midwestern State University.

2010 Uniform General Conditions apply to this Bid and can be found at the below listed link:

<http://mwsu.edu/purchasing/contract-management>

Schedule: Please supply a schedule with bid,

A Bid Bond will be required to accompany your Bid.

If awarded the Bid a Payment Bond will be required if your Bid is over \$25,000.00.

If awarded the Bid a Performance Bond will be required is your Bid is over \$100,000.

BID SHEET
RFP #735-18-8187
DUST COLLECTOR INSTALLATION FFA

Base Bid: _____

Total: _____

Company: _____

Address: _____

City & State: _____

Printed Name: _____

Signature: _____

Telephone: _____

Email: _____

MIDWESTERN STATE UNIVERSITY

FAIN FINE ARTS
CERAMICS LAB VENTILATION AND DUST CONTROL SYSTEM

Project Manual VOLUME 1 OF 1



ENGINEERING FIRM
Summit Consultants, Ind.
1300 Summit Ave.
Suite 500
Fort Worth, TX 76102
817-878-4242

September 26, 2017

**Project Name: FAIN FINE ARTS – CERAMICS LAB
VENTILATION AND DUST CONTROL SYSTEM
Project No: P17175.00**

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September 26, 2017**

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SECTION 011100 – SUMMARY OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2 REQUIREMENTS INCLUDED

- A. Summary of Work
- B. Contract Description
- C. Work by Owner

1.3 WORK SYNOPSIS

- A. Consistent with the requirements of the balance of the contract documents, this descriptive synopsis of the work is intended only to present the contract document package in an abbreviated form in order to provide prospective bidders a quick overview of the projects major requirements.
 - 1. This synopsis is not intended to, nor does it in any way limit, modify or otherwise change any of the requirements of the contract documents
- B. In general, the work of this Contract comprises general, mechanical and electrical demolition and construction work of the following:
 - 1. Removal of the existing ductwork associated with the lab/classroom exhaust system and the ductwork associated with the mixing room exhaust system. A new bag filter type ventilation system will be installed with ductwork extending to various areas in the lab/classroom and adjacent spaces.

1.4 CONTRACT DESCRIPTION

- A. Construct work under a single lump sum contract.
- B. AIA Document A101 latest version shall be utilized for Contract.

1.5 CONTRACTOR USE OF SITE

- A. Limit use of site to allow:
 - 1. Confine operations at the site to the areas permitted under the contractor submitted plan.

1.6 WORK BY OWNER

- A. The Contractor shall permit the Owner to jointly occupy the site to construct portions of the work such as above ceiling cabling, and other portions indicated in the documents “by Owner: Owner shall obey all contractor safety rules and coordinate work with the contractor.

1.7 SCHEDULING

- A. Space Availability:
 - 1. Midwestern State University will be out of session from December 18, 2017 to January 15, 2018. The project work shall, if possible, be completed within that timeframe. If there is an equipment lead time conflict that will not allow the project to be fully completed in the above timeframe then the ductwork and associated electrical components shall be installed and the dust collection unit can be installed at a time that is coordinated with the University staff.

END OF SECTION

SECTION 012600 – CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to the work of this section.

1.2 REQUIREMENTS INCLUDED

- A. Contingency Allowance
- B. Schedule of Values
- C. Application for Payment.
- D. Change Procedures

1.3 RELATED SECTIONS

- A. Section 01 11 00 – Summary of Work.
- B. Section 01 60 00 – Product Requirements.

1.4 SCHEDULE OF VALUES

- A. Submit Schedule of Values in duplicate within ten (10) working days after Notice of Award of Contract.
- B. Submit a typed schedule on AIA Form G703 – Application and Certificate for Payment Continuation Sheet.
- C. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the major specification section. Identify site mobilization, bonds, insurance, and General Conditions. Include line item for allowances.
- D. Include within each line item, a direct proportional amount of Contractor's overhead and profit.
- E. Revise schedule to list approved change orders with each Application for Payment.
- F. Along with the Schedule of Values Contractor will be requested to itemize and submit approximate value of each building and site work resulting in total contract cost.

1.5 APPLICATIONS FOR PAYMENT

- A. Submit pay application on AIA Form G702 – Application and Certificate for Payment and AIA G703 – Continuation Sheet via email to bdr@summitmep.com.

- B. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.
- C. Payment Period: Monthly, due by the 1st day of each month.
- D. Include the following with the application:
 - 1. Payment Application, signed by the design professional.
 - 2. MWBE Utilization Report (MWBE reports are in both hard copy and online).
 - 3. Project Status Report
 - 4. Supporting backup, as applicable
 - a. Partial release of liens.
 - b. Current and updated construction progress schedule.
 - c. Request for time extension for period of Pay Application if applicable.
 - d. Proof of current and updated record drawings.

1.6 GENERAL CHANGE PROCEDURES

- A. The Engineer will advise of minor changes in the work not involving an adjustment to contract sum or contract time as authorized by AIA A201, Latest Edition, Paragraph 7.4 by issuing supplemental instructions on AIA Form G710.

1.7 MIDWESTERN STATE UNIVERSITY INITIATED CHANGE PROCEDURE

- A. The Engineer may issue a Proposal Request in response to a Request For Proposal (RFP) from the Midwestern State University Project Manager which includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in contract time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor will prepare and submit an estimate within ten (10) days.

1.8 CMAR OR CONTRACTOR INITIATED CHANGE PROCEDURE

- A. The Contractor may propose changes by submitting a request for change to the Architect/Engineer, describing the proposed change and its full effect on the work. Include a statement describing the reason for the change, and the effect on the contract sum and contract time with full documentation and a statement describing the effect on work by separate or other contractors.
- B. Stipulated Sum/Change Order: Based on Proposal Request and Contractor's fixed price quotation.
- C. Construction Change Directive: Architect/Engineer may issue a directive, on AIA Form G713 Construction Change Directive signed by the Owner, instructing the Contractor to proceed with a change in the work, for subsequent inclusion in a change order. Document will describe changes in the work, and designate method of determining any change in contract sum or contract time. Promptly execute the change.

- D. Time and Material Change Order: Submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the contract. Architect will determine the change allowable in contract sum and contract time as provided in the contract documents.
- E. Maintain detailed records of work done on Time and Material basis. Provide full information required to evaluate proposed changes, and to substantiate costs for changes in the work.
- F. Change Order Forms: AIA G701 Change Order.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

SECTION 013000 – ADMINISTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to the work of this section.

1.2 REQUIREMENTS INCLUDED

- A. Summary of the Work
- B. Contract Method
- C. Signed Drawings and Specifications.
- D. Watertight - Weathertight

1.3 SUMMARY OF THE WORK

- A. Occupancy Prior To Completion:

It is the general intent of the Owner to accept the project in its entirety and not as substantially completed. The owner shall have the right to occupy the site that is substantially completed on or after the specified completion date (even though the Contractor may not have completed the entire Project). Such occupancy by the owner will not release the Contractor or his bonding agency from any warranties or guarantees and final completion of work in accordance with the Contract Documents.

- B. Contractor Use of Premises:

The Contractor shall limit the storage of materials and equipment to the areas approved by the Owner

At no time during the work under the Contract shall the Contractor place, or cause to be placed, any material or equipment, etc., at any location that would impede or impair traffic, safety or security.

The Contractor shall cooperate with the Owner and the Engineer to the fullest extent in providing pedestrian and vehicle traffic control during course of construction.

The Contractor shall send proper notices, make all necessary arrangements, and perform all services required in the care and maintenance of all private and public utilities. The Contractor shall, during the construction period and until final acceptance of the work as a whole by the Owner, assume all responsibility concerning the same for which the Owner may be liable.

- C. Disposition of Utilities:

Observe rules and regulations governing the respective utilities in executing all work under this heading.

Adequately protect active utilities from damage, and remove or relocate only as indicated or specified.

Remove, plug or cap inactive and abandoned utilities encountered during the work. If there are no specific requirements, plug or cap such utility lines at least 3 feet outside of new building walls or as required by local regulations.

D. Contractor's License Law:

Contractor shall comply with, and require all Subcontractors to comply with, State and City Contractor's license laws and be duly registered and licensed thereunder.

E. Approved Applicators:

Where specific instructions in these specifications require that a particular product and/or material(s) be installed and/or applied by an approved applicator of the manufacturer, it shall be the Contractor's responsibility to ensure that any Subcontractors used for such Work be approved applicators. Contractor shall provide written "proof" of same when requested by the Architect or Owner.

F. Safety Requirements:

These Construction Documents, and the joint and several phases of construction hereby contemplated are to be governed, at all times, by applicable provisions of the federal laws, including but not limited to, the latest amendments of the following:

Williams-Steiger Occupational Safety & Health Act of 1970, Public Law, 91-596.

Part 1910 - Occupational Safety and Health Standards, Chapter XVII of Title 29, Code of Federal Regulations.

Part 1518 - Safety and Health Regulations for Construction, Chapter XIII of Title 29, Code of Federal Regulations.

G. Coordination:

Coordinate work of the various Sections of Specifications to assure efficient and orderly sequence of installation of construction elements, with provisions for accommodating items installed later.

Verify characteristics of elements of interrelated operating equipment are compatible; coordinate work of Sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduits, as closely as practicable; make runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

In finished areas (except as otherwise shown,) conceal pipes, ducts, and wiring in the construction. Coordinate locations of fixtures and outlets with finish elements.

Execute cutting and patching to integrate elements of Work, uncover ill-timed, defective, and non-conforming work, provide openings for penetrations of existing surfaces, and provide samples for testing. Seal penetrations through floors, walls, and ceilings.

H. Field Engineering:

Provide field engineering services; establish grades, lines, and levels, by use of recognized engineering survey practices.

Control datum for survey is that shown on Drawings. Locate and protect control and reference points.

I. Reference Standards:

For products specified by association or trade standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

The date of the standard is that in effect as of the date of the Contract Documents, except when a specific date is specified.

1.4 CONTRACT METHOD

- A. Construct work under a single lump sum contract.

1.5 SIGNED “FOR CONSTRUCTION” DRAWINGS AND SPECIFICATIONS

The Contractor shall sign a designated number of complete sets of Drawings and Project Manuals (for Project Manual, the Owner Contractor Agreement will be signed by the Contractor) as additional evidence of his understanding of the work called for with such Amendments as specifically mentioned in the Agreement. Submit all sets to the Owner for contract execution and distribution. The Owner will distribute executed documents. Contractor to keep one signed set at the job site at all times during the progress of the work. The job site set shall be Contractor's copy.

1.6 WATERTIGHT - WEATHERTIGHT

Anything in the Contract Documents notwithstanding, the Contractor accepts the responsibility of constructing a watertight and weathertight project.

END OF SECTION

SECTION 013100 – PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to the work of this section.

1.2 REQUIREMENTS INCLUDED

- A. Pre-construction meeting.
- B. Site mobilization meeting.
- C. Progress meetings.
- D. Pre-installation meetings.

1.3 RELATED REQUIREMENTS:

- A. Section 014200 – References.
- B. Section 013300 – Submittal Requirements.
- C. Section 014000 – Quality Requirements.
- D. Individual Specifications sections: Pre-installation conferences.

1.4 PRECONSTRUCTION MEETINGS

- A. The Owner will schedule a pre-construction meeting within 10 days after Notice of Award of Contract.
- B. Midwestern State University Project Manager will administer the pre-construction meeting.
- C. Attendance required: Owner, MEP Engineer, and Contractor
- D. Proposed Agenda:
 - 1. Contract and Notice to Proceed.
 - 2. Review of executed bonds.
 - 3. Submission of insurance certificates.
 - 4. Review of ROCIP and safety program.
 - 5. Distribution of Contract Documents.
 - 6. Submission of schedule of values and progress schedule.
 - 7. Designation of personnel representing the parties in Contract and the Engineer.
 - 8. Procedures and processing of requests for information, field decisions, submittals, Engineer Supplemental Instructions, applications for payments, proposal requests, changes orders, and contract closeout procedures.
 - 9. Site mobilization meeting.

10. Scheduling
 11. Progress meeting.
 12. Environmental procedures.
 13. Construction facilities and temporary controls.
 14. Coordination of existing conditions and other work.
 15. Notice to proceed.
 16. Testing and balancing.
 17. Permits, inspections and occupancy.
 18. “As-built” and “Record” drawings.
- E. Midwestern State University Project Manager shall record minutes and distribute copies to participants for their review and approval within 5 days after meeting.

1.5 CONSTRUCTION “KICK-OFF” MEETING

- A. The Midwestern State University Project Manager will schedule a meeting at the project site prior to contractor occupancy.
- B. Attendance Required: Midwestern State University Project Manager, Owner, Architect/Engineer, Contractor, Contractor’s Superintendent, and major Subcontractors.
- C. Proposed Agenda:
1. Use of premises by Owner and Contractor.
 2. Owner’s requirements and partial occupancy.
 3. Construction facilities and controls provided by Owner.
 4. Temporary utilities provided by Owner.
 5. Survey and building layout.
 6. Security and housekeeping procedures.
 7. Schedules.
 8. Application for payment procedures.
 9. Procedures for testing.
 10. Procedures for maintaining record documents.
 11. Requirements for start-up of equipment.
 12. Inspection and acceptance of equipment put into service during construction period.
- D. Contractor shall record minutes and distribute copies within 3 days after meeting to participants and those affected by decisions made.

1.6 PROGRESS MEETINGS:

- A. Contractor to schedule and administer meetings throughout the work at maximum monthly intervals.
- B. Make physical arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- C. Attendance Required: Midwestern State University Project Manager, Job superintendent, major subcontractors and suppliers; Owner/Engineer as appropriate to agenda topics for each meeting.

- D. Proposed Agenda:
1. Review minutes of previous meetings.
 2. Review of work progress.
 3. Field observations, problems, and decisions.
 4. Identification of problems that impede planned progress.
 5. Review of submittals schedule and status of submittals.
 6. Review of off-site fabrication and delivery schedules.
 7. Maintenance of progress schedule.
 8. Corrective measures to regain projected schedules.
 9. Planned progress during succeeding work period
 10. Coordination of projected progress.
 11. Maintenance of quality and work standards.
 12. Effect of proposed changes on progress schedule and coordination.
 13. Review environmental procedures, waste management, and site management.
 14. Other business relating to work.

1.7 PRE-INSTALLATION MEETING

- A. When required in individual specification on sections, the Contractor shall convene a pre-installation meeting at the site prior to commencing work of the section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify Midwestern State University Project Manager and Engineer four days in advance of meeting date and time.
- D. Prepare agenda and preside at meeting.
1. Review conditions of installation, preparation and installation procedures.
 2. Review coordination with related work.
- E. The Contractor shall record minutes and distribute copies to participants within 3 days after the meeting.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

SECTION 013300 – SUBMITTAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2 REQUIREMENTS INCLUDED

- A. Procedures.
- B. Construction Progress Schedules.
- C. Schedule of Values.
- D. Shop Drawings.
- E. Product Data.
- F. Samples
- G. Manufacturer's Instructions
- H. Manufacturer's Certificates
- I. Contractor's Review and Approval
- J. Engineer's Action

1.3 RELATED REQUIREMENTS

- A. Section 013000 - Administrative Requirements: Applications for Payment.
- B. Section 016000 – Product Requirements: Contractor's list of Products.

1.4 PROCEDURES

- A. Deliver submittals to Engineer at 1300 Summit Ave., Suite 500, Fort Worth, Texas 76102
- B. Submit initial progress schedules and schedule of values in duplicate within 15 working days after date of Notice of Award of Contract. After review by the Owner and Engineer, revise and resubmit as required. Submit revised schedules with each Application for Payment, reflecting changes since previous submittal.
- C. Coordination: Coordinate the preparation and processing of submittals with the performance of the Work. Coordinate each separate submittal with other submittals and related activities such as testing, purchasing, fabrication, delivery and similar activities that require sequential activity.

1. Coordinate the submittal of different units of interrelated work so that one submittal will not be delayed by the Engineer's need to review a related submittal. The Engineer reserves the right to withhold action on any submittal requiring coordination with other submittals until related submittals are forthcoming.
 - a. Prepare and transmit each submittal to the Engineer sufficiently in advance of the scheduled performance of related work and other applicable activities. Transmit different kinds of submittals for the same unit of work, so that processing will not be delayed by the Engineers need to review submittals concurrently for coordination.
- D. Review Time: Allow sufficient time so that the installation will not be delayed as a result of the time required to properly process submittals, including time for re-submittal, if necessary. Advise the Engineer on each submittal, as to whether processing time is critical to the progress of the work, and if the work would be expedited if processing time could be shortened.
 1. Allow 14 calendar days for the Engineer's initial processing of each submittal. Allow a longer time period where processing must be delayed for coordination with subsequent submittals. The Engineer will advise the Contractor promptly when it is determined that a submittal being processed must be delayed for coordination.
 2. Allow 14 calendar days for reprocessing each submittal.
 3. No extension of time will be authorized because of the Contractor's failure to transmit submittals to the Engineer sufficiently in advance of the work.
- E. After Engineer review of submittal, revise and resubmit as required, identifying changes made since previous submittal.
- F. Distribute copies of reviewed submittals to concerned persons. Instruct recipients to promptly report any inability to comply with provisions.
- G. Transmit each item under the attached form, Submittal Transmittal. Identify Project, Contractor, subcontractor, and major supplier; identify pertinent Drawing sheet and detail number, and Specification section number, as appropriate. Contractor shall identify deviations from Contract documents. If deviations are not identified, Engineer's review, if so, will be voided. Provide space for Contractor and Engineer review stamps.
- H. The Engineer will make available, upon request, CADD / BIM file documents for use by contractors and/or sub-contractor as backgrounds for shop drawing and/or record set documentation only, as referenced herein. Exchange of subject information in no way relieves any party of responsibilities as defined under the Terms of Agreement. A \$250.00 processing fee will be charged for each request.

1.5 CONSTRUCTION PROGRESS SCHEDULES

- A. Within 15 working days, after Notice of Award of Contract, submit horizontal bar chart with separate bar for each major trade or operation identifying first work day of each week.
 1. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.
 2. Identify each item by specification section number.
 3. Identify work of separate stages and other logically grouped activities.
 4. Provide sub-schedules for each stage of work identified in Section 01010.
 5. Provide sub-schedules to define critical portions of the entire schedule.

6. Include conferences and meetings in schedule.
7. Show accumulated percentage of completion of each item, and total percentage of work completed, as of the first day of each month.
8. Provide separate schedule of submittal dates for shop drawings, product data, and samples, including Owner-furnished products and items identified under Allowances, and dates reviewed submittal will be required from Engineer. Indicate decision dates for selection of finishes.
9. Indicate delivery dates for Owner-furnished products.
10. Coordinate content with schedule of values specified in Section 013000.

B. REVISIONS TO SCHEDULES

1. Indicate progress of each activity to date of submittal, and projected completion date of each activity.
2. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.
3. Provide narrative report to define problem areas, anticipated delays, and impact on Schedule. Report corrective action taken, or proposed, and its effect including the effect of changes on schedules of separate contractors.

- C. Show complete sequence of construction by activity, identifying work of separate stages and other logically grouped activities. Show projected percentage of completion for each item of Work as of time of each Application for Progress Payment.

- D. Show submittal dates required for shop drawings, product data, and samples, and product delivery dates.

1.6 SHOP DRAWINGS

- A. For Plumbing, HVAC, Electrical and Security work:

1. Submit in the form of one original and three opaque reproductions.
2. Distribution:
 - a. Original returned to Contractor.
 - b. Two copies retained by Engineer.

- B. For work under all other Divisions:

1. Submit in the form of one original and three opaque reproductions.
2. Distribution:
 - a. Original returned by Contractor.
 - b. Two copies retained by Engineer
 - c. Provide and distribute additional copies of reviewed and processed shop drawings to concerned persons.

- C. After review, reproduce and distribute in accordance with the requirements in article on Procedures, above.

1.7 PRODUCT DATA

- A. Mark each copy to identify applicable products, models, options, and other data; supplement manufacturers' standard data to provide information unique to the work.
- B. Manufacturer's Certificates: When required by individual specification sections, submit six manufacturer's certificates that products meet or exceed specified requirements.

1.8 MISCELLANEOUS SUBMITTALS

- A. Manufacturer's Instructions: When required by individual specification sections, submit copies of manufacturer's instructions for delivery, storage, assembly installation, start-up, adjusting, and finished, in quantities specified for product data.
- B. Manufacturer's Certificates: When required by individual specification sections, submit six manufacturer's certificates that products meet or exceed specified requirements.

1.9 SAMPLES

- A. Submit full range of manufacturers' standard colors, textures, and patterns for Engineer's selection. Submit samples for selection of finishes within 45 days after date of Notice to Proceed.
- B. Submit samples to illustrate functional characteristics of the product, with integral parts and attachment devices. Coordinate submittal of different categories for interfacing work.
- C. Include identification on each sample, giving full information.
- D. Submit the number specified in the respective Specification section.

1.10 FIELD SAMPLES

- A. Provide mock-up at Project as required by individual Specifications section. Install sample complete and finished.

1.11 CONTRACTORS REVIEW AND APPROVAL

- A. Contractor's stamp of approval on each Shop Drawing, Product Data or Sample shall constitute a representation to Owner and Engineer that Contractor has either determined and verified all quantities, dimensions, field construction criteria, materials, catalog numbers, and similar data or assumes full responsibility for doing so, and that Contractor has reviewed or coordinated each Shop Drawing or Sample with the requirements of the Work and the Contract Documents.
- B. Submittals received by Engineer without Contractor's stamp of approval will be returned to the Contractor without Engineer's action.
- C. Submittal received which obviously has not been reviewed but does have Contractor's stamp of approval, will be returned to the Contractor without Engineer's action.

1.12 ENGINEER'S ACTION

- A. The Engineer process will be to mark one or more copies of submittals with one of the following actions listed below and transmit the required copies to the Contractor:
1. Returned without comment: The Engineer has reviewed the submittal and found no issues with the submitted data.
 2. Returned with comment: The Engineer has reviewed the submittal and found issues requiring commentary. The contractor shall review said submittal comments and take the appropriate action to correct or satisfy the issues.
 3. Revise and resubmit: The Engineer has determined the submittal to be insufficient to proceed with installing the subject product. The contractor shall make the appropriate corrections and resubmit a complete package.
 4. Submit specific item: The Engineer has determined the contractor is required to submit specific missing or additional information to complete the review of the submittal package.
 5. Not Subject to Review: The Engineer has determined that the information submitted is not required to be reviewed and will be returned or filed with no action taken.
- B. Engineer will take action on maximum of two submittals for each Shop Drawing, Product Data or Sample of the same item. In the event a third submittal is required, Contractor shall bear cost of processing by the Engineer.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

SECTION 014000 – QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2 REQUIREMENTS INCLUDED

- A. General Quality Control.
- B. Workmanship.
- C. Manufacturer's Instructions.
- D. Manufacturer's Certificates.
- E. Manufacturer's field services.
- F. Mockups.

1.3 RELATED REQUIREMENTS

- A. General conditions: Inspection and testing required by governing authorities.
- B. Section 011100 – Summary of Work.
- C. Section 012600 – Contract Modification Procedures.
- D. Section 013300 – Submittals.
- E. Section 014523 – Testing Laboratory Services.
- F. Section 016000 – Product Requirements.

1.4 QUALITY CONTROL, GENERAL

- A. Maintain quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

1.5 WORKMANSHIP

- A. Comply with industry standards except when more restrictive tolerances specified requirements indicate more rigid standards or more precise workmanship.
- B. Perform work by persons qualified to produce workmanship of specified quality.

- C. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.
- D. Monitor fabrication and installation tolerances control of products to produce acceptable work.

1.6 MANUFACTURERS' INSTRUCTIONS

- A. Comply with instructions in full detail, including each step in sequence. Should instructions conflict with Contract Documents, request clarification from Engineer before proceeding with work.
- B. Comply with Manufacturer's tolerances. Should conflicts with Contract Documents occur, request clarification from Engineer before proceeding.
- C. Adjust products to appropriate dimensions; position properly before securing products in place.

1.7 MANUFACTURERS' CERTIFICATES

- A. When required by individual Specifications Section, submit manufacturer's certificate, in duplicate, that products meet or exceed specified requirements.

1.8 MANUFACTURERS' FIELD SERVICES

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.
- B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
- C. Refer to Section 013300 – SUBMITTALS

1.9 MOCKUPS

- A. When required by individual Specifications Section, erect complete, full-scale mockup of assembly at Project site.
- B. Tests will be performed under provisions identified in this section and identified in the respective product specification sections.
- C. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- D. Accepted mock-ups shall be a comparison standard for the remaining work.
- E. Where mock-up has been accepted by Engineer and is specified in product specification sections to be removed; remove mock-up and clear area when directed to do so.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Beginning new work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Verify that utility services are available, of the correct characteristics, and in the correct locations.

3.2 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

END OF SECTION

SECTION 014200 – REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2 REQUIREMENTS INCLUDED

- A. Project coordination.
- B. Project Conditions.
- C. Reference standards.
- D. Schedule of Abbreviations.
- E. Alteration project procedures.

1.3 RELATED SECTIONS

- A. Section 011100 – Summary of Work.
- B. Section 015000 – Temporary Facilities and Controls.
- C. Section 016000 – Product Requirements.
- D. Maintain a complete and accurate log of control and survey work as it progresses.

1.4 COORDINATION AND PROJECT CONDITIONS

- A. Coordinate scheduling, submittals, and work of the various sections of the project manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- B. Verify utility requirements and characteristics of operating equipment are compatible with building utilities prior to submitting or ordering such equipment. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- C. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on the drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- D. In finished areas, except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

- E. Coordinate completion and clean-up of work of separate sections in preparation for Substantial Completion and for portions of work designated for Owner's partial occupancy.
- F. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with contract documents, to minimize disruption of Owner's activities.

1.5 PROJECT CONDITIONS

- A. Contractor's License Law:

Contractor shall comply with, and require all subcontractors to comply with, State and City contractor's license laws and be duly registered and licensed thereunder.

- B. Approved Applicators:

Where specific instructions in these specifications require that a particular product and/or material(s) be installed and/or applied by an approved applicator of the manufacturer, it shall be the contractor's responsibility to ensure that any subcontractors used for such work be approved applicators. Contractor shall provide written "proof" of same when requested by the Engineer or Owner.

- C. Safety Requirements:

These Construction Documents, and the joint and several phases of construction hereby contemplated are to be governed, at all times, by applicable provisions of the federal laws, including but not limited to, the latest amendments of the following:

1. Williams-Steiger Occupational Safety & Health Act of 1970, Public Law, 91-596.
2. Part 1910 – Occupational Safety and Health Standards, Chapter XVII of Title 29, Code of Federal Regulations.
3. Part 1518 – Safety and Health Regulations for Construction, Chapter XIII of Title 29, Code of Federal Regulations.

1.6 REFERENCE STANDARDS

- A. Various sections of specifications contain references to specific standards. Applicable portions of standards listed that are not in conflict with specification requirements are hereby made a part of the Contract Documents.
- B. For products or workmanship specified by association, trade, or other consensus standard, except when more rigid requirements are specified or are required by applicable codes.
- C. Modifications and exceptions to standards shall be considered as amendments and unmodified portions shall remain in effect.
- D. In case of conflict between standards, or between specifications and standards, most stringent requirement shall govern.
- E. Editions of standards shall be the latest edition at the time of contract award, including any supplements or amendments thereto.

- F. Maintain copies of standards at the project site during submittals, planning, and progress of the specific work, until substantial completion.
- G. Neither the contractual relationship, duties, and responsibilities of the parties in the contract nor those of the Engineer shall be altered by the contract documents by mention or inference otherwise in any reference documents.

H. General Specification Abbreviations

Cubic Foot	cu.ft.
Degree	deg.
Diameter	dia.
Feet or Foot	ft.
Inch	in.
Inside Diameter	i.d.
Miles Per Hour	mph
Millimeter	mm
Ounce	o.d.
Pound	lb.
Pounds per Cubic Foot	pcf
Pounds per Square Foot	psf
Pounds per Square Inch	psi
Square Foot	sq. ft.
Square Inch	sq. in.

- I. The General Contractor shall be responsible for reporting any abbreviations on the drawings that are not listed and not understood, to the Engineer for clarification at least 7 days prior to bid openings. Additional costs will not be allowed for clarification of abbreviations after bid opening as it will be assumed that the Contractor understood the abbreviation at the time the bid was submitted.

END OF SECTION

SECTION 015000 – TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2 REQUIREMENTS INCLUDED

- A. Electricity, Lighting.
- B. Heat, Ventilation.
- C. Water.
- D. Sanitary Facilities.
- E. Barriers.
- F. Enclosures.
- G. Protection of Installed Work.
- H. Water Control.
- I. Cleaning During Construction.
- J. Noise and Dust Control.
- K. Project Identification.
- L. Field Offices and Sheds.
- M. Fire Protection.
- N. Interim Life Safety Measures.
- O. Access Roads and Parking Areas.

1.3 RELATED REQUIREMENTS

- A. Section 01 11 00 – Summary of Work.

1.4 QUALITY CONTROL

- A. Regulations:
 - 1. Comply with governing regulations for the installation and use of temporary construction facilities, and operation of security and protection facilities, including health and safety regulations.
 - 2. Comply with pollution, environmental protection, and conservation regulations for the use of water and energy, and for the control of dust, air pollution, noise, trash and similar nuisances.
- B. Contractor shall assign responsibilities for installation and maintenance of temporary facilities, security and protection, and compliance with regulations.
- C. Job Conditions.
 - 1. Scheduled Uses: Provide temporary construction facilities and temporary controls at the time first needed to avoid delays in the performance of the work. Maintain, expand, and modify as needed through the progress of work.
 - 2. Condition of Use: Operate, maintain, control, and protect temporary construction facilities and temporary controls in a manner which will prevent over-loading, freezing, pollution, contamination of water source, flooding, unsanitary conditions, hazardous exposure, fire, disease, erosion of site, damage or deterioration of completed work, public nuisances, trash and similar deleterious effects.

1.5 ELECTRICITY, LIGHTING

- A. Provide service required for construction operations, with branch wiring and distribution boxes located to allow service and lighting by means of construction-type power cords. Comply with applicable codes. Existing facilities with power and lighting are available for use by the contractor
- B. Provide lighting for construction operations which shall be adequate to permit workmen to properly perform their work. Comply with applicable codes.
- C. Permanent lighting may be used during construction provided contractor assumes full responsibility for the system. Maintain lighting and make routine repairs.
- D. Installation shall be in accordance with temporary power requirements of National Electrical Code.

1.6 HEAT, VENTILATION

- A. Provide as required to maintain specified conditions for construction operations, to protect materials and finishes from damage due to temperature or humidity.
- B. Prior to operation of permanent facilities for temporary purposes, verify that installation is approved for operation, and that filters are in place.
- C. Provide ventilation of enclosed areas to cure materials, to disperse humidity, and to prevent accumulations of dust, fumes, vapors, or gases.

1.7 WATER

- A. Provide service required for construction operations. Extend branch piping with outlets located so that water is available by use of hoses. Existing facilities with water outlets, sinks, etc. are available for use by the contractor
- B. Contractor shall make the necessary arrangements with the Water District and pay all charges for the equipment, the installation and the cost of water consumed.
- C. Permanent water system may be used as a source of water supply for construction purposes provided Contractor assumes full responsibility for the maintenance of the system, and pays for the cost of water consumed.

1.8 SANITARY FACILITIES

- A. Provide and maintain required toilet facilities and enclosures for the use of all workmen. Facilities where toilet room exist are available for use by the contractor. Contractor is responsible for cleaning toilet rooms at the end of each day.

1.9 BARRIERS

- A. Provide as required to prevent unauthorized entry to construction areas, to allow for Owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations.
- B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for access to existing building by public and city personnel.
- C. Provide protection for plants to remain.
- D. Protect non-owned vehicular traffic from damage.

1.10 ENCLOSURES

- A. Provide temporary weather-tight closure of openings in exterior surfaces to provide acceptable working conditions and protection for materials, to allow for temporary heating, and to prevent entry of unauthorized persons. Provide doors with self-closing hardware and locks.

1.11 PROTECTION OF INSTALLED WORK

- A. Protect installed work.

- B. Provide temporary protection for installed products. Control traffic in immediate area to minimize damage.
- C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings. Protect finished floors and stairs and other surfaces from traffic, dirt, damage and wear and movement of heavy objects.
- D. Prohibit traffic and storage on lawn and landscaped areas.
- E. Provide and maintain pumping facilities, including power, for keeping the site, excavations and structure free from accumulations of water at all times, whether from underground seepage, rainfall, drainage or broken lines.
- F. Prohibit traffic or storage upon waterproofed or roofed surfaces.
- G. Provide security and facilities to protect work and existing facility and Owner's operations from unauthorized entry, vandalism or theft.
- H. Coordinate with Owner's security program.

1.12 CLEANING DURING CONSTRUCTION

- A. Maintain areas free of waste materials and rubbish; periodically dispose of off-site.
- B. Maintain site in a clean and orderly condition.
- C. Clean interior areas prior to start of finish work, maintain areas free of dust and other contaminants during finishing operations.

1.13 NOISE AND DUST CONTROL

- A. Exercise all possible care to control excessive noise and dust during the construction to keep these problems to a minimum. Traffic or construction areas shall be sprinkled with water or chemicals as required and in accordance with applicable county requirements.

1.14 FIRE PROTECTION

- A. Comply with the city ordinances for fire protection. Maintain access to fire hydrants.
- B. Provide adequate fire extinguishers on the premises during the course of construction, of the type and sizes recommended by the NFPA to control fires resulting from the particular work being performed, Instruct employees in their use. Place extinguishers in the immediate vicinity of the work being performed, ready for instant use. In the use of especially hazardous types of equipment, such as acetylene torches, welding equipment, tar pots, kettles, etc., no work shall be commenced or equipment used unless fire extinguishers of an approved type and capacity are placed in the working area and available for immediate use by the workmen using the above-mentioned equipment.
- C. Fire extinguishers shall be maintained throughout all accessible areas. Provide one approved 2-1/2 gallon foam type extinguisher in the construction shed and also in the space where paint or oil, etc., is stored. Other special features of hazard shall be provided with special extinguisher protection as may be warranted.
- D. Store combustible materials in fire-safe locations and containers.

1.15 CONTRACTOR LIFE SAFETY MEASURES

- A. The Contractor is required to follow strict guidelines for compliance with licensing regulations where construction occurs adjacent to existing facilities. These life safety measures apply to safety, separations, and means of egress around and within the construction area. The Contractor is required to monitor and enforce compliance with these measures. Specific requirements will be reviewed at monthly meetings with Contractors, the Owner, and the Engineer.

1.16 ACCESS ROADS AND PARKING AREAS

- A. Construct and maintain temporary roads accessing public thoroughfares to serve construction area.
- B. Extend and relocate as work progress requires. Provide detours necessary for unimpeded traffic flow.
- C. Provide and maintain access to fire hydrants, free of obstructions.
- D. Provide means of removing mud from vehicle wheels before entering streets.
- E. Parking: Provide temporary parking areas to accommodate construction personnel. Coordinate location with owner.
 - 1. When site space is not adequate, provide additional off-site parking.
 - 2. Do not allow vehicle parking on existing pavement.

1.17 SECURITY

- A. Provide security program to protect work from unauthorized entry, vandalism and theft during construction of work.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.1 REMOVAL

- A. Remove temporary materials, equipment, services, and construction prior to Substantial Completion inspection.

END OF SECTION

SECTION 016000 – PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2 REQUIREMENTS INCLUDED

- A. Products.
- B. Transportation and Handling.
- C. Storage and Protection.
- D. Product Options.
- E. Product List.
- F. Substitutions.

1.3 RELATED REQUIREMENTS

- A. Section 011100 – Summary of Work.
- B. Section 013300 – Submittals.
- C. Section 014000 – Quality Control.

1.4 PRODUCTS

- A. Products include material, equipment, and systems.
- B. Comply with Specifications and referenced standards as minimum requirements.
- C. Components required to be supplied in quantity within a Specification section shall be the same, and shall be interchangeable.

1.5 TRANSPORTATION AND HANDLING

- A. Transport and handle products in accordance with Manufacturer's instructions.
- B. Transport products by methods to avoid product damage; deliver in undamaged condition in manufacturer's unopened containers or packaging, dry.
- C. Provide equipment and personnel to handle products by methods to prevent soiling or damage.

- D. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

1.6 STORAGE AND PROTECTION

- A. Store products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight enclosures; maintain within temperature and humidity ranges required by manufacturer's instructions.
- B. For exterior storage of fabricated products, place on sloped supports above ground. Cover products subject to deterioration with impervious sheet covering; provide ventilation to avoid condensation.
- C. Store loose granular materials on solid surfaces in a well-drained area; prevent mixing with foreign matter.
- D. Arrange storage to provide access for inspection. Periodically inspect to assure products are undamaged, and are maintained under required conditions.

1.7 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards.
- B. Products Specified by Naming One of More Manufacturers with a Provision for Substitutes: Submit a request for substitution for any manufacturer not specifically named.
- C. Products Specified by Naming Several Manufacturers: Products of name manufacturers meeting specifications; no options, no substitutions allowed.
- D. Products Specified by Naming Only One Manufacturer: No options, no substitutions allowed.

1.8 PRODUCTS LIST

- A. Within 45 days after date of Notice to Proceed, submit complete list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.

1.9 SUBSTITUTIONS

- A. After the pre-bid conference, the Architect / Engineer will not consider formal requests from Contractors for substitutions. Subsequently, substitutions will be considered only when a product becomes unavailable due to no fault of Contractor.
- B. Any request for substitution shall be transmitted to the Architect / Engineer on the enclosed form, Contractor's Substitution Request.
- C. By making requests for substitutions the Contractor:

1. Represents that the Contractor has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified.
 2. Represents that the Contractor will provide the same warranty for the substitution that the Contractor would for that specified.
 3. Certifies that the cost data presented is complete and includes all related costs under this Contract except the Architect / Engineer's redesign costs, and waives all claims for additional costs related to the substitution which subsequently become apparent.
 4. Represents that the Contractor shall pay all costs of architectural and engineering redesign required by reason of acceptance of a substitution. Redesign costs shall be determined on the basis of the fees for additional services in the Owner / Architect - Engineer Contract.
 5. Will coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.
 6. Waves claims for additional costs or time extension as a result of substitution.
- D. The materials, products and equipment described in the Bidding Documents established a standard of required function, dimension, appearance and quality to be met by any proposed substitution.
- E. Each substitution request shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitute including drawings, cut sheets, performance and test data and any other information necessary for an evaluation. A statement setting forth any changes in other materials, equipment or other Work that incorporation of the substitute would require shall be included.
- F. The burden of proof of the merit of the proposed substitute is upon the proposer.
- G. The Architect / Engineer's decision of approval or disapproval of a proposed substitution shall be final.

1.10 SURPLUS

- A. For general finishes used on the project including ceiling tiles, floor tiles, paint, and vinyl, the Contractor shall at the completion of the project, furnish to the owner, not less than 2 percent of the total used for the entire project, unless indicated otherwise in the specific sections. Surplus materials to be furnished in new, unused, unopened cartons and containers.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

**Project Name: FAIN FINE ARTS – CERAMICS LAB
VENTILATION SYSTEM
Project No: P17175.00**

**Division 01 – General Requirements
September 26, 2017**

PROJECT: Fain Fine Arts-Ceramics Lab Venitlation

Job No. _____

TO: Summit Consultants, Inc.
1300 Summit Avenue, Suite
500 Fort Worth, TX 76102
Phone: (817) 7878-
4242 Fax: (817) 878-
4240

Request No. _____
Date: _____

ATTN: _____

CONTRACTOR: _____

SPECIFIED ITEM:

Section: _____ Page: ____ Paragraph: _____ Description: _____

Drawing Number(s): _____ Detail Number(s): _____

The undersigned request consideration of the following,

PROPOSED SUBSTITUTION:

REASON FOR NOT GIVING PRIORITY TO SPECIFIED ITEMS:

SAVINGS or CREDIT for ACCEPTING SUBSTITUTE: \$ _____

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

Attached data also includes a description of changes to contract documents that proposed substitution will require for its proper installation.

The undersigned certifies that the following paragraphs, unless modified by attachments, are correct:

1. Proposed Substitution has been fully checked and coordinated with Contract Documents.
2. Proposed Substitution does not affect dimensions shown on drawings.
3. Proposed Substitution does not require revisions to mechanical or electrical work.
4. The undersigned will pay for changes to building design, including Architectural and Engineering design, detailing, and construction costs caused by requested Substitution.
5. Proposed Substitution will have no adverse affect on other trades, construction schedule, or specified warranty requirements.

6. Maintenance and service parts will be locally available for proposed substitution.

The undersigned further states that the function, appearance, and quality of proposed Substitution are equivalent or superior to specified item.

Attachments: The attached data is furnished herewith for evaluation of the proposed substitution.

☐ Catalog ☐ Drawings ☐ Samples ☐ Reports ☐ Tests ☐ Other_____

Submitted by:

(Firm)

(Authorized legal signature)

(Address)

(Telephone)

For use by:

☐ Approved ☐ Approved as noted ☐ Not Approved ☐ Received too late

Date: _____

BY: _____
(Authorized legal signature)

Remarks:

SECTION 017000 – EXECUTION AND CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2 REQUIREMENTS INCLUDED

- A. Closeout Procedures.
- B. Final Cleaning.
- C. Project Record Documents.
- D. Operation and Maintenance Data.
- E. Warranties.
- F. Maintenance Service.

1.3 RELATED REQUIREMENTS

- A. General: Fiscal provisions, legal submittals, and other administrative requirements.
- B. Section 011100 – Summary of Work.
- C. Section 015000 – Temporary Facilities and Controls: Cleaning during construction.
- D. Section 017500 – Starting and Adjusting.

1.4 CLOSEOUT PROCEDURES

- A. Comply with procedures stated in General Conditions of the Contract for issuance of Certificate of Substantial Completion.
- B. Owner will occupy designated portion of Project for the purpose of installation of equipment, and conduct of business, under provision stated in Certificate of Substantial Completion.
- C. When Contractor considers Work has reached final completion, submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Engineer inspection.
- D. In addition to submittals required by the conditions of the Contract, provide submittals required by governing authorities.

- E. Resubmit a final statement of accounting giving total adjusted Contract Sum, previous payments, and sum remaining due.
- F. Engineer will issue a final Change Order as required reflecting approved adjustments to Contract Sum not previously made by Change Order.
- G. If, because of acts or omissions of the Contractor, the Engineer is required to conduct more than one substantial completion inspection or final inspection of the Project, he will enter into a separate agreement with the Owner for the additional services required and such costs will be deducted from the money still due the Contractor.
- H. Final Checkout of Structure with Owner: Before acceptance and final payment, at a time arrived at with the Owner, a complete checkout and test shall be made of all architectural and structural devices, etc., with the Owner. For this purpose, each trade concerned shall provide a skilled operating engineer or technician for a period of at least one day. This person, together with selected operating personnel, shall test all systems and devices and demonstrate the complete operation and required maintenance of each.
- I. The Contractor shall coordinate with the Owner's testing and balancing consultant and comply with all systems test requirements. Adjustments and remedial action recommended by Owner's testing and balancing consultant shall be the responsibility of the Contractor.

1.5 FINAL CLEANING

- A. Execute final cleaning prior to final project inspection.
- B. Clean interior and exterior surfaces, remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces. Leave concrete floors broom clean. Vacuum carpet surfaces. Clean floors, equipment and fixtures to a sanitary condition. Clean drainage systems. Replace filters of mechanical equipment..
- C. Clean non-occupied spaces and limited-access spaces, such as plenums, shafts, equipment vaults, attics, and similar spaces, broom clean and free of surface dust.
- D. Clean equipment and fixtures to sanitary conditions with cleaning materials appropriate to the surface and material being cleaned.
- E. Clean site, sweep paved areas, rake clean other surfaces. Legally dispose of all trash and waste.
- F. Remove waste and surplus materials, rubbish, and construction facilities from the Project and from the site.
- G. Clean and polish woodwork and hardware.
- H. Clean debris from roofs, gutters, downspouts and drainage systems.

1.6 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.

1.7 PROJECT RECORD DOCUMENTS

- A. Maintain one set of complete record documents on site. Contractor shall post required updates weekly. At the time of each pay application, the Contractor shall have the contract record documents available for review by the Owner, the Program Manager and the Engineer.
- B. Maintain on site one set of reviewed shop drawings, product data, samples, manufacturer's instruction for assembly, installation and adjusting.
- C. Store documents separate from those used for construction.
- D. Keep documents legible and current with construction progress; do not permanently conceal any work until required information has been recorded.
- E. Documents shall be available for inspection and use by the Owner, the Program Manager and Engineer at all times.
- F. Contractor's Record Document Drawings.
 - 1. Legibly record all information on one full size set of bond paper print drawings during construction.
 - 2. Prepare separate record drawings for Architectural, HVAC, Plumbing and Electrical work.
 - 3. Legibly mark each item to record actual construction, including:
 - a. Measured depths of elements of foundation in relation to finish first floor datum.
 - b. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - c. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of construction.
 - d. Field changes of dimension and detail.
 - e. Changes made by modifications.
 - f. Changes by Addendum, Engineers Supplemental Instructions and Requests for Information.
 - g. Details not on original contract documents.
 - h. References to related shop drawings modifications.
 - 4. Mechanical and Electrical Record Drawings shall indicate exact routing of all piping, duct work, power and control wiring, etc., location and function of all controls and whether manual or automatic, normal amperage readings for all motors taken at the equipment under normal load conditions, final air quantities at each air outlet and at each air return.
 - 5. Record Drawings shall contain the names, addresses and phone number of Subcontractors and shall be signed by the Contractor.
- G. Contractor's Record Document Specifications:
 - 1. Legibly mark and record at each product section description of actual products installed, including the following:
 - a. Manufacturer's name and product model and number.
 - b. Product substitutions or alternates utilized.
 - c. Changes made by addenda and modifications.
- H. Upon notice of Substantial Completion of the Project work, submit the Contractor's Record Drawings and Specifications to the Engineer.

The Engineer will transfer the annotations from the Contractor's Record Drawings and Specifications to the Engineer's electronic media and produce the Final Record Documents. At completion of the Final Record Documents the Engineer will deliver the Contractor's Record Drawings and Specifications together with two sets of Final Record Documents prints and electronic files to the Program Manager.

1.8 OPERATION AND MAINTENANCE MANUALS

- A. Coordinate requirements and conditions of Commissioning Consultant and provide all such items in the Operations and Maintenance Manuals.
- B. Submit data bound in 8-1/2 x 11 inch text pages, three ring binders with durable plastic covers.
- C. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project, and subject matter of binder when multiple binders are required.
- D. Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with tab tilting clearly printed under reinforced laminated plastic tabs.
- E. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, printed on 20 pound white paper, in three parts as follows.
 - 1. Part 1: Directory, listing names, addresses, and telephone numbers of Engineer, Contractor, Subcontractors, and major equipment suppliers.
 - 2. Part 2: Operation and maintenance instructions arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of subcontractors and suppliers. Identify the following:
 - a. Significant design criteria.
 - b. List of equipment.
 - c. Parts list for each component.
 - d. Operating instructions.
 - e. Maintenance instructions for equipment and systems.
 - f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
 - 3. Part 3: Project documents and certificates, including the following:
 - a. Shop drawings and product data.
 - b. Certificates.
 - c. Original of warranties and bonds.

1.9 WARRANTIES

- A. Provide table of contents and assemble in 3-ring binder with durable plastic cover.
- B. Provide duplicate, notarized copies. Execute Contractor's submittals and assemble documents executed by subcontractors, suppliers, and manufacturers.
- C. Submit material prior to final application for payment. For equipment put into use with Owner's permission during construction, submit 10 days after first operation.

For items of work delayed materially beyond Date of Substantial Completion, provide updated submittal within 10 days after acceptance, listing date of acceptance as start of warranty period.

- D. The Contractor shall warranty all work to the Owner for a period of one year from the date of Certificate of Substantial Completion unless required for a longer period. In the case of work performed by a subcontractor the Contractor shall warranty the work to and in favor of the Owner. Each subcontractor shall warranty their work for a period of one year or as otherwise noted, after the date of Certificate of Substantial Completion. Work that proves to be defective in workmanship and/or materials shall be repaired without expense whatsoever to the Owner.

1.10 MAINTENANCE SERVICE

- A. Coordinate requirements and conditions of Commissioning Consultant and provide all such Maintenance Service work as indicated.
- B. Furnish service and maintenance of components indicated in specification sections for one (1) year from date of Substantial Completion.
- C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.
- D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.
- E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the owner.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

SECTION 017500 – STARTING AND ADJUSTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2 SECTION INCLUDES

- A. Starting systems.
- B. Demonstration and instructions.

1.3 RELATED SECTIONS

- A. Section 014000 – Quality Control: Manufacturers' field reports.

1.4 STARTING SYSTEMS

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Notify Midwestern State University Project Manager and Engineer seven (7) days prior to start-up of each item.
- C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.
- D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- E. Verify that wiring and support components for equipment are complete and tested.
- F. Execute start-up under supervision of applicable manufacturer's representative and Contractor's personnel in accordance with manufacturers' instructions.
- G. When specified in individual specification sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- H. Submit a written report in accordance with Section 013300 – Submittals, that equipment or system has been properly installed and is functioning correctly.

1.5 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate operation, adjustment and maintenance of products to Owner's personnel two (2) weeks prior to date of Substantial Completion.
- B. Demonstrate Project equipment instructed by a qualified manufacturers' representative who is knowledgeable about the project.
- C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six (6) months.
- D. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owners' personnel in detail to explain all aspects of operation and maintenance.
- E. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time at equipment location.
- F. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.
- G. The amount of time required for instruction on each item of equipment and system is that specified in individual sections.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

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. Balancing Air Systems:
 - a. Constant-volume air systems.

1.3 DEFINITIONS

- A. AABC: Associated Air Balance Council.
- B. NEBB: National Environmental Balancing Bureau.
- C. TAB: Testing, adjusting, and balancing.
- D. TABB: Testing, Adjusting, and Balancing Bureau.
- E. TAB Specialist: An entity engaged to perform TAB Work.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: Within 45 days of Contractor's Notice to Proceed, submit documentation that the TAB contractor and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.
- B. Contract Documents Examination Report: Within 45 days of Contractor's Notice to Proceed, submit the Contract Documents review report as specified in Part 3.
- C. Certified TAB reports.
- D. Sample report forms.
- E. Instrument calibration reports, to include the following:
 - 1. Instrument type and make.
 - 2. Serial number.

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3. Application.
4. Dates of use.
5. Dates of calibration.

1.5 QUALITY ASSURANCE

- A. TAB Contractor Qualifications: Engage a TAB entity certified by AABC or NEBB.
- B. Certify TAB field data reports and perform the following:
 1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
 2. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.
- C. TAB Report Forms: Use standard TAB contractor's forms approved by Engineer.
- D. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."

1.6 PROJECT CONDITIONS

- A. Full Owner Occupancy: Owner will occupy the site and existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.
- B. Examine systems for installed balancing devices, such as manual volume dampers. Verify that locations of these balancing devices are accessible.
- C. Examine the approved submittals for HVAC systems and equipment.
- D. Examine equipment performance data including fan curves.
 1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.

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- E. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
- F. Examine test reports specified in individual system and equipment Sections.
- G. Examine HVAC equipment and filters and verify that bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.
- H. Examine heat-transfer coils for correct piping connections and for clean and straight fins.
- I. Examine operating safety interlocks and controls on HVAC equipment.
- J. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

- A. Prepare a TAB plan that includes strategies and step-by-step procedures.
- B. Complete system-readiness checks and prepare reports. Verify the following:
 - 1. Permanent electrical-power wiring is complete.
 - 2. Automatic temperature-control systems are operational.
 - 3. Equipment and duct access doors are securely closed.
 - 4. Balance, smoke, and fire dampers are open.
 - 5. Isolating and balancing valves are open and control valves are operational.
 - 6. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
 - 7. Windows and doors can be closed so indicated conditions for system operations can be met.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in certifying organization standards and in this Section.
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.
 - 1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
 - 2. After testing and balancing, install test ports and duct access doors that comply with requirements in Section 233300 "Air Duct Accessories."
 - 3. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Section 230713 "Duct Insulation."

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- C. Mark equipment and balancing devices, including damper-control positions, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.
- D. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.
- E. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- F. Verify that motor starters are equipped with properly sized thermal protection.
- G. Check dampers for proper position to achieve desired airflow path.
- H. Check for airflow blockages.
- I. Check condensate drains for proper connections and functioning.
- J. Check for proper sealing of air-handling-unit components.
- K. Verify that air duct system is sealed as specified in Section 233113 "Metal Ducts."

3.5 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

- A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
 - 1. Measure total airflow.
 - a. Where sufficient space in ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow.
 - 2. Measure fan static pressures as follows to determine actual static pressure:
 - a. Measure outlet static pressure as far downstream from the fan as practical and upstream from restrictions in ducts such as elbows and transitions.
 - b. Measure static pressure directly at the fan outlet or through the flexible connection.

- c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from the flexible connection, and downstream from duct restrictions.
 - d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.
 3. Measure static pressure across each component that makes up an air-handling unit, rooftop unit, and other air-handling and -treating equipment.
 - a. Report the cleanliness status of filters and the time static pressures are measured.
 4. Measure static pressures entering and leaving other devices, such as sound traps, heat-recovery equipment, and air washers, under final balanced conditions.
 5. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
 6. Obtain approval from Engineer for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in HVAC Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
 7. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.
- B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.
 1. Measure airflow of submain and branch ducts.
 - a. Where sufficient space in submain and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.
 2. Measure static pressure at a point downstream from the balancing damper, and adjust volume dampers until the proper static pressure is achieved.
 3. Remeasure each submain and branch duct after all have been adjusted. Continue to adjust submain and branch ducts to indicated airflows within specified tolerances.
- C. Measure air outlets and inlets without making adjustments.
 1. Measure terminal outlets using a direct-reading hood or outlet manufacturer's written instructions and calculating factors.
- D. Adjust air outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using branch volume dampers rather than extractors and the dampers at air terminals.

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1. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents.
2. Adjust patterns of adjustable outlets for proper distribution without drafts.

3.6 PROCEDURES FOR MOTORS

A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:

1. Manufacturer's name, model number, and serial number.
2. Motor horsepower rating.
3. Motor rpm.
4. Efficiency rating.
5. Nameplate and measured voltage, each phase.
6. Nameplate and measured amperage, each phase.
7. Starter thermal-protection-element rating.

B. Motors Driven by Variable-Frequency Controllers: Test for proper operation at speeds varying from minimum to maximum. Test the manual bypass of the controller to prove proper operation. Record observations including name of controller manufacturer, model number, serial number, and nameplate data.

3.7 PROCEDURES FOR CONDENSING UNITS

- A. Verify proper rotation of fans.**
- B. Measure entering- and leaving-air temperatures.**
- C. Record compressor data.**

3.8 PROCEDURES FOR HEAT-TRANSFER COILS

A. Measure, adjust, and record the following data for each electric heating coil:

1. Nameplate data.
2. Airflow.
3. Entering- and leaving-air temperature at full load.
4. Voltage and amperage input of each phase at full load and at each incremental stage.
5. Calculated kilowatt at full load.
6. Fuse or circuit-breaker rating for overload protection.

B. Measure, adjust, and record the following data for each refrigerant coil:

1. Dry-bulb temperature of entering and leaving air.
2. Wet-bulb temperature of entering and leaving air.
3. Airflow.
4. Air pressure drop.
5. Refrigerant suction pressure and temperature.

- A. Perform a preconstruction inspection of existing equipment that is to remain and be reused.
 - 1. Measure and record the operating speed, airflow, and static pressure of each fan.
 - 2. Measure motor voltage and amperage. Compare the values to motor nameplate information.
 - 3. Check the refrigerant charge.
 - 4. Check the condition of filters.
 - 5. Check the condition of coils.
 - 6. Check the operation of the drain pan and condensate-drain trap.
 - 7. Check bearings and other lubricated parts for proper lubrication.
 - 8. Report on the operating condition of the equipment and the results of the measurements taken. Report deficiencies.
- B. Before performing testing and balancing of existing systems, inspect existing equipment that is to remain and be reused to verify that existing equipment has been cleaned and refurbished. Verify the following:
 - 1. New filters are installed.
 - 2. Coils are clean and fins combed.
 - 3. Drain pans are clean.
 - 4. Fans are clean.
 - 5. Bearings and other parts are properly lubricated.
 - 6. Deficiencies noted in the preconstruction report are corrected.
- C. Perform testing and balancing of existing systems to the extent that existing systems are affected by the renovation work.
 - 1. Compare the indicated airflow of the renovated work to the measured fan airflows, and determine the new fan speed and the face velocity of filters and coils.
 - 2. Verify that the indicated airflows of the renovated work result in filter and coil face velocities and fan speeds that are within the acceptable limits defined by equipment manufacturer.
 - 3. If calculations increase or decrease the air flow rates and water flow rates by more than 5 percent, make equipment adjustments to achieve the calculated rates. If increase or decrease is 5 percent or less, equipment adjustments are not required.
 - 4. Balance each air outlet.

3.10 TOLERANCES

- A. Set HVAC system's air flow rates within the following tolerances:
 - 1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 5 percent.
 - 2. Air Outlets and Inlets: Plus or minus 5 percent.

- A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.
 - 1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
 - 2. Include a list of instruments used for procedures, along with proof of calibration.
- B. Final Report Contents: In addition to certified field-report data, include the following:
 - 1. Fan curves.
 - 2. Manufacturers' test data.
 - 3. Field test reports prepared by system and equipment installers.
 - 4. Other information relative to equipment performance; do not include Shop Drawings and product data.
- C. General Report Data: In addition to form titles and entries, include the following data:
 - 1. Title page.
 - 2. Name and address of the TAB contractor.
 - 3. Project name.
 - 4. Project location.
 - 5. Architect's name and address.
 - 6. Engineer's name and address.
 - 7. Contractor's name and address.
 - 8. Report date.
 - 9. Signature of TAB supervisor who certifies the report.
 - 10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
 - 11. Summary of contents including the following:
 - a. Indicated versus final performance.
 - b. Notable characteristics of systems.
 - c. Description of system operation sequence if it varies from the Contract Documents.
 - 12. Nomenclature sheets for each item of equipment.
 - 13. Data for terminal units, including manufacturer's name, type, size, and fittings.
 - 14. Notes to explain why certain final data in the body of reports vary from indicated values.
 - 15. Test conditions for fans and pump performance forms including the following:
 - a. Settings for outdoor-, return-, and exhaust-air dampers.
 - b. Conditions of filters.
 - c. Cooling coil, wet- and dry-bulb conditions.
 - d. Face and bypass damper settings at coils.
 - e. Fan drive settings including settings and percentage of maximum pitch diameter.
 - f. Inlet vane settings for variable-air-volume systems.
 - g. Settings for supply-air, static-pressure controller.
 - h. Other system operating conditions that affect performance.

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- D. System Diagrams: Include schematic layouts of air distribution systems. Present each system with single-line diagram and include the following:
1. Quantities of outdoor, supply, return, and exhaust airflows.
 2. Duct, outlet, and inlet sizes.
 3. Position of balancing devices.
- E. Air-Handling-Unit Test Reports: For air-handling units with coils, include the following:
1. Unit Data:
 - a. Unit identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and unit size.
 - e. Manufacturer's serial number.
 - f. Unit arrangement and class.
 - g. Discharge arrangement.
 - h. Sheave make, size in inches, and bore.
 - i. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 - j. Number, make, and size of belts.
 - k. Number, type, and size of filters.
 2. Motor Data:
 - a. Motor make, and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - e. Sheave make, size in inches, and bore.
 - f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 3. Test Data (Indicated and Actual Values):
 - a. Total air flow rate in cfm.
 - b. Total system static pressure in inches wg.
 - c. Fan rpm.
 - d. Discharge static pressure in inches wg.
 - e. Filter static-pressure differential in inches wg.
 - f. Preheat-coil static-pressure differential in inches wg.
 - g. Cooling-coil static-pressure differential in inches wg.
 - h. Heating-coil static-pressure differential in inches wg.
 - i. Outdoor airflow in cfm.
 - j. Return airflow in cfm.
 - k. Outdoor-air damper position.
 - l. Return-air damper position.
- F. Apparatus-Coil Test Reports:
1. Coil Data:

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- a. System identification.
 - b. Location.
 - c. Coil type.
 - d. Number of rows.
 - e. Fin spacing in fins per inch o.c.
 - f. Make and model number.
 - g. Face area in sq. ft..
 - h. Tube size in NPS.
 - i. Tube and fin materials.
 - j. Circuiting arrangement.
 2. Test Data (Indicated and Actual Values):
 - a. Air flow rate in cfm.
 - b. Average face velocity in fpm.
 - c. Air pressure drop in inches wg.
 - d. Outdoor-air, wet- and dry-bulb temperatures in deg F.
 - e. Return-air, wet- and dry-bulb temperatures in deg F.
 - f. Entering-air, wet- and dry-bulb temperatures in deg F.
 - g. Leaving-air, wet- and dry-bulb temperatures in deg F.
 - h. Refrigerant expansion valve and refrigerant types.
 - i. Refrigerant suction pressure in psig.
 - j. Refrigerant suction temperature in deg F.
- G. **Gas- Fired Heat Apparatus Test Reports:** In addition to manufacturer's factory startup equipment reports, include the following:
1. Unit Data:
 - a. System identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and unit size.
 - e. Manufacturer's serial number.
 - f. Fuel type in input data.
 - g. Output capacity in Btu/h.
 - h. Ignition type.
 - i. Burner-control types.
 - j. Motor horsepower and rpm.
 - k. Motor volts, phase, and hertz.
 - l. Motor full-load amperage and service factor.
 - m. Sheave make, size in inches, and bore.
 - n. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 2. Test Data (Indicated and Actual Values):
 - a. Total air flow rate in cfm.
 - b. Entering-air temperature in deg F.
 - c. Leaving-air temperature in deg F.
 - d. Air temperature differential in deg F.
 - e. Entering-air static pressure in inches wg.

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- f. Leaving-air static pressure in inches wg.
 - g. Air static-pressure differential in inches wg.
 - h. Low-fire fuel input in Btu/h.
 - i. High-fire fuel input in Btu/h.
 - j. Manifold pressure in psig.
 - k. High-temperature-limit setting in deg F.
 - l. Operating set point in Btu/h.
 - m. Motor voltage at each connection.
 - n. Motor amperage for each phase.
- H. **Electric-Coil Test Reports:** For electric furnaces, duct coils, and electric coils installed in central-station air-handling units, include the following:
 - 1. Unit Data:
 - a. System identification.
 - b. Location.
 - c. Coil identification.
 - d. Capacity in Btu/h.
 - e. Number of stages.
 - f. Connected volts, phase, and hertz.
 - g. Rated amperage.
 - h. Air flow rate in cfm.
 - i. Face area in sq. ft..
 - j. Minimum face velocity in fpm.
 - 2. Test Data (Indicated and Actual Values):
 - a. Heat output in Btu/h.
 - b. Air flow rate in cfm.
 - c. Air velocity in fpm.
 - d. Entering-air temperature in deg F.
 - e. Leaving-air temperature in deg F.
 - f. Voltage at each connection.
 - g. Amperage for each phase.
- I. Fan Test Reports: For supply, return, and exhaust fans, include the following:
 - 1. Fan Data:
 - a. System identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and size.
 - e. Manufacturer's serial number.
 - f. Arrangement and class.
 - g. Sheave make, size in inches, and bore.
 - h. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 - 2. Motor Data:

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- a. Motor make, and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - e. Sheave make, size in inches, and bore.
 - f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 - g. Number, make, and size of belts.
 3. Test Data (Indicated and Actual Values):
 - a. Total airflow rate in cfm.
 - b. Total system static pressure in inches wg.
 - c. Fan rpm.
 - d. Discharge static pressure in inches wg.
 - e. Suction static pressure in inches wg.
 - J. Round, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:
 1. Report Data:
 - a. System and air-handling-unit number.
 - b. Location and zone.
 - c. Traverse air temperature in deg F.
 - d. Duct static pressure in inches wg.
 - e. Duct size in inches.
 - f. Duct area in sq. ft..
 - g. Indicated air flow rate in cfm.
 - h. Indicated velocity in fpm.
 - i. Actual air flow rate in cfm.
 - j. Actual average velocity in fpm.
 - k. Barometric pressure in psig.
 - K. Instrument Calibration Reports:
 1. Report Data:
 - a. Instrument type and make.
 - b. Serial number.
 - c. Application.
 - d. Dates of use.
 - e. Dates of calibration.
- 3.12 ADDITIONAL TESTS
- A. Within 120 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.
 - B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

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SECTION 230713 - DUCT INSULATION

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 insulating the following duct services:
 - 1. Outdoor, exposed exhaust ductwork.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied if any).

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.
- C. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
 - 1. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

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1.6 DELIVERY, STORAGE, AND HANDLING

- A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.7 COORDINATION

- A. Coordinate sizes and locations of supports, hangers, and insulation shields.
- B. Coordinate clearance requirements with duct Installer for duct insulation application. Before preparing ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

1.8 SCHEDULING

- A. Schedule insulation application with other trades.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Comply with requirements in "Duct Insulation Schedule, General" article for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type II for sheet materials.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Armaflex USA.
 - b. Approved Equal.

2.2 ADHESIVES

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.
- B. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.

2.3 MASTICS

- A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

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B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-80/30-90.
 - b. Vimasco Corporation; 749.
2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
5. Color: White.

2.4 FACTORY-APPLIED JACKETS

- A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
1. Aluminum Jacket: Comply with ASTM B 209, Alloy 3003, 3005, 3105, or 5005, Temper H-14.
 - a. Sheet and roll stock ready for shop or field sizing.
 - b. Finish and thickness are indicated in field-applied jacket schedules.
 2. Moisture Barrier for Outdoor Applications: 3-mil-thick, heat-bonded polyethylene and kraft paper.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.
1. Verify that systems to be insulated have been tested and are free of defects.
 2. Verify that surfaces to be insulated are clean and dry.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.3 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of ducts and fittings.
- B. Install insulation materials, vapor barriers or retarders, jackets, and thicknesses required for each item of duct system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Keep insulation materials dry during application and finishing.
- G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- H. Install insulation with least number of joints practical.
- I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
- J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- K. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- L. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- M. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

3.4 DUCT INSULATION SCHEDULE, GENERAL

- A. Exposed, outdoor, round, exhaust-air duct insulation shall be the following:
 - 1. Flexible Elastomeric: 2 inches thick with aluminum jacket.
- B. Exposed, outdoor, rectangular, return duct insulation at transition from silencer to field assembled ductwork shall be the following:
 - 1. Flexible Elastomeric: 1 inches thick with aluminum jacket. Extend exterior insulation 1'-0" on either side of the joint connecting the silencer to the field assembled ductwork.

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SECTION 233113 - METAL DUCTS

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. Single-wall rectangular ducts and fittings.
2. Single-wall round ducts and fittings.
3. Sheet metal materials.
4. Duct liner.
5. Sealants and gaskets.
6. Hangers and supports.

- B. All round exhaust ductwork on this project shall be spiral type with a negative pressure rating of 10" w.g.

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Duct hangers and supports shall withstand the effects of gravity loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"

1.4 ACTION SUBMITTALS

A. Product Data: For each type of the following products:

1. Liners and adhesives.
2. Sealants and gaskets.
3. Hanger, supports, and anchors.

B. Shop Drawings:

1. Shop Drawings: 1/8" = 1' foot scale. Show fabrication and installation details for metal ducts.
2. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
3. Factory- and shop-fabricated ducts and fittings.
4. Duct layout indicating sizes, configuration, liner material, and static-pressure classes.
5. Elevation of top of ducts.

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6. Dimensions of main duct runs from building grid lines.
7. Fittings.
8. Reinforcement and spacing.
9. Seam and joint construction.
10. Penetrations through fire-rated and other partitions.
11. Equipment installation based on equipment being used on Project.
12. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
13. Hangers and supports, including methods for duct and building attachment and vibration isolation.

C. Delegated-Design Submittal:

1. Sheet metal thicknesses.
2. Joint and seam construction and sealing not listed below.
3. Reinforcement details and spacing.
4. Materials, fabrication, assembly, and spacing of hangers and supports.

PART 2 - PRODUCTS

2.1 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.
- B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," "Rectangular Duct Reinforcement Tables," for static-pressure class listed in this specification, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- C. Longitudinal Seams: Shall be Type L-1, Pittsburgh seam and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," "Rectangular Duct/Longitudinal Seams," for applicable sealing requirements, materials involved, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Unless specified below select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Fittings and Other Construction," 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."

2.2 SINGLE-WALL ROUND DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.

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1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Lindab Inc.
 - b. McGill AirFlow LLC.
 - c. SEMCO Incorporated.
 - d. Spiral Manufacturing Co., Inc.
- B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse 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."
- C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," 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."
- D. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," 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."

2.3 SHEET METAL MATERIALS

- A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 1. Galvanized Coating Designation: G90.
 2. Finishes for Surfaces Exposed to View: Mill phosphatized.
- C. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
 1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.
- D. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

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2.4 DUCT LINER

- A. Fibrous-Glass Duct Liner: Comply with ASTM C 1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corporation
 - b. Johns Manville.
 - c. Knauf Insulation.
 - d. Owens Corning.
 2. Maximum Thermal Conductivity:
 - 1) Type I, Flexible: 0.27 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.
 3. Antimicrobial Erosion-Resistant Coating: Apply to the surface of the liner that will form the interior surface of the duct to act as a moisture repellent and erosion-resistant coating. Antimicrobial compound shall be tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.
 4. Solvent or Water-Based Liner Adhesive: Comply with NFPA 90A or NFPA 90B and with ASTM C 916.
 - a. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - b. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- B. Insulation Pins and Washers:
1. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.135-inch- diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.
 2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick galvanized steel; with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.
- C. Shop Application of Duct Liner: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 7-11, "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.

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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 with air velocity of 2500 fpm.
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 2500 fpm or where indicated.
9. 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.

2.5 SEALANT AND GASKETS

- A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
- B. Water-Based Joint and Seam Sealant:
 1. Application Method: Brush on.
 2. Solids Content: Minimum 65 percent.
 3. Shore A Hardness: Minimum 20.
 4. Water resistant.
 5. Mold and mildew resistant.
 6. VOC: Maximum 75 g/L (less water).
 7. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
 8. Service: Indoor or outdoor.
 9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.
- C. Solvent-Based Joint and Seam Sealant:
 1. Application Method: Brush on.
 2. Base: Synthetic rubber resin.
 3. Solvent: Toluene and heptane.
 4. Solids Content: Minimum 60 percent.
 5. Shore A Hardness: Minimum 60.
 6. Water resistant.
 7. Mold and mildew resistant.

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8. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
9. VOC: Maximum 395 g/L.
10. Maximum Static-Pressure Class: 10-inch wg, positive or negative.
11. Service: Indoor or outdoor.
12. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

D. Flanged Joint Sealant: Comply with ASTM C 920.

1. General: Single-component, acid-curing, silicone, elastomeric.
2. Type: S.
3. Grade: NS.
4. Class: 25.
5. Use: O.
6. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

F. Round Duct Joint O-Ring Seals:

1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg and shall be rated for 10-inch wg static-pressure class, positive or negative.
2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.6 HANGERS AND SUPPORTS

- A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.
- B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
- C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."
- D. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- E. Trapeze and Riser Supports:
 1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.

3.1 DUCT INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.
- B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.
- C. Install round ducts in maximum practical lengths.
- D. Install ducts with fewest possible joints.
- E. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.
- F. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- H. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.
- I. Route ducts to avoid passing through transformer vaults, electrical equipment rooms and enclosures, and elevator equipment rooms.
- J. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.
- K. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Section 233300 "Air Duct Accessories" for fire and smoke dampers.
- L. Protect duct interiors from moisture, construction debris and dust, and other foreign materials.

3.2 INSTALLATION OF EXPOSED DUCTWORK

- A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.
- B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.

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- C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.
- D. Maintain consistency, symmetry, and uniformity in the arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.
- E. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.3 DUCT SEALING

- A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

3.4 HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."
- B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
 - 1. Where practical, install concrete inserts before placing concrete.
 - 2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
 - 3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
 - 4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
- C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.
- D. Hangers Exposed to View: Threaded rod and angle or channel supports.
- E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.
- F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.5 FIELD QUALITY CONTROL

- A. Duct System Cleanliness Tests:

1. Visually inspect duct system to ensure that no visible contaminants are present.

3.6 DUCT CLEANING

- A. Clean new duct system(s) before testing, adjusting, and balancing.

3.7 DUCT SCHEDULE

- A. Fabricate ducts with galvanized sheet steel.

- B. Supply Ducts:

1. Ducts Connected to outlet of dust collection system:

- a. Pressure Class: Positive 4-inch wg.
- b. Minimum SMACNA Seal Class: A.

- C. Exhaust Ducts:

1. Ducts Connected to inlet of the dust collection system:

- a. Pressure Class: Negative 10-inch wg.
- b. Minimum SMACNA Seal Class: A.

- D. Intermediate Reinforcement:

1. Galvanized-Steel Ducts: Galvanized steel.

- E. Liner:

1. Supply Air Ducts: Fibrous glass, Type I, 1-1/2 inches thick-where duct are inside the building.
2. Supply Air Ducts: Fibrous glass, Type I, 3 inches thick-where duct are outside the building.
3. Exhaust Air Ducts: Fibrous glass, Type I, 1 inch thick.

- F. Elbow Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."
 - a. Radius Type RE 3 with minimum 1.5 radius-to-diameter ratio.
 - b. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
2. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "Round Duct Elbows."
 - a. Round Elbows, 4 Inches and Larger in Diameter: Standing seam or Welded.

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G. Branch Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-6, "Branch Connection."
 - a. Rectangular Main to Rectangular Branch: 45-degree entry.
 - b. Rectangular Main to Round Branch: Conical spin in or 45-degree lead in.
2. Round: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees." Saddle taps are permitted in existing duct.
 - a. Velocity all: 45-degree lateral.

END OF SECTION 233113

SECTION 233300 - AIR DUCT ACCESSORIES

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. Manual volume dampers.
 - 2. Flange connectors.
 - 3. Turning vanes.
 - 4. Flexible connectors.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

- A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
- B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

2.2 MATERIALS

- A. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - 1. Galvanized Coating Designation: G90.
 - 2. Exposed-Surface Finish: Mill phosphatized.
- B. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

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- C. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.3 MANUAL VOLUME DAMPERS

A. Standard, Steel, Manual Volume Dampers:

- 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. McGill AirFlow LLC.
 - b. Nailor Industries Inc.
 - c. Pottorff.
 - d. Ruskin Company.
- 2. Low leakage rating, with linkage outside airstream.
- 3. Suitable for horizontal or vertical applications.
- 4. Frames:
 - a. Frame: Hat-shaped, 0.094-inch- thick, galvanized sheet steel.
 - b. Mitered and welded corners.
 - c. Flanges for attaching to walls and flangeless frames for installing in ducts.
- 5. Blades:
 - a. Multiple or single blade.
 - b. Opposed-blade design.
 - c. Stiffen damper blades for stability.
 - d. Galvanized-steel, to match duct static pressure rating.
- 6. Blade Axles: Galvanized steel.
- 7. Bearings:
 - a. Molded synthetic.
 - b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
- 8. Tie Bars and Brackets: Galvanized steel.

B. Jackshaft:

- 1. Size: 0.5-inch diameter.
- 2. Material: Galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
- 3. Length and Number of Mountings: As required to connect linkage of each damper in multiple-damper assembly.

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2.4 FLANGE CONNECTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Ductmate Industries, Inc.
 - 2. Nexus PDQ; Division of Shilco Holdings Inc.
 - 3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Description: Add-on, factory-fabricated, slide-on transverse flange connectors, gaskets, and components.
- C. Material: Galvanized steel.
- D. Gage and Shape: Match connecting ductwork.

2.5 TURNING VANES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Ductmate Industries, Inc.
 - 2. Duro Dyne Inc.
 - 3. METALAIRE, Inc.
 - 4. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Manufactured Turning Vanes for Metal Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.
- C. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 4-3, "Vanes and Vane Runners," and 4-4, "Vane Support in Elbows."
- D. Vane Construction: Single wall.

2.6 FLEXIBLE CONNECTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Ductmate Industries, Inc.
 - 2. Duro Dyne Inc.
 - 3. Ventfabrics, Inc.
 - 4. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Materials: Flame-retardant or noncombustible fabrics.
- C. Coatings and Adhesives: Comply with UL 181, Class 1.

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- D. Metal-Edged Connectors: Factory fabricated with a fabric strip 5-3/4 inches wide attached to two strips of 2-3/4-inch- wide, 0.028-inch- thick, galvanized sheet steel or 0.032-inch- thick aluminum sheets. Provide metal compatible with connected ducts.
- E. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.
 - 1. Minimum Weight: 26 oz./sq. yd..
 - 2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
 - 3. Service Temperature: Minus 40 to plus 200 deg F.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.
- B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.
- C. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.
- D. Set dampers to fully open position before testing, adjusting, and balancing.
- E. Install test holes at fan inlets and outlets and elsewhere as indicated.
- F. Install flexible connectors to connect ducts to equipment.

3.2 FIELD QUALITY CONTROL

- A. Tests and Inspections:
 - 1. Operate dampers to verify full range of movement.
 - 2. Inspect locations of access doors and verify that purpose of access door can be performed.
 - 3. Operate fire dampers to verify full range of movement and verify that proper heat-response device is installed.
 - 4. Inspect turning vanes for proper and secure installation.
 - 5. Operate remote damper operators to verify full range of movement of operator and damper.

END OF SECTION 233300

SECTION 237413 - PACKAGED, OUTDOOR, CENTRAL-DUST COLLECTION UNITS

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. This Section includes packaged, outdoor, central-station air-handling units (rooftop units) with the following components and accessories:
 - 1. Pulse-Jet collector.
 - 2. Cartridge filters.

1.3 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design anchor supports to comply with wind performance requirements using performance requirements and design criteria indicated.
- B. Wind-Restraint Performance:
 - 1. Basic Wind Speed: 90 mph.
 - 2. Minimum 10 lb/sq. ft multiplied by the maximum area of the mechanical component projected on a vertical plane that is normal to the wind direction, and 45 degrees either side of normal.

1.4 ACTION SUBMITTALS

- A. Product Data: Include manufacturer's technical data for dust collection system, including rated capacities, certified fan curve, dimensions, required clearances, characteristics, furnished specialties, and accessories.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 1. Wiring Diagrams: Power, signal, and control wiring.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For dust collection system to include in emergency, operation, and maintenance manuals.

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1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to replace components of dust collection system that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period for fan: Manufacturer's standard, but not less than five years from date of Substantial Completion.
 - 2. Warranty Period for cartridge filters: Manufacturer's standard, but not less than 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Donaldson Torit.
 - 2. Approved Equal.

2.2 COLLECTER

- A. Furnish a complete Downflo Evolution Pulse-jet dust collector system as shown on the plans and/or listed in the equipment schedule. The system shall be capable of providing continuous on-line cleaning for a volumetric flow rate of 4,000 SCFM (minimum flow rate just prior to filter cleaning). The collector system equipped with Donaldson Torit UltraWeb cartridges shall operate at a filtering velocity of 2.6-1 FPM. The pulse-jet cartridge collector shall be supplied as major sub-assemblies sized to meet airflow capacities and design requirements and shall include instruction manual and replacement parts list for easy assembly and maintenance.
- B. Each module shall be of bolted and welded construction using 7-, 10-, and 12-gauge carbon steel designed for -25" water gauge. It shall come complete with pulse-jet hardware, 1" single diaphragm valves, pilot solenoid valves in NEMA 4 enclosure, 4" square x 3/16" wall tubing compressed air manifold, 4" x 4" structural angles support legs with cross bracing, and discharge hopper with an octagonal outlet to prevent bridging.

2.3 FILTER CARTRIDGES

- A. Filter cartridges shall be arranged in a horizontal orientation. They shall be serviced from outside the collector through a front access port. 3-rod filter support yokes shall ensure filters cartridges are installed properly with the filter cartridge gaskets facing in
- B. Dust-laden air will enter the collector above the filter cartridges and be distributed to the venturi dropout zone near the back of the dirty air plenum and around the filter elements by an air distribution baffle above the cartridges to provide even dust loading and to minimize abrasion.

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Heavy dust particles will fall into the collection hopper at the base of the collector and small, light particles will be collected on the media surface. Clean air will pass through the media, enter the clean air chamber, and exit on the rear side of the collector.

2.4 CONTROLLER

- A. The collector will be controlled and filter cleaning initiated by a solid-state printed circuit controller. The cleaning controller shall energize pilot solenoid valves at regular intervals, causing the diaphragm valves to release 60 psig compressed air to the filter cartridges. Each pulse will be discharged through a diaphragm valve, blowpipe, and venture before entering the filter cartridge to dislodge dust from the surface of the filter. The cleaning system shall incorporate venturies that extend from the tubesheet into the dirty air plenum in order to deliver uniform and maximum pulse cleaning energy over the entire length of the filter cartridges. Dust removed during pulse cleaning will be continuously removed from the hopper at the base of the collector.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the dust collector.
- B. Examine roughing-in for dust collector to verify actual locations of equipment and duct connections before equipment installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Concrete Bolted Connections: The dust collector shall be attached to the existing concrete surface in the location indicated on the drawings and verified by the contractor. The contractor shall provide concrete anchor bolts for the dust collector support leg bolt pattern using all stainless steel bolts, nuts and washers. Dust collector shall be installed level and at right angles to the existing building.

3.3 CONNECTIONS

- A. Install 1" diameter galvanized schedule 40 pipe and fitting from the existing compressed air system to the dust collector connection point. Ensure that maintenance access to any part of the dust collector is not obstructed by the piping.
- B. Duct installation requirements are specified in other HVAC Sections. Drawings indicate the general arrangement of ducts. The following are specific connection requirements:

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1. Install ducts to termination at top duct connect flange on dust collector (intake) and silencer (discharge).

3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Report results in writing.
- B. Remove and replace malfunctioning units and retest as specified above.

3.5 CLEANING AND ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to site during other-than-normal occupancy hours for this purpose.
- B. After completing system installation and testing, adjusting, and balancing the dust collection and air-distribution systems, the filters shall be cleaned.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain the dust collection system.

END OF SECTION 237413

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.

1.3 DEFINITIONS

- A. VFC: Variable frequency controller.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA or an NRTL.
 - 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

- A. 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:

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1. Alcan Products Corporation; Alcan Cable Division.
2. American Insulated Wire Corp.; a Leviton Company.
3. General Cable Corporation.
4. Senator Wire & Cable Company.
5. Southwire Company.

B. Copper Conductors: Comply with NEMA WC 70/ICEA S-95-658.

C. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for Type THHN-2-THWN-2.

2.2 CONNECTORS AND SPLICES

A. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.3 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 NFPA 70.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Exposed Feeders: Type THHN-2-THWN-2, single conductors in raceway.

B. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN-2-THWN-2, single conductors in raceway.

C. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-2-THWN-2, single conductors in raceway.

D. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-2-THWN-2, single conductors in raceway.

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- E. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-2-THWN-2, single conductors in raceway.
- F. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.
- B. 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.
- C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

3.4 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 of slack.

3.5 IDENTIFICATION

- A. Identify and color-code conductors and cables per the NEC.
- B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.6 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.

3.7 FIRE-STOPPING

- A. Apply fire-stopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly.

3.8 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test feeder and branch conductors for compliance with requirements.
 - 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
- B. Test and Inspection Reports: Prepare a written report 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.
- C. Cables will be considered defective if they do not pass tests and inspections.

END OF SECTION

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 systems and equipment.
- B. Section includes grounding systems and equipment.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.4 INFORMATIONAL SUBMITTALS

- A. Informational Submittals: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article, including the following:
 - 1. Grounding for sensitive electronic equipment.
- B. Qualification Data: For qualified testing agency and testing agency's field supervisor.
- C. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA or an NRTL.
 - 1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.
- 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 467 for grounding and bonding materials and equipment.

2.1 CONDUCTORS

- A. Insulated Conductors: Copper or tinned-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 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 wide and 1/16 inch thick.
 - 7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
- C. Bare Grounding Conductor and Conductor Protector for Wood Poles:
 - 1. No. 4 AWG minimum, soft-drawn copper.
 - 2. Conductor Protector: Half-round PVC or wood molding; if wood, use pressure-treated fir, cypress, or cedar.
- D. Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 by 4 inches, in cross section, with 9/32-inch holes spaced 1-1/8 inches apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V. Lexan or PVC, impulse tested at 5000 V.

2.2 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. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.
 - 1. Pipe Connectors: Clamp type, sized for pipe.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
- D. Bus-bar Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- B. 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.
- C. Grounding Bus: Install in electrical and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
 - 1. Install bus on insulated spacers 2 inches minimum from wall, 6 inches 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 to specified height above floor; connect to horizontal bus.
- D. 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 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- B. 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.
- C. 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.
- D. 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.
- E. 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.

- F. Signal and Communication Equipment: In addition to grounding and bonding required by NFPA 70, provide a separate grounding system complying with requirements in TIA/ATIS J-STD-607-A.

3.3 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. 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.
- C. 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.
- D. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install tinned bonding jumper to bond across flexible duct connections to achieve continuity.

3.4 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

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END OF SECTION

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. This Section includes the following:
 - 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. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

1.5 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Steel slotted support systems.
 - 2. Nonmetallic slotted support systems.
- B. Shop Drawings: Show fabrication and installation details and include calculations for the following:

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1. Trapeze hangers. Include Product Data for components.
2. Steel slotted channel systems. Include Product Data for components.
3. Nonmetallic slotted channel systems. Include Product Data for components.
4. Equipment supports.

1.6 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

1.7 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Comply with NFPA 70.

1.8 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified together with concrete Specifications.
- B. Coordinate installation of roof curbs, equipment supports, and roof penetrations.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
 1. 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:
 - a. Allied Tube & Conduit.
 - b. Cooper B-Line, Inc.; a division of Cooper Industries.
 - c. ERICO International Corporation.
 - d. GS Metals Corp.
 - e. Thomas & Betts Corporation.
 - f. Unistrut; Tyco International, Ltd.
 - g. Wesanco, Inc.
 2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 3. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.

4. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
 5. Channel Dimensions: Selected for applicable load criteria.
- B. Nonmetallic Slotted Support Systems: Structural-grade, factory-formed, glass-fiber-resin channels and angles with 9/16-inch- diameter holes at a maximum of 8 inches o.c., in at least 1 surface.
1. 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:
 - a. Allied Tube & Conduit.
 - b. Cooper B-Line, Inc.; a division of Cooper Industries.
 - c. Fabco Plastics Wholesale Limited.
 - d. Seasafe, Inc.
 2. Fittings and Accessories: Products of channel and angle manufacturer and designed for use with those items.
 3. Fitting and Accessory Materials: Same as channels and angles.
 4. Rated Strength: Selected to suit applicable load criteria.
- C. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- D. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- E. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored 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 malleable iron.
- F. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- G. 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.
 - 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) Hilti Inc.
 - 2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 3) MKT Fastening, LLC.
 - 4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.

2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
 - 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) Cooper B-Line, Inc.; a division of Cooper Industries.
 - 2) Empire Tool and Manufacturing Co., Inc.
 - 3) Hilti Inc.
 - 4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 5) MKT Fastening, LLC.
3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type 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.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

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 except if requirements in this Section are stricter.
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch 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 two-bolt conduit clamps.
- D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

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, EMT, IMC, and RMC may be supported by openings through structure members, as permitted in 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.
- 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 New Concrete: Bolt to concrete inserts.
 - 2. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - 3. To Existing Concrete: Expansion anchor fasteners.
 - 4. 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 thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
 - 5. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
 - 6. To Light Steel: Sheet metal screws.
 - 7. 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.
- E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- B. 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 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, 28-day compressive-strength concrete.

C. Anchor equipment to concrete base.

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.
- 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.

1.3 DEFINITIONS

- A. ARC: Aluminum rigid conduit.
- B. GRC: Galvanized rigid steel conduit.
- C. IMC: Intermediate metal conduit.

1.4 ACTION SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

- A. 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:
 - 1. AFC Cable Systems, Inc.
 - 2. Allied Tube & Conduit; a Tyco International Ltd. Co.
 - 3. Anamet Electrical, Inc.

4. Electri-Flex Company.
 5. O-Z/Gedney; a brand of EGS Electrical Group.
 6. Southwire Company.
 7. Thomas & Betts Corporation.
 8. Western Tube and Conduit Corporation.
 9. Wheatland Tube Company; a division of John Maneely Company.
- B. 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.
- C. GRC: Comply with ANSI C80.1 and UL 6.
- D. ARC: Comply with ANSI C80.5 and UL 6A.
- E. IMC: Comply with ANSI C80.6 and UL 1242.
- F. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.
1. Comply with NEMA RN 1.
 2. Coating Thickness: 0.040 inch, minimum.
- G. EMT: Comply with ANSI C80.3 and UL 797.
- H. FMC: Comply with UL 1; zinc-coated steel.
- I. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.
- J. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
1. Fittings for EMT:
 - a. Material: Steel.
 - b. Type: Setscrew.
 2. 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.
 3. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.
- K. 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. 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:

1. AFC Cable Systems, Inc.
 2. Arnco Corporation.
 3. CANTEX Inc.
 4. CertainTeed Corp.
 5. Electri-Flex Company.
 6. RACO; a Hubbell company.
 7. Thomas & Betts Corporation.
- B. 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.
- C. ENT: Comply with NEMA TC 13 and UL 1653.
- D. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
- E. LFNC: Comply with UL 1660.
- F. Rigid HDPE: Comply with UL 651A.
- G. Continuous HDPE: Comply with UL 651B.
- H. Coilable HDPE: Preassembled with conductors or cables, and complying with ASTM D 3485.
- I. RTRC: Comply with UL 1684A and NEMA TC 14.
- J. Fittings for ENT and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
- K. Fittings for LFNC: Comply with UL 514B.
- L. Solvent cements and adhesive primers shall have a VOC content of 510 and 550 g/L or less, respectively, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- M. Solvent cements and adhesive primers shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

- A. 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:
1. Cooper B-Line, Inc.
 2. Hoffman; a Pentair company.
 3. Mono-Systems, Inc.
 4. Square D; a brand of Schneider Electric.

- B. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1, Type 3R, Type 4, Type 12 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.
- C. 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.
- D. Wireway Covers: Flanged-and-gasketed type unless otherwise indicated.
- E. Finish: Manufacturer's standard enamel finish.

2.4 NONMETALLIC WIREWAYS AND AUXILIARY GUTTERS

- A. 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:
 - 1. Allied Moulded Products, Inc.
 - 2. Hoffman; a Pentair company.
 - 3. Lamson & Sessions; Carlon Electrical Products.
 - 4. Niedax-Kleinhuis USA, Inc.
- B. Listing and Labeling: Nonmetallic wireways and auxiliary gutters shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. 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.
- D. Description: PVC, extruded and fabricated to required size and shape, and having snap-on cover, mechanically coupled connections, and plastic fasteners.
- E. 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.
- F. Solvent cements and adhesive primers shall have a VOC content of 510 and 550 g/L or less, respectively, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- G. Solvent cements and adhesive primers shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.5 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 Owner.
 - 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. Mono-Systems, Inc.
 - b. Panduit Corp.
 - c. Wiremold / Legrand.

2.6 BOXES, ENCLOSURES, AND CABINETS

- A. 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:
 - 1. Adalet.
 - 2. Cooper Technologies Company; Cooper Crouse-Hinds.
 - 3. FSR Inc.
 - 4. Hoffman; a Pentair company.
 - 5. Hubbell Incorporated; Killark Division.
 - 6. RACO; a Hubbell Company.
 - 7. Spring City Electrical Manufacturing Company.
 - 8. Thomas & Betts Corporation.
 - 9. Wiremold / Legrand.
- B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
- C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.
- E. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.
- F. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb shall be listed and marked for the maximum allowable weight.
- G. Paddle Fan Outlet Boxes: Nonadjustable, designed for attachment of paddle fan weighing 70 lb.

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.
- H. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- I. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, galvanized, cast iron with gasketed cover.
- J. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
- K. Device Box Dimensions: 4 inches square by 2-1/8 inches deep.
- L. Gangable boxes are allowed.
- M. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type as indicated, with continuous-hinge cover with flush latch unless otherwise indicated.
 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 2. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
 1. Exposed Conduit: GRC.
 2. Concealed Conduit, Aboveground: EMT.
 3. Underground Conduit: RNC.
 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: GRC. Raceway locations include the following:
 - a. Loading dock.
 - b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
 - c. Mechanical rooms.
 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: GRC.
 7. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel in damp or wet locations.
- C. Minimum Raceway Size: 3/4-inch] trade size.
- D. 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.
- E. 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.
- F. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.
- G. Install surface raceways only where indicated on Drawings.
- H. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

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 6 inches 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. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- E. 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 of changes in direction.

- F. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- G. Support conduit within 12 inches of enclosures to which attached.
- H. Raceways Embedded in Slabs:
 - 1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot intervals.
 - 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
 - 3. Arrange raceways to keep a minimum of 1 inch of concrete cover in all directions.
 - 4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
 - 5. Change from ENT to GRC before rising above floor.
- 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 trade size and insulated throat metal bushings on 1-1/2-inch 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 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. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches 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 radius control at bend points.
2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches 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. Comply with manufacturer's written instructions for solvent welding RNC and fittings.

V. Expansion-Joint Fittings:

1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F and that has straight-run length that exceeds 25 feet. Install in each run of aboveground RMC and EMT conduit that is located where environmental temperature change may exceed 100 deg F and that has straight-run length that exceeds 100 feet.
2. 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 temperature change.
 - b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
 - c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.
 - d. Attics: 135 deg F temperature change.
3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F 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 of temperature change for metal conduits.
4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.

5. 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.
- W. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches of flexible conduit for recessed and semi-recessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
 1. Use LFMC in damp or wet locations subject to severe physical damage.
 2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.
- X. 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.
- Y. 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.
- Z. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
- AA. Locate boxes so that cover or plate will not span different building finishes.
- BB. 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.
- CC. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
- DD. Set metal floor boxes level and flush with finished floor surface.
- EE. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.

3.4 FIRE-STOPPING

- A. Install fire-stopping at penetrations of fire-rated floor and wall assemblies.

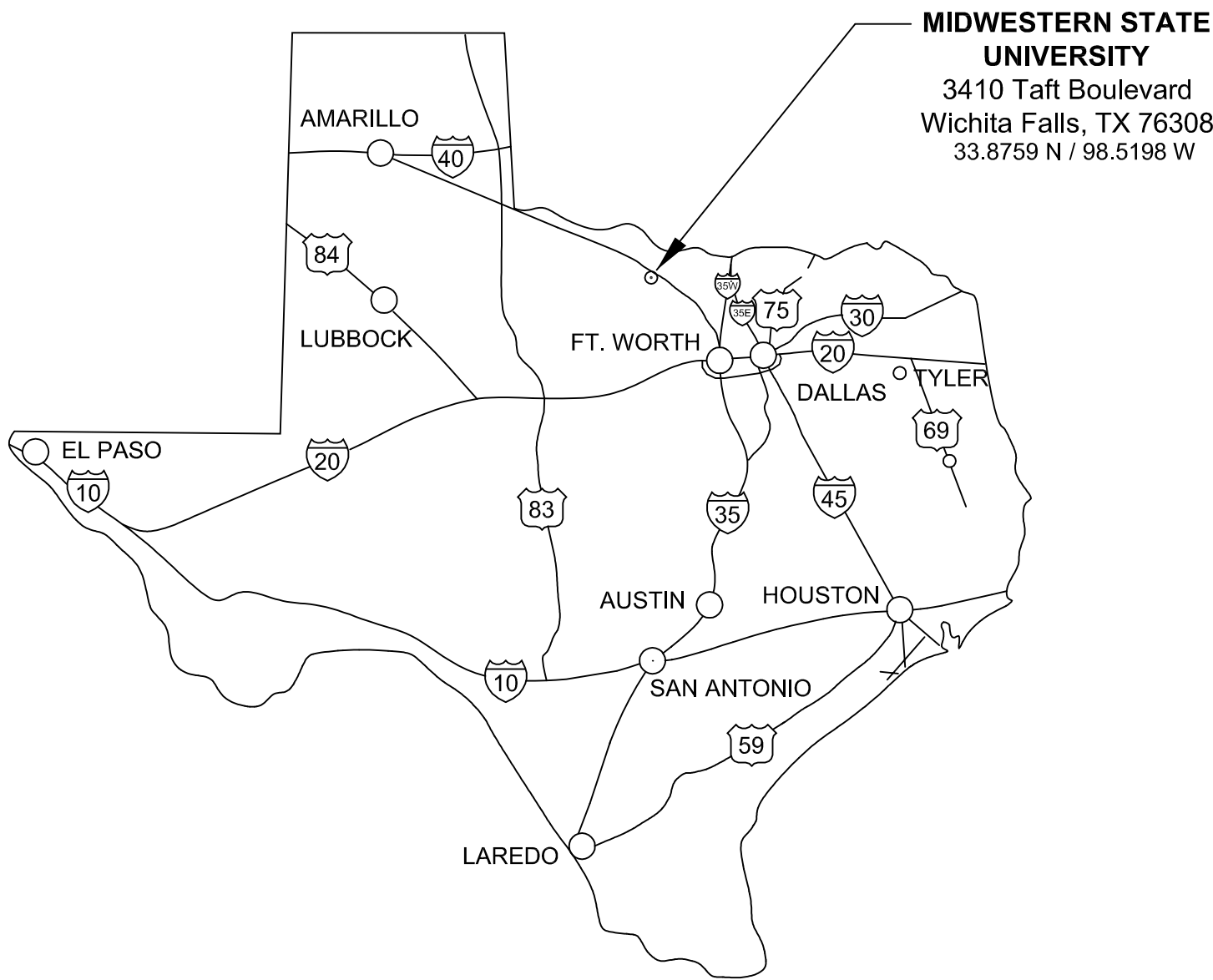
3.5 PROTECTION

- 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

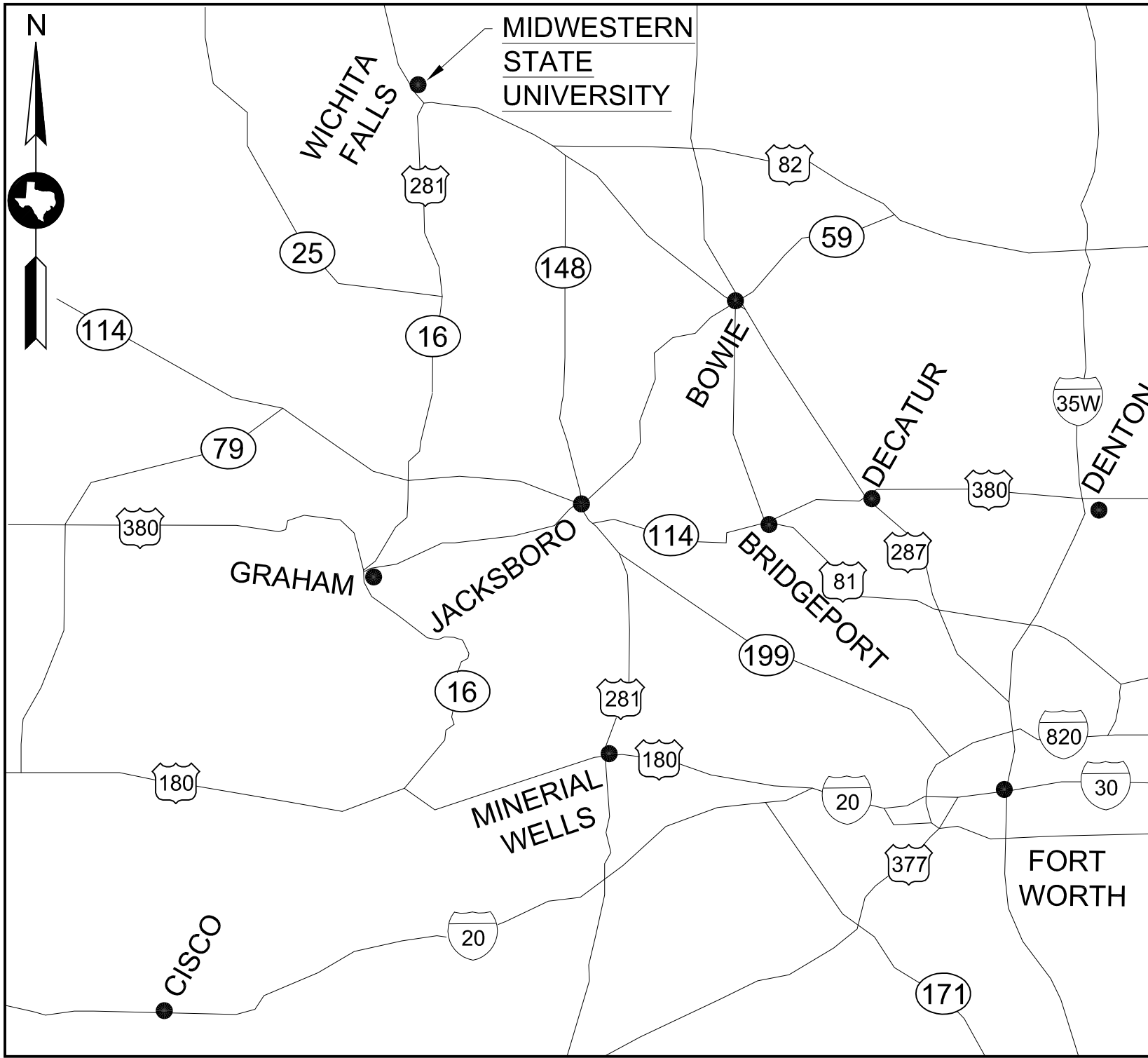
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FAIN FINE ARTS - CERAMICS LAB VENTILATION AND DUST CONTROL SYSTEM NOCONA TRAIL, WICHITA FALLS, TX

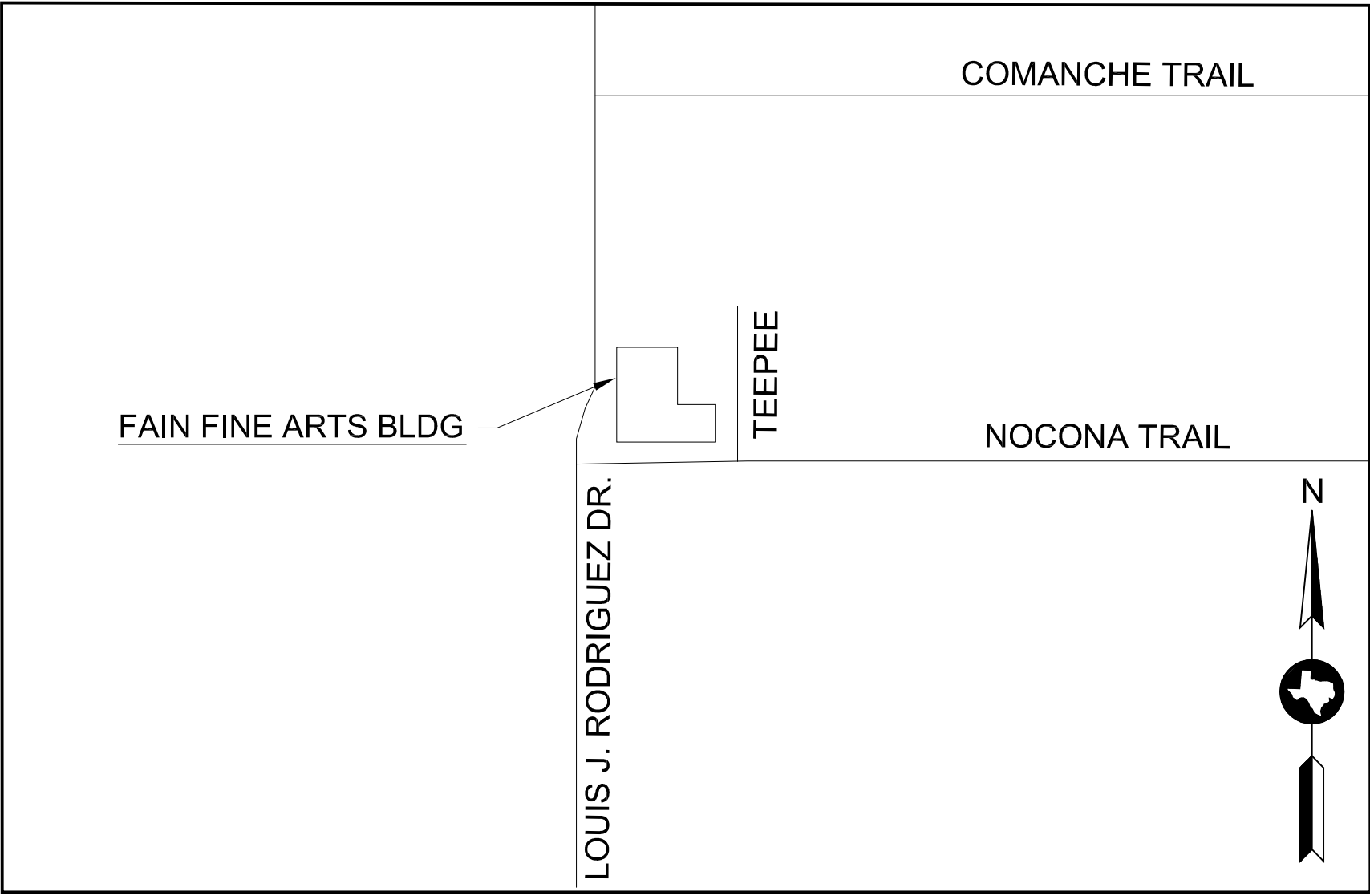


1300 Summit Avenue Suite 500 Fort Worth, Texas 76102
Office 817 878 4242 Facsimile 817 878 4240
4144 N. Central Expwy Suite 635 Dallas, Texas 75204
Office 214 420 9111 www.summitmep.com

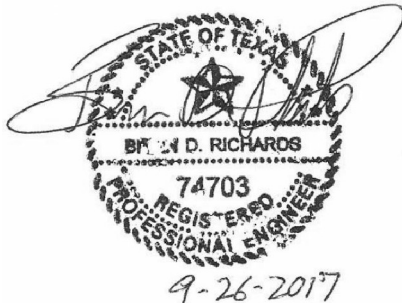


REGIONAL VIEW
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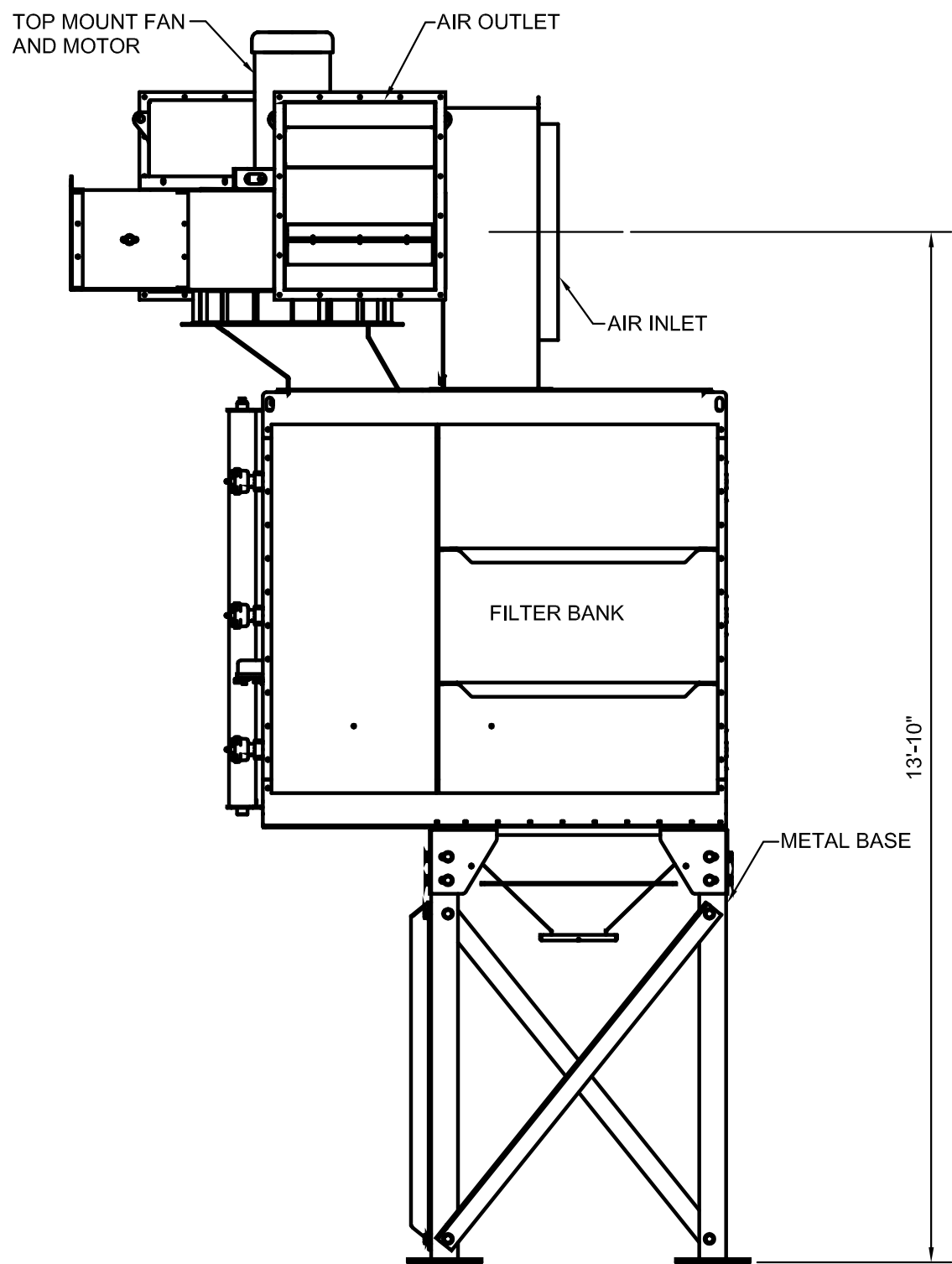
DRAWING INDEX	
DRAWING NUMBER	DRAWING TITLE
COVER	COVER DRAWING
M0.1	MECHANICAL NOTES AND DETAILS
M1.1	MECHANICAL DEMOLITION PLAN
M2.1	MECHANICAL FLOOR PLAN
E2.1	ELECTRICAL FIRST FLOOR PLAN
E2.2	ELECTRICAL SECOND FLOOR PLAN



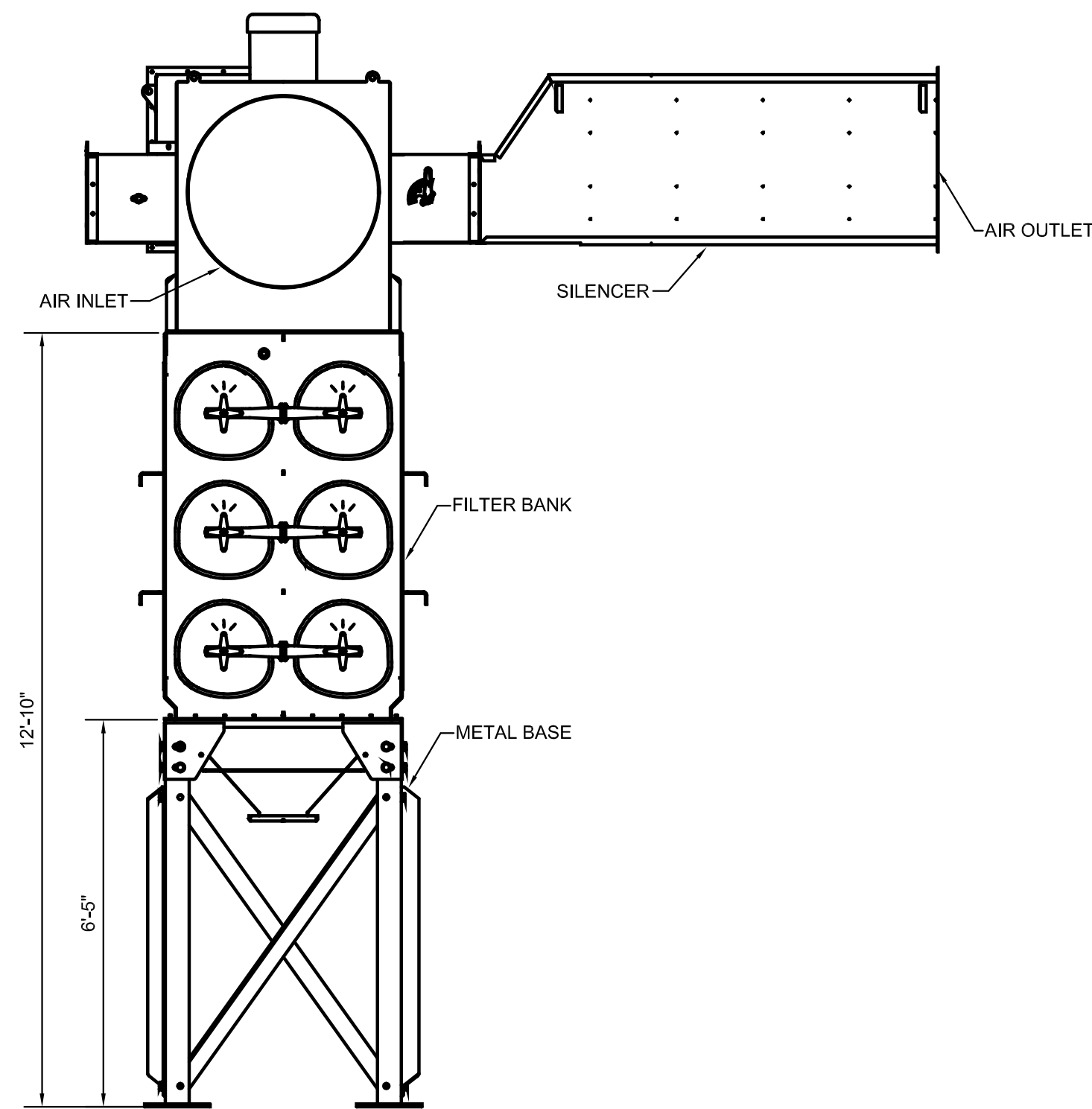
VICINITY MAP
N.T.S.



ISSUED FOR CONSTRUCTION
09/26/2017

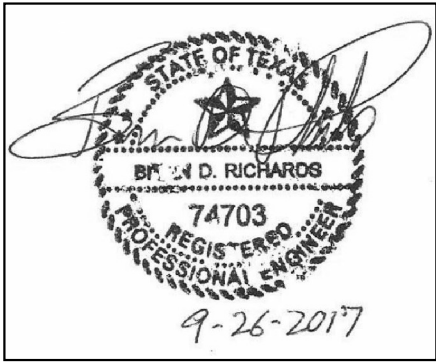


2 DUST COLLECTOR DCS-1 SIDE ELEVATION
SCALE: NO SCALE



1 DUST COLLECTOR DCS-1 FRONT ELEVATION
SCALE: NO SCALE

MECHANICAL SYMBOLS AND ABBREVIATIONS			NOTE: ALL SYMBOLS AND ABBREVIATIONS SHOWN ARE NOT NECESSARILY USED ON THE DRAWINGS
GENERAL NOTES			
<p>1. PERFORM ALL WORK IN ACCORDANCE WITH ALL APPLICABLE CODES AND AUTHORITIES HAVING JURISDICTION. PROVIDE ALL PERMITS, INSPECTIONS, LICENSES AND FEES. FURNISH ALL LABOR, EQUIPMENT, SUPPLIES AND MATERIALS NECESSARY TO PROVIDE COMPLETE AND OPERATIONAL SYSTEMS.</p> <p>2. THE DRAWINGS AND SPECIFICATIONS INDICATE THE GENERAL DESIGN AND ARRANGEMENT OF PIPES, FIXTURES, EQUIPMENT, SYSTEMS, ETC. INFORMATION SHOWN IS DIAGRAMMATIC IN CHARACTER AND DOES NOT NECESSARILY INDICATE EVERY REQUIRED OFFSET, FITTING, ETC. DO NOT SCALE THE DRAWINGS FOR DIMENSIONS. TAKE ALL DIMENSIONS, MEASUREMENTS, EQUIPMENT LOCATIONS, LEVELS, ETC FROM THE ARCHITECTURAL DRAWINGS AND FROM THE EQUIPMENT TO BE FURNISHED. PIPING MAY BE RELOCATED OR OFFSET FOR PROPER CLEARANCES OR TO AVOID CONFLICTS WITH OTHER TRADES. THE DESIGN INTENT (I.E. PITCHES, VELOCITIES, PRESSURE DROPS, VOLTAGE DROPS, ETC) CANNOT BE GREATLY ALTERED WITHOUT THE APPROVAL OF THE ARCHITECT. THE COST OF THESE DEVIATIONS TO AVOID INTERFERENCE'S SHALL BE PART OF THE ORIGINAL CONTRACT BID.</p> <p>3. CONFER AND COOPERATE WITH ALL OTHER TRADES TO COORDINATE THEIR WORK. COORDINATION SHALL INCLUDE, BUT SHALL NOT BE LIMITED TO MATERIALS AND EQUIPMENT ROUTED IN CEILING AND WALL CAVITIES, EQUIPMENT ARRANGEMENT IN MECHANICAL SPACES, INCLUDING EQUIPMENT CLEARANCE REQUIREMENTS, ELEVATIONS AND DIMENSIONS OF STRUCTURAL MEMBERS AND OPENINGS, ETC. NOTIFY THE ARCHITECT OF ANY CONFLICTS.</p> <p>4. BASE FINAL INSTALLATION OF MATERIALS AND EQUIPMENT ON ACTUAL DIMENSIONS AND CONDITIONS AT THE PROJECT SITE. FIELD MEASURE FOR MATERIALS AND EQUIPMENT REQUIRING EXACT FIT. NO EXTRAS WILL BE GIVEN FOR THE CONTRACTORS FAILURE TO FIELD COORDINATE.</p> <p>5. THE OWNER OR ENGINEER ARE NOT RESPONSIBLE FOR SAFETY PRECAUTIONS OR FOR MEANS, METHODS, TECHNIQUES, CONSTRUCTION SEQUENCES, OR PROCEDURES REQUIRED TO PERFORM THE WORK.</p> <p>6. LOCATE ALL EQUIPMENT THAT MUST BE SERVICED, OPERATED, OR MAINTAINED IN FULLY ACCESSIBLE POSITIONS. EQUIPMENT SHALL INCLUDE (BUT NOT LIMITED TO) VALVES, MOTORS, CONTROLLERS, SWITCHGEAR, AND DRAIN POINTS IF REQUIRED FOR BETTER ACCESSIBILITY. FURNISH ACCESS DOORS FOR THIS PURPOSE. MINOR DEVIATIONS FROM THE DRAWINGS MAY BE ALLOWED TO PROVIDE FOR BETTER ACCESSIBILITY. ANY CHANGES SHALL BE APPROVED BY THE ARCHITECT PRIOR TO MAKING THE CHANGE.</p> <p>7. PROVIDE ACCESS DOORS, WALL OPENINGS, ROOF OPENINGS OR ANY OTHER CONSTRUCTION REQUIREMENT NEEDED TO ACCOMMODATE THE MECHANICAL EQUIPMENT. LOCATIONS OF THESE OPENINGS SHALL BE SUBMITTED IN SUFFICIENT TIME TO BE INSTALLED IN THE NORMAL COURSE OF WORK. ALL ACCESS DOORS SHALL HAVE GASKETS AND BE RATED FOR 10"W.G.</p> <p>8. COORDINATE ELECTRICAL REQUIREMENTS OF APPROVED EQUIPMENT WITH ALL TRADES PRIOR TO THE PURCHASE AND INSTALLATION OF ANY ELECTRICAL GEAR OR CONDUIT.</p> <p>9. ALL DIMENSIONS SHOWN ON THE DRAWINGS FOR DUCTWORK ARE NET INSIDE CLEAR DIMENSIONS, FOR RECTANGULAR DUCT, THE FIRST FIGURE OF THE DUCT SIZE INDICATES THE DIMENSION OF THE FACE SHOWN. VERIFY THAT THE DUCTWORK SPECIFIED WILL FIT IN THE SPACE AVAILABLE USING THE ARCHITECTURAL, STRUCTURAL AND ELECTRICAL DRAWINGS AS REFERENCE PRIOR TO FABRICATION AND INSTALLATION. ROUND DUCT OF EQUAL NET INSIDE CLEAR AREA MAY BE USED IN LIEU OF RECTANGULAR DUCT.</p> <p>10. PROVIDE TURNING VANES ON ALL RECTANGULAR SUPPLY, EXHAUST AND RETURN DUCTWORK INCLUDING THE TOP AND BOTTOM OF VERTICAL DUCTS.</p> <p>11. PROVIDE A HEAVY DUTY, LOCKING QUADRANT VOLUME DAMPER AT THE TAP OF EACH RUN-OUT TO DIFFUSERS FOR BALANCING PURPOSES, UNLESS OTHERWISE INDICATED. THE RUN-OUT DUCT SIZE IS THE SAME SIZE AS THE DIFFUSER OR GRILLE NECK SIZE UNLESS OTHERWISE INDICATED.</p> <p>12. ALL DUCTWORK SHALL BE SHEET METAL FABRICATED IN ACCORDANCE WITH SMACNA STANDARDS. ALL ROUND DUCTWORK SHALL BE SPIRAL TYPE WITH AT -10"W.G. GRATING WITH SEALING TO SMACNA CLASS A.</p> <p>13. PROVIDE VIBRATION ISOLATORS FOR MOTOR DRIVEN EQUIPMENT UNLESS NOTED OTHERWISE. PROVIDE ISOLATION AS INDICATED OR AS RECOMMENDED BY THE EQUIPMENT MANUFACTURER.</p> <p>14. SOME PIPES AND DUCTS SHOWN ON EACH FLOOR PLAN MAY BE SHOWN WITH AN OFFSET FOR CLARITY.</p> <p>15. SEAL ALL PIPE AND DUCT PENETRATIONS THROUGH FIRE RATED BUILDING ELEMENTS WITH AN APPROVED FIRE PROOFING MATERIAL.</p> <p>16. EXPAND OR REDUCE DUCTS AT EQUIPMENT CONNECTIONS BASED ON THE EQUIPMENT PURCHASED, WITH TRANSITIONS NOT TO EXCEED 30 DEGREES. SIZES SHOWN ON SCHEDULES, ETC. ARE FOR GUIDANCE ONLY. ASPECT RATIO SHALL BE NO GREATER THAN 4:1, PER SMACNA'S GUIDELINES.</p> <p>17. ALL DUCTS WITH A DIMENSION GREATER THAN 12" PASSING THRU A NONRATED WALL SHALL HAVE THE OPENING FRAMED IN WITH METAL STUDS. COORDINATE OPENING SIZE AND LOCATION WITH OTHER TRADES.</p> <p>18. TEST AND BALANCE SHALL BE PERFORMED BY AN AABC LICENSED FIRM IN THE TESTING, ADJUSTING, AND BALANCING (TAB) BUSINESS FOR A MINIMUM OF 10 YEARS. AABC FIRM SHALL SUBMIT A REPORT TO THE ENGINEER OF RECORD INDICATING EQUIPMENT NAMEPLATE DATA, DESIGN PERFORMANCE, INITIAL TESTED PERFORMANCE, AND FINAL ADJUSTED PERFORMANCE. REPORT SHALL BE SUBMITTED IN A TIMELY FASHION PRIOR TO JOB CLOSE-OUT. TAB SHALL BE PERFORMED ON ALL SYSTEMS SPECIFIED AS PART OF THIS CONTRACT. TAB FIRM SHALL PERFORM A FUNCTIONAL PERFORMANCE TEST OF THE SYSTEM BASED ON THE CONTRACT DOCUMENTS HEREIN SHALL AND RELAY ALL DISCREPANCIES AND OUTSTANDING CONSTRUCTION ITEMS RELATING TO THE MECHANICAL EQUIPMENT AND PERFORMANCE TO THE ENGINEER OF RECORD.</p>			
ABBREVIATIONS			
AD A/C A/E AFF AFS AHU APPROX BAS BHP BTU CA CC CFH CFM CLG CU D DEG DB DCS (E) EAT E/A EDH EF EQUIP EWT °F FCU FD FLA FLR FPVAV FSD FT. FT. WG GA GPM H HP HPC HPS HWR HWS HZ IN. IN.WG J-BOX KW	ACCESS DOOR AIR CONDITIONING UNIT ARCHITECT/ENGINEER ABOVE FINISHED FLOOR AIR FLOW SWITCH AIR HANDLING UNIT APPROXIMATE BUILDING AUTOMATION SYSTEM BRAKE HORSE POWER BRITISH THERMAL UNIT PER HOUR COMBUSTION AIR COOLING COIL CUBIC FEET PER HOUR CUBIC FEET PER MINUTE CEILING CONDENSING UNIT EQUIPMENT DRAIN DEGREES DRY BULB DUST COLLECTOR SYSTEM EXISTING ENTERING AIR TEMPERATURE EXHAUST AIR ELECTRIC DUCT HEATER EXHAUST FAN EQUIPMENT ENTERING WATER TEMPERATURE DEGREES FAHRENHEIT FAN COIL UNIT FIRE DAMPER FULL LOAD AMPS FLOOR FAN POWERED VAV FIRE SMOKE DAMPER FOOT, FEET FEET WATER GAUGE U.S. GAUGE GALLONS PER MINUTE HEIGHT HORSEPOWER HIGH PRESSURE CONDENSATE HIGH PRESSURE STEAM HEATING WATER RETURN HEATING WATER SUPPLY HERTZ INCH, INCHES INCHES WATER GAUGE JUNCTION BOX KILOWATT	L LAT LPC LPS LB LRA LWT MAX MBH MCA MFR MIN N/A N/O,N/C O/A OBD O/C O/E PH PROVIDE PRV PSI R/A RE: RL RLA RM RPM RS S/A SD SF SPECS T, TSTAT T/A THRU TSP TSTAT TYP UL UH V VAV VEL VFD W/ WB W/O	LENGTH LEAVING AIR TEMPERATURE LOW PRESSURE CONDENSATE LOW PRESSURE STEAM POUNDS LOCKED ROTOR AMPS LEAVING WATER TEMPERATURE MAXIMUM 1000 BRITISH THERMAL UNITS / HOUR MINIMUM CIRCUIT AMPACITY MANUFACTURER MINIMUM NOT APPLICABLE NORMALLY OPEN, NORMALLY CLOSED OUTSIDE AIR/FRESH AIR OPPOSED BLADE DAMPER ON CENTER PURGE EXHAUST FAN PHASE FURNISH AND INSTALL PRESSURE REDUCING VALVE POUNDS PER SQUARE INCH RETURN AIR REFERENCE, REFER REFRIGERANT LIQUID RUNNING LOAD AMPS ROOM REVOLUTIONS PER MINUTE REFRIGERANT SUCTION SUPPLY AIR SMOKE DETECTOR SQUARE FOOT, SUPPLY FAN SPECIFICATIONS THERMOSTAT, ROOM SENSOR TRANSFER AIR THROUGH TOTAL STATIC PRESSURE THERMOSTAT OR ROOM SENSOR TYPICAL UNDERWRITERS LABORATORIES, INC. UNIT HEATER VOLTS VARIABLE AIR VOLUME VELOCITY VARIABLE FREQUENCY DRIVE WITH WET BULB WITHOUT
DRAWING/DETAIL REFERENCE			
<p>REFER TO DRAWING/DETAIL NUMBER</p> <p>SHEET NUMBER</p> <p>NECK SIZE OR WIDTH X HEIGHT (FOR LOUVERS)</p> <p>AMOUNT OF AIR</p> <p>DIFFUSER, GRILLE DESIGNATION</p> <p>ELEVATION NUMBER</p> <p>SHEET NUMBER</p>			
MISCELLANEOUS			
<p>DRAWING NOTE REFERENCE (I.E., NOTES BY SYMBOL)</p> <p>CONNECTION INTO EXISTING</p>			
SYMBOLS			
SYMBOL	DESCRIPTION		
	ACOUSTICAL DUCT LINING (FIGURES SHOWN ARE INSIDE DUCT DIMENSIONS)		
	SUPPLY AIR DUCT UP (POSITIVE PRESSURE)		
	RETURN, EXHAUST OR OUTSIDE AIR INTAKE DUCT UP (NEGATIVE PRESSURE)		
	SUPPLY AIR DUCT DOWN (POSITIVE PRESSURE)		
	RETURN, EXHAUST OR OUTSIDE AIR INTAKE DUCT DOWN (NEGATIVE PRESSURE)		



JOB NUMBER:
P17175.00
DATE ISSUED:
Sept. 26, 2017

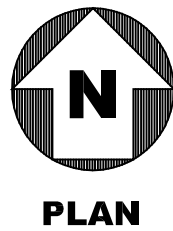
ISSUES:
ISSUED FOR REVIEW 09/11/2017
ISSUED FOR CONST. 09/26/2017

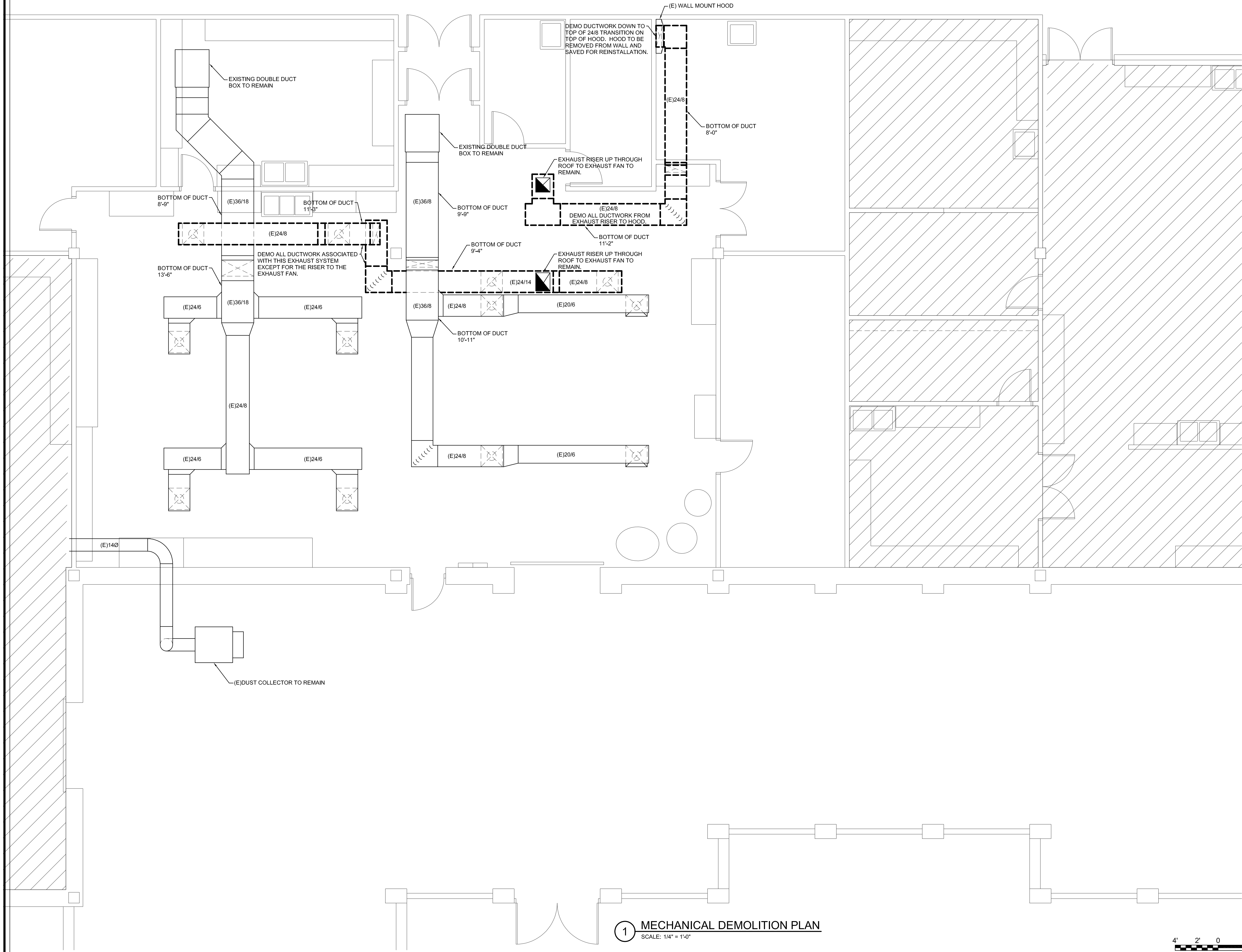
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SHEET CONTENTS:
MECHANICAL NOTES
AND DETAILS

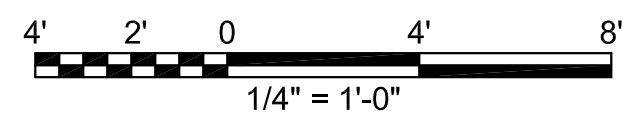
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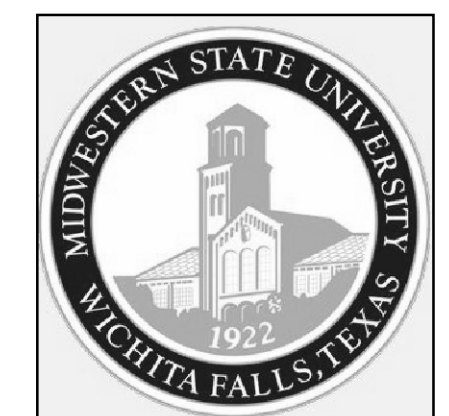




1 MECHANICAL DEMOLITION PLAN
SCALE: 1/4" = 1'-0"



Midwestern State University
Fain Fine Art - Ceramics Lab
Ventilation
3410 Tait Blvd.
Wichita Falls, TX 76308



JOB NUMBER:
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DATE ISSUED:
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ISSUES:
ISSUED FOR REVIEW 09/11/2017
ISSUED FOR CONST. 09/26/2017

REVISIONS:

NO.	DESCRIPTION	DATE

SHEET CONTENTS:
MECHANICAL DEMOLITION
PLAN

Midwestern State University
Fain Fine Art - Ceramics Lab
Ventilation

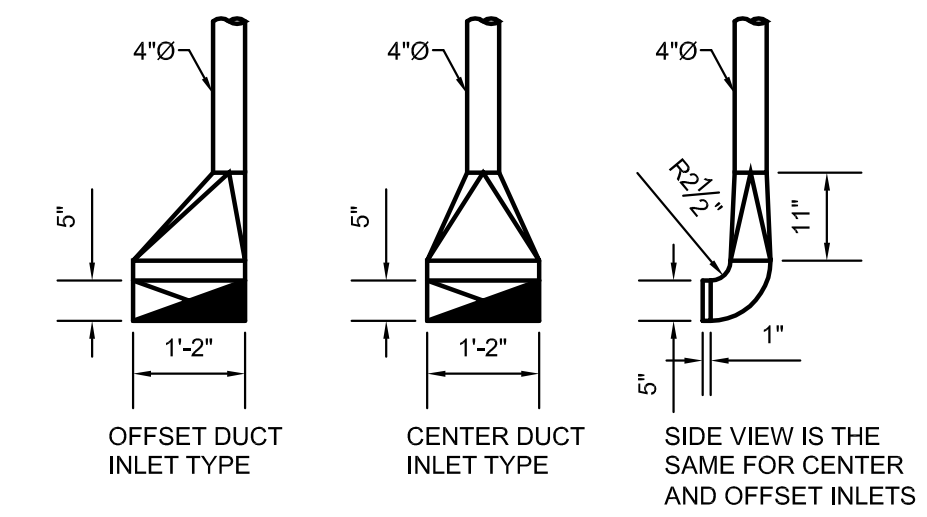


ISSUES:	
ISSUED FOR REVIEW	09/11/2017
ISSUED FOR CONST.	09/26/2017

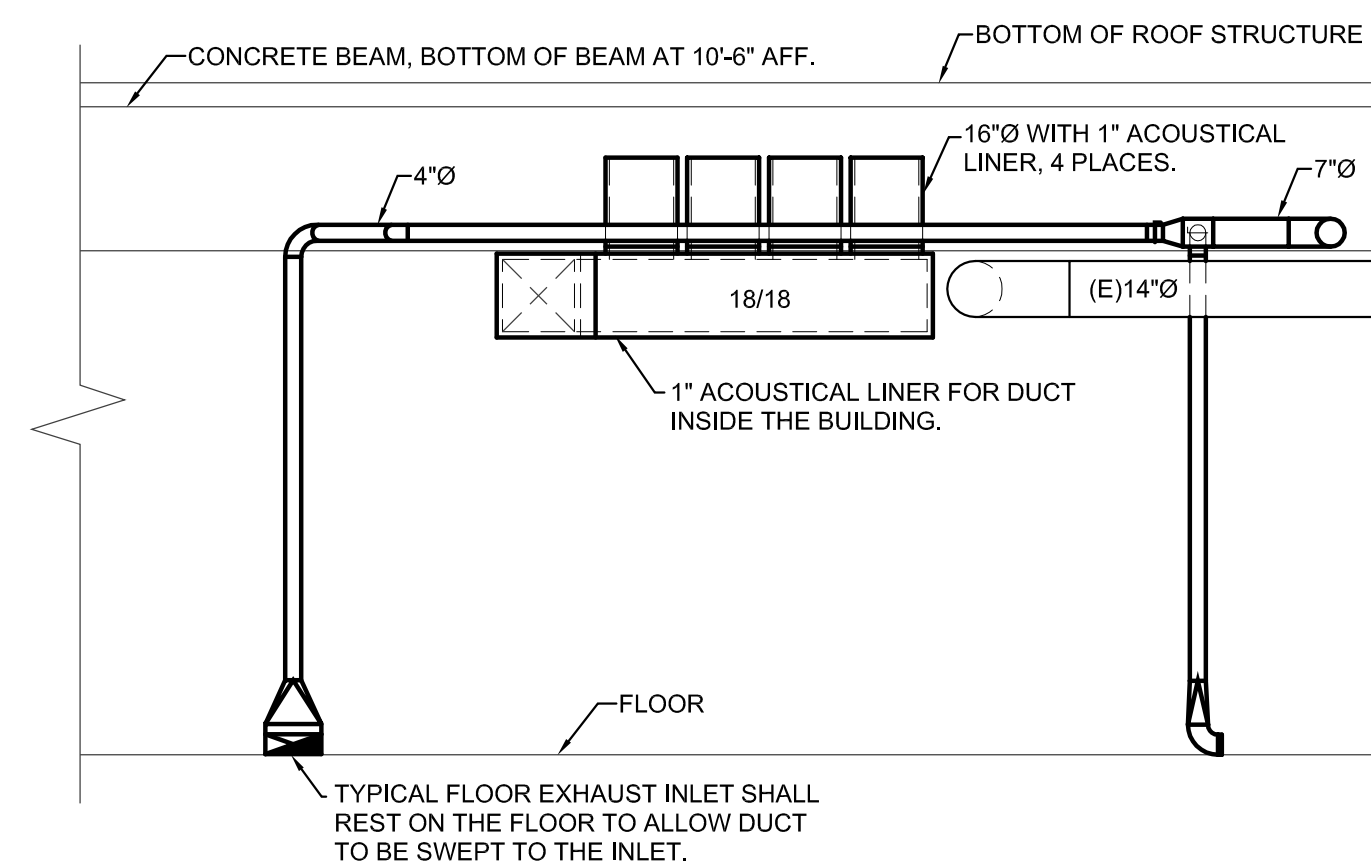
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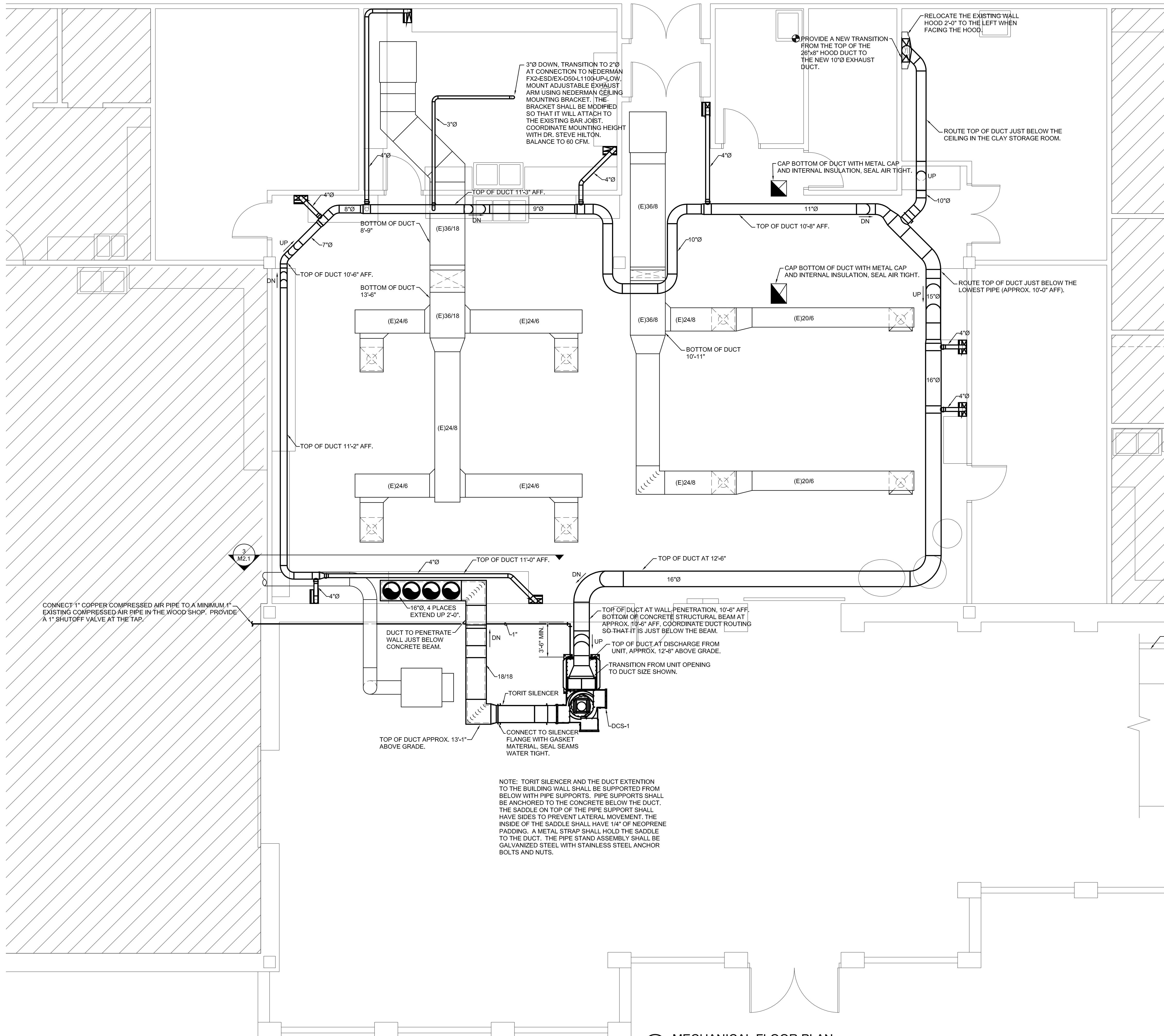
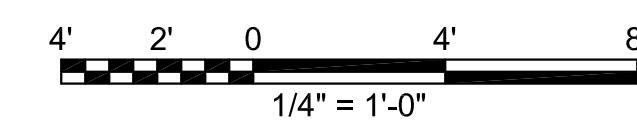
M2.1



2 TYPICAL FLOOR INTAKE HOOD



3 WALL ELEVATION



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



Midwestern State University
Fain Fine Art - Ceramics Lab
Ventilation
3410 Taft Blvd.
Wichita Falls, TX 76308



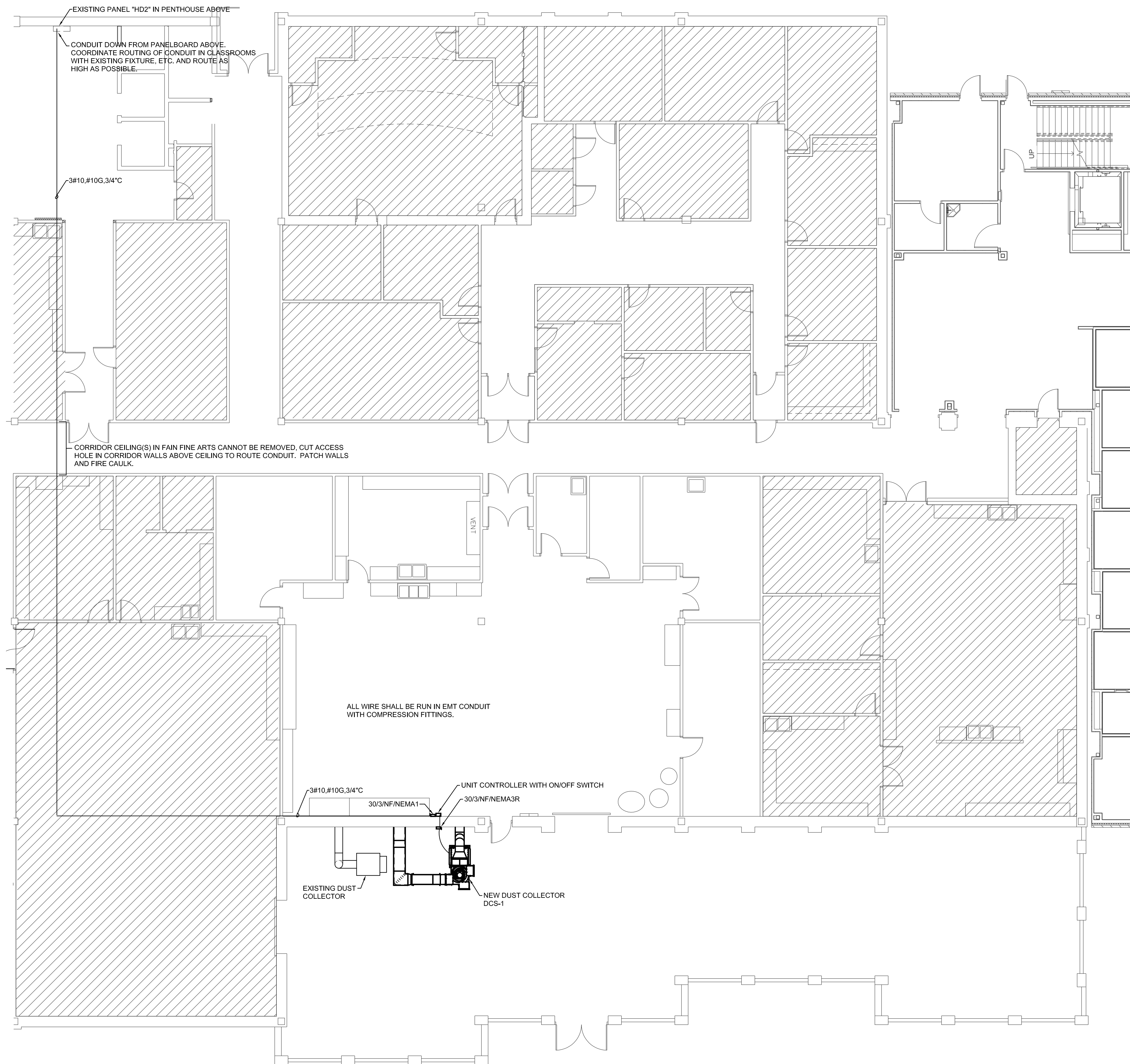
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ISSUED FOR REVIEW 09/11/2017
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REVISIONS:

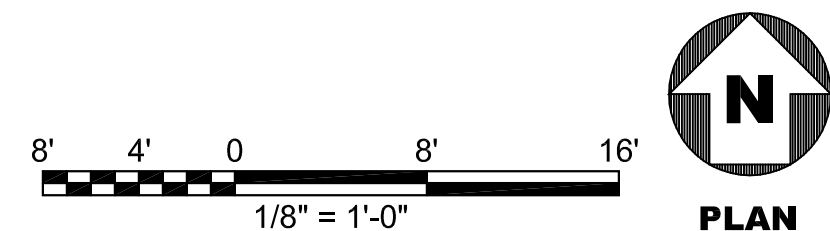
NO.	DESCRIPTION	DATE

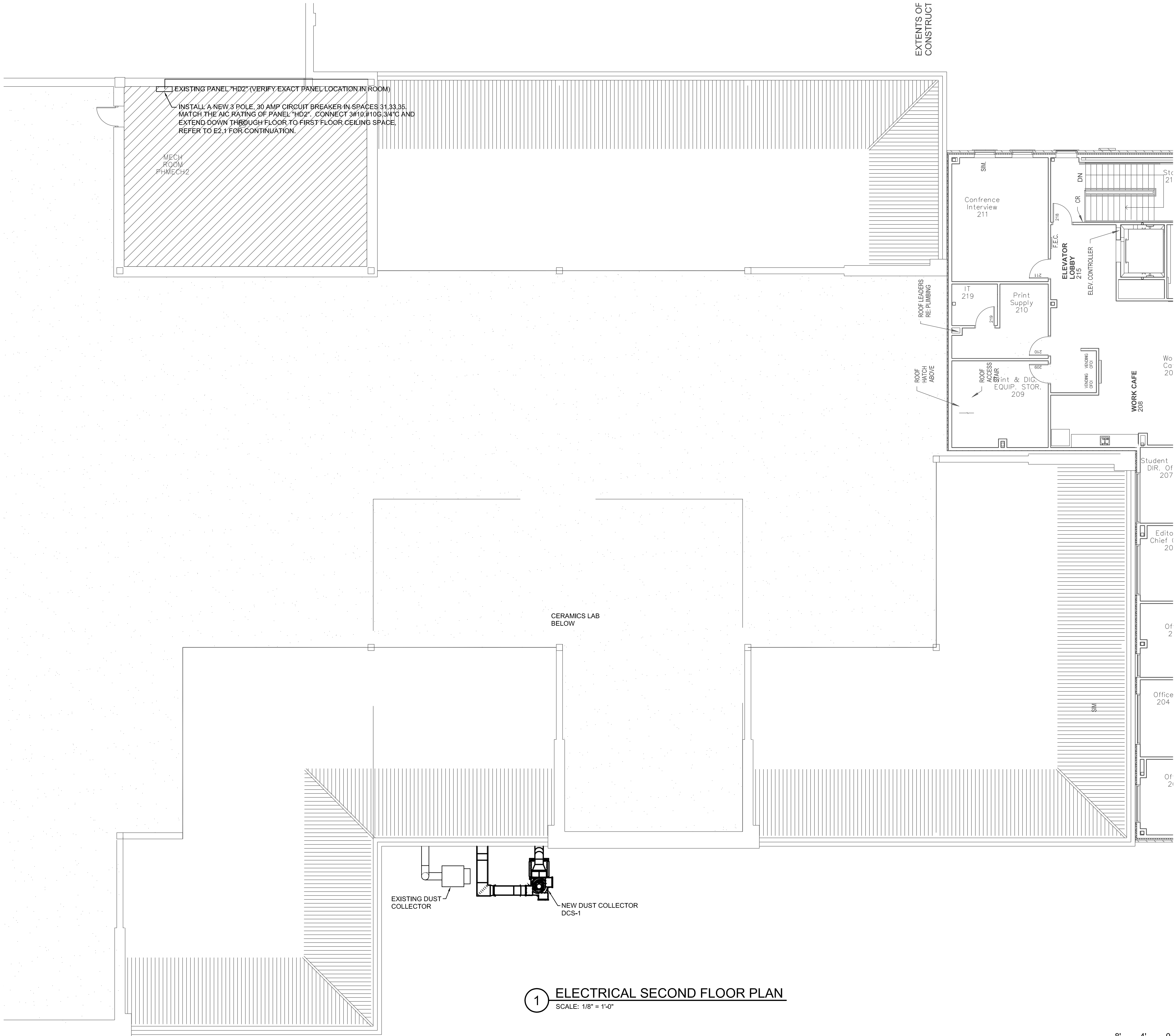
SHEET CONTENTS:
ELECTRICAL FIRST
FLOOR PLAN

SHEET NUMBER:
E2.1

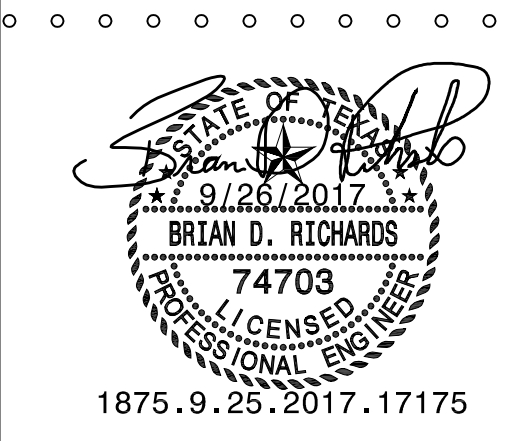
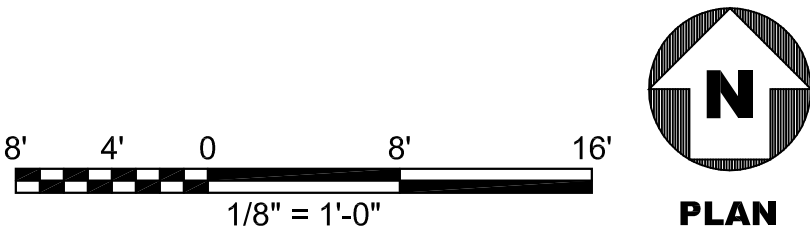


1 ELECTRICAL FIRST FLOOR PLAN
SCALE: 1/8" = 1'-0"





1 ELECTRICAL SECOND FLOOR PLAN
SCALE: 1/8" = 1'-0"



Midwestern State University
Fain Fine Art - Ceramics Lab
Ventilation

3410 Taft Blvd.
Wichita Falls, TX 76308



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ISSUES:
ISSUED FOR REVIEW 09/11/2017
ISSUED FOR CONST. 09/26/2017

REVISIONS:

SHEET CONTENTS:
ELECTRICAL SECOND FLOOR PLAN

SHEET NUMBER:
E2.2

VENDOR REFERENCES

Please list three (3) references of current customers who can verify the quality of service your company provides. The University prefers customers of similar size and scope of work to this proposal. ***THIS FORM MUST BE RETURNED WITH YOUR PROPOSAL.***

REFERENCE ONE

Government/CompanyName: _____

Address: _____

ContactPersonandTitle: _____

Phone: _____ Fax: _____

Contract Period: _____ ScopeofWork: _____

REFERENCE TWO

Government/CompanyName: _____

Address: _____

ContactPersonandTitle: _____

Phone: _____ Fax: _____

Contract Period: _____ ScopeofWork: _____

REFERENCE THREE

Government/CompanyName: _____

Address: _____

ContactPersonandTitle: _____

Phone: _____ Fax: _____

Contract Period: _____ ScopeofWork: _____

AFFIDAVIT

The undersigned certifies that the bid prices contained in this proposal have been carefully checked and are submitted as correct and final and if bid is accepted (within 90 days unless otherwise noted by vendor), agrees to furnish any and/or all items upon which prices are offered, at the price(s) and upon the conditions contained in the Specifications.

STATE OF TEXAS
COUNTY OF WICHITA

BEFORE ME, the undersigned authority, a Notary Public in and for the State of Texas, on this day personally appeared

who, after having first been duly sworn, upon oath did depose and say;

That the foregoing proposal submitted by _____

____ hereinafter called "Bidder" is the duly authorized agent of said company and that the person signing said proposal has been duly authorized to execute the same. Bidder affirms that they are duly authorized to execute this contract, that this company, corporation, firm, partnership or individual has not prepared this bid in collusion with any other Bidder, and that the contents of this bid as to prices, terms or 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.

Name and Address of Bidder:

Telephone number _____

Email _____

Signature

Name: _____

Title: _____

SWORN TO AND SUBSCRIBED BEFORE ME THIS _____ day of _____,
20 _____.

Notary Public in and for the
State of Texas.

**AGREEMENT BETWEEN
MIDWESTERN STATE UNIVERSITY
AND**

CONTRACT NO.

This Agreement made the _____ day of _____ in the year 20____, by and between _____, hereinafter called the Contractor, and the Board of Regents of Midwestern State University, hereinafter called the Owner,

WITNESSETH, that the Contractor and the Owner for the consideration hereinafter named agree as follows:

ARTICLE 1. SCOPE OF WORK: The Contractor shall furnish all of the materials and perform all of the work shown on the drawings and described in the specifications for the project entitled _____. These drawings and specifications prepared for Midwestern State University by _____, acting as and in these Contract Documents entitled the Project Architect. The Contractor shall do everything required by this Agreement, the General and Supplemental Conditions of the Contract, the Special Conditions, the Addenda, the Specifications, the Drawings, the Historically Underutilized Business (HUB) Subcontracting Plan, and the Proposal attached as **Exhibit 1** (including any unit prices stated therein).

The Specifications and Drawings are enumerated as follows:

SPECIFICATIONS: See attached as **Exhibit 2**.

DRAWINGS: See attached as **Exhibit 2**.

ADDENDA: See attached as **Exhibit 2**.

ALTERNATES: The following Alternate Proposals, fully described in the Specifications, are included as a part of this Contract: _____.

ARTICLE 2. TIME OF COMPLETION: The Owner shall provide a Notice to Proceed in which a date for commencement of the work shall be stated; such commencement date shall be 10 or more days after the date of the notice. The Contractor shall achieve substantial completion of the work within _____ (_____) calendar days after such commencement date, as such completion date may be extended by approved Change Orders. The time set forth for completion of the work is an essential element of the Contract.

ARTICLE 3. THE CONTRACT SUM: The Owner shall pay the Contractor for performance of the Contract, subject to additions and deductions provided therein, the sum of (\$ _____), and make payment on account as hereinafter provided.

ARTICLE 4. HUB SUBCONTRACTING PLAN: The Owner has adopted Exhibit H, Policy on Utilization of Historically Underutilized Business ("Policy"), which is incorporated herein by reference. Contractor, as a provision of the Agreement must comply with the requirements of the Policy and adhere to the HUB Subcontracting Plan submitted with Contractor's Proposal and attached as **Exhibit 3**. No changes to the HUB Subcontracting Plan can be made by the Contractor without the prior written approval of the Owner in accordance with the Policy.

ARTICLE 5. LIQUIDATED DAMAGES: For each consecutive calendar day after the substantial completion period set forth in Article 2 above that any work, including the correction of deficiencies found during the final testing and inspection, is not completed, the amount of (\$) will be deducted from the money due or becomes due the Contractor, not as a penalty but as liquidated damages representing the parties' estimate at the time of contract execution of the damages which the Owner will sustain for late completion.

ARTICLE 6. CERTIFICATION OF NO ASBESTOS CONTAINING MATERIALS OR WORK:

The Contractor shall provide a certification statement, included with each materials submittal, stating that no asbestos containing materials or work is included within the scope of the proposed submittal.

The Contractor shall insure that Texas Department of Health licensed individuals, consultants or companies are used for any required asbestos work including asbestos inspection, asbestos abatement plans/specifications, asbestos abatement, asbestos project management and third-party asbestos monitoring.

The Contractor shall provide at Substantial Completion, a notarized affidavit to the Owner and the Architect stating that no asbestos containing materials or work was provided, installed, furnished or added to the Project.

The Contractor shall take whatever measures he deems necessary to insure that all employees, suppliers, fabricators, materialmen, subcontractors, or their assigns, comply with this requirement.

All materials used on this Project shall be certified as non Asbestos Containing Building Materials (ACBM). The Contractor shall insure compliance with the following acts from all of his subcontractors and assigns:

Asbestos Hazard Emergency Response Act (AHERA—40 CFR 763-99 (7));

National Emission Standards for Hazardous Air Pollutants (NESHAP—EPA 40 CFR 61, National Emission Standard for Asbestos;

Texas Asbestos Health Protection Rules (TAHRP—Tex. Admin. Code Title 25, Part 1, Ch. 295C, Asbestos Health Protection

Every subcontractor shall provide a notarized statement that no ACBM has been used, provided, or left on this Project.

The Contractor shall provide, in hard copy and electronic form, all necessary material safety data sheets (MSDS) of all products used in the construction of the Project to the Texas Department of Health licensed inspector or Project Architect or Engineer who will compile the information from the MSDS and, finding no asbestos in any of the product, make a certification statement.

At Final Completion the Contractor shall provide a notarized certification statement per TAC Title 25 Part 1, Ch. 295.34, par. c.1 that no ACBM was used during construction of the Project.

ARTICLE 7. ACCEPTANCE OF BID OR AWARD OF CONTRACT: By signing this Agreement, the undersigned certifies as follows:

Assignment. This Agreement is a personal service contract for the services of Construction, and Contractor's interest in this Agreement, duties hereunder and/or fees due hereunder may not be assigned or delegated to a third party.

Records of expenses pertaining to Additional Services and services performed on the basis of a Worker Wage Rate or Monthly Salary Rate shall be kept on the basis of generally accepted accounting principles and in accordance with cost accounting standards promulgated by the Federal Office of Management and Budget Cost Accounting Standards Board and shall be available for audit by the Owner or the Owner's authorized representative on reasonable notice.

Family Code Child Support Certification. Pursuant to Section 231.006, Texas Family Code, Service Provider certifies that it is not ineligible to receive the award of or payments under this Agreement and acknowledges that this Agreement may be terminated and payment may be withheld if this certification is inaccurate.

Eligibility Certification. Pursuant to Section 2155.004, Texas Government Code, Service Provider certifies that the individual or business entity named in this Agreement is not ineligible to receive the award of or payments under this Agreement and acknowledges that this Agreement may be terminated and payment withheld if this certification is inaccurate.

Franchise Tax Certification. A corporate or limited liability company Contractor certifies that it is not currently delinquent in the payment of any Franchise Taxes due under Chapter 171 of the Texas Tax Code, or that the corporation or limited liability company is exempt from the payment of such taxes, or that the corporation or limited liability company is an out-of-state corporation or limited liability company that is not subject to the Texas Franchise Tax, whichever is applicable.

Payment of Debt or Delinquency to the State. Pursuant to Sections 2107.008 and 2252.903, Texas Government Code, Contractor agrees that any payments owing to Contractor under this Agreement may be applied directly toward any debt or delinquency that Contractor owes the State of Texas or any agency of the State of Texas regardless of when it arises, until such debt or delinquency is paid in full.

Entire Agreement; Modifications. This Agreement supersedes all prior agreements, written or oral, between Contractor and Owner and shall constitute the entire Agreement and understanding between the parties with respect to the Project. This Agreement and each of its provisions shall be binding upon the parties and may not be waived, modified, amended or altered except by a writing signed by Contractor and Owner.

Captions. The captions of paragraphs in this Agreement are for convenience only and shall not be considered or referred to in resolving questions of interpretation or construction.

Governing Law and Venue. This Agreement and all of the rights and obligations of the parties and all of the terms and conditions shall be construed, interpreted and applied in accordance with and governed by and enforced under the laws of the State of Texas without reference to its conflicts of law provisions. The county where the Project is located shall be the sole place of venue for any legal action arising from or related to this Agreement or the Project in which the Owner is a party.

Waivers. No delay or omission by either party in exercising any right or power arising from non compliance or failure of performance by the other party with any of the provisions of this Agreement shall impair or constitute a waiver of any such right or power. A waiver by either party of any covenant or condition of this Agreement shall not be construed as a waiver of any subsequent breach of that or of any other covenant or condition of the Agreement.

Binding Effect. This Agreement shall be binding upon and inure to the benefit of the parties and their respective permitted assigns and successors.

Appointment. Owner hereby expressly reserves the right from time to time to designate by notice to Contractor a representative(s) to act partially or wholly for Owner in connection with the performance of Owner's obligations. Contractor shall act only upon instructions from the designated representative(s) unless otherwise specifically notified to the contrary.

Records. Records of Contractor's costs, reimbursable expenses pertaining to the Project and payments shall be available to Owner or its authorized representative during business hours and shall be retained for four (4) years after final Payment or abandonment of the Project, unless Owner otherwise instructs Contractor in writing.

Notices. All notices, consents, approvals, demands, requests or other communications relied on by the parties shall be in writing. Written notice shall be deemed to have been given when delivered in person to the designated representative of the Contractor or Owner for whom it is intended; or sent by U. S. Mail to the last known business address of the designated representative; or transmitted by fax machine to the last known business fax number of the designated representative.

Mail notices are deemed effective upon receipt or on the third business day after the date of mailing, whichever is sooner. Fax notices are deemed effective the next business day after faxing.

Severability. Should any term or provision of this Agreement be held invalid or unenforceable in any respect, the remaining terms and provisions shall not be affected and this Agreement shall be construed as if the invalid or unenforceable term or provision had never been included.

Illegal Dumping. The Contractor shall ensure that it and all of its Subcontractors and assigns prevent illegal dumping of litter in accordance with Title 5, Texas Health and Safety Code, Chapter 365.

Ethics Matters/No Financial Interest. Contractor and its employees, agents, representatives and subcontractors have read and understand University's Conflicts of Interest Policy, University's Standards of Conduct Guide and applicable state ethics laws and rules. Neither Contractor nor its employees, agents, representatives or subcontractors will assist or cause University employees to violate University's Conflicts of Interest Policy, provisions described by University's Standards of Conduct Guide, or applicable state ethics laws or rules. Contractor represents and warrants that no member of the Board has a direct or indirect financial interest in the transaction that is the subject of this Agreement.

By signature hereon, Contractor certifies that no member of the Board of Regents of Midwestern State University, or Executive Officers, including component institutions, has a financial interest, directly or indirectly, in the transaction that is the subject of this contract.

BY SIGNING BELOW, the Parties have executed and bound themselves to this Agreement as of the day and year first above written.

MIDWESTERN STATE UNIVERSITY

By: _____
Signature

Print name

Date: _____

By: _____
Signature

Print name

Date: _____

SAMPLE