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SPECIFICATIONS FOR LABOR AND MATERIALS

FOR

HVAC RENOVATION
LINCOLN CENTRAL ELEMENTARY SCHOOL

100 7th STREET, LINCOLN IL 62656

FOR

LINCOLN ELEMENTARY SCHOOL DISTRICT NO. 27
DISTRICT OFFICE: 304 8th STREET, LINCOLN, IL 62656

DISTRICT SUPERINTENDENT: KENT FROEBE

PROJECT NUMBER: 25821422

ISSUE DATE: October 25, 2022

PRE-BID: Wednesday, November 9, 2022 at 3:00 p.m.
at Central Elementary (Meet at north entrance to the Gymnasium; Park on 8th Street which runs parallel to the north elevation of the Gymnasium)

BID DATE: **November 17, 2022 at 2:00 p.m., prevailing time**
District 27 Office
304 8th Street
Lincoln, Illinois 62656

Specification Booklet #: _____

PROJECT: HVAC Renovation – Central Elementary School

FOR: Lincoln Elementary School District No. 27
304 8th Street
Lincoln, IL 62656

SUPERINTENDENT OF SCHOOLS: Kent Froebe

ARCHITECT: Middleton Associates Incorporated
1702 W. College Avenue, Suite E
Normal, IL 61761-3028
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A/E PROJECT NO: 25821422

ISSUE DATE: October 25, 2022

DRAWINGS:

G100	COVER SHEET
A801	FIRST FLOOR REFL'D CEILING PLAN – NORTH
A802	FIRST FLOOR REFL'D CEILING PLAN – SOUTH
A803	SECOND FLOOR REFLECTED CEILING PLAN
MS1	SITE PLAN
ME1	FIRST FLOOR NORTH MECHANICAL/ELECTRICAL DEMOLITION PLAN
ME2	FIRST FLOOR SOUTH MECHANICAL/ELECTRICAL DEMOLITION PLAN
ME3	SECOND FLOOR MECHANICAL/ELECTRICAL DEMOLITION PLAN
M1.1	FIRST FLOOR NORTH MECHANICAL RENOVATION PLAN
M1.2	FIRST FLOOR SOUTH MECHANICAL RENOVATION PLAN
M1.3	SECOND FLOOR MECHANICAL RENOVATION PLAN
M3.1	GEOTHERMAL SYSTEM FLOW DIAGRAM
M3.2	MECHANICAL DETAILS
M4.1	MECHANICAL SCHEDULES
M4.2	MECHANICAL SCHEDULES
E1.1	FIRST FLOOR NORTH ELECTRICAL RENOVATION PLAN
E1.2	FIRST FLOOR SOUTH ELECTRICAL RENOVATION PLAN
E1.3	SECOND FLOOR ELECTRICAL RENOVATION PLAN
E3.1	ELECTRICAL SCHEDULES AND DETAILS

END 00 01 10

1. GENERAL

1.1. This is a project requiring the payment of prevailing wages. Proper written notification as required under Public Act 96-0437:

This contract calls for the construction of a "public work," within the meaning of the Illinois Prevailing Wage Act, 820ILCS 130/.01 *et seq*. ("the Act"). The Act requires contractors and subcontractors to pay laborers, workers and mechanics performing services on public works projects no less than the current "prevailing rate of wages" (hourly cash wages plus amount for fringe benefits) in the county where the work is preformed. The Department publishes the prevailing wage rates on its website at http://labor.illinois.gov/. The Department revises the prevailing wage rates and the contractor/subcontractor has an obligation to check the Department's web site for revisions to prevailing wage rates. For information regarding current prevailing wage rates, please refer to the Illinois Department of Labor's website. All contractors and subcontractors rendering services under this contract must comply with all requirements of the Act, *including but not limited to,* all wage requirements and notice of record keeping duties.

END 00 0450

Sealed proposals will be received by: Lincoln Elementary School District No. 27

For Project: Central Elementary School HVAC Renovation

Proposals to be submitted prior to **2:00 p.m., prevailing time, Thursday, November 17, 2022**

Submit to: District 27 Office
304 8th Street
Lincoln, IL 62656

Pre-Bid Meeting: **3:00 p.m., Wednesday, November 9, 2022, at Central Elementary School, 100 7th Street, Lincoln, IL 62656 – meet at north Gymnasium entrance – (double doors, park on 8th St. or Maple St.).**

Proposals shall be delivered to the above Lincoln Elementary School District No. 27 Office prior to the time of opening. Proposals shall be clearly identified on the outside of the envelope as "Sealed Proposal" and list the project title as shown above. Immediately following the stated time, proposals will be opened and publicly read.

Terms of the proposal:
- Bid Security is required, 5% Bid Bond payable to Lincoln Elementary School District No. 27
- Owner protective bonds are required in the amount of 100% of the Contract value.
- Illinois Prevailing Wage Act P.A. 86-799 and Illinois Certified payroll reporting P.A. 094-0515 apply to this contract.
- Revised Statutes of the Illinois Criminal Code, apply, including the School code.
- E-mail proposals received prior to bid due date and time will be read at bid opening. See specification section 002113 Paragraph 2.6.A.5.

The Board of Education has the right to reject or accept any or all parts of all bids submitted and to waive any irregularities in the bidding and to accept the lowest responsible bid.

Plans and specifications prepared by the Architect, Middleton Associates Incorporated, 1702 W. College Avenue, Suite E, Normal, Illinois 61761-2793, Phone 309/452-1271, FAX 309/454-8049. Plans and specifications may be reviewed without deposit at the office of the Architect. Sets may be purchased directly from The Copy Shop in Bloomington, phone 309/827-5466.

END 00 11 16

1. GENERAL

1.1. QUALIFICATION

A. The Prime Contractor managing the project shall be a Contractor specializing in HVAC work.

B. Competency and responsibility of the Bidder, and of their proposed subcontractors, may be considered in making awards. Determination of responsibility prior to award may include:

1. A detailed statement regarding the business, technical organization, crew availability and evidence of capability for the work that is contemplated.
2. Evidence of successful experience of personnel and previously completed construction projects

    a. Contractor and personnel, five years or more commercial construction experience, including recent projects of similar or greater value, similarity of types of work, technical content, and complexity
    b. Evidence that recent projects as described above have been scheduled and delivered on time, aggressively pursued to conclusion without delay.
    c. Experience does not include frivolous claims for additional costs, or work requiring abnormal or extensive corrections.
    d. Evidence that equipment was properly installed and started and functioned without abnormal warranty calls for installation related problems.
    e. Evidence that the contractor coordinated with the Owner, scheduled work in a progressive manner to allow Owner reasonable access to get facilities ready for occupancy in a timely manner.
    f. Evidence that phased projects have been completed without loss of services between phases.

3. Information pertaining to the financial resources of the contractor to pursue the work may be considered prior to making the award:

    a. Evidence of financial resources to cover retainage, meet payrolls, contract for and acquire or pre-pay materials. Resources and Contractor net worth available to this project less than 35% of the contract award may be grounds to disqualify the bid.
    b. Evidence of unpaid bills, unresolved liens, outstanding claims by the Department of labor for wage, benefits or workman compensation violations or failure to provide accurate payroll information.

2. CONTRACT CONDITIONS

2.1. EXAMINATION OF DOCUMENTS, SITE AND WORK INCLUDED

LOCATION OF THE PROJECT: Lincoln Elementary School District No. 27, Central Elementary School, 100 7th Street, Lincoln, IL 62656

A. PRE BID MEETING

1. **Pre-Bid Meeting is scheduled for 3:00 p.m., Wednesday, November 9, 2022, Central Elementary School, 100 7th Street, Lincoln, IL 62656 (Meet at north entrance to the Gymnasium)**
2. Building may be available for inspection after 4:00 p.m. on school days, or all day on no school days when staff is available.

    a. Call ahead to schedule. (Superintendent, phone 217/732-2522, Kent Froebe)

B. EXAMINATION OF SITE AND CONTRACT DOCUMENTS

1. Bidder shall carefully examine bidding documents and inspect the site to obtain first-hand knowledge of existing conditions.
2. Access may not be available on short notice.
3. Do not ask for directions or interpretations of the work during these visits unless in combination with a pre-bid meeting, you may discuss the work but if any clarifications or questions become evident these must be handled through the A/E and no change to the project requirements will result from verbal clarifications of the work during a visit.
4. Each Bidder, by submitting his bid, represents that he has examined the bidding documents, inspected the site and premises, compared task requirements and time constraints to installation conditions and that he understands the obligations of the bidding documents. By providing a proposal he is certifying that he has familiarized himself with the local conditions under which the work is to be performed. Bidders will not be given extra payment or contract time for conditions that could have been determined by on site examination.

C. INTERPRETATION OF DOCUMENTS

1. Anyone having a doubt concerning the meaning of the Contract Documents, or any other questions, may submit a request for interpretation from the Architect/Engineer. All pre-bid interpretation shall be requested not later than FIVE (5) DAYS prior to the bid due date. Response, other than minor clarification, will be in the form of Addenda and will be mailed to each Bidder.
2. It shall be the Architect/Engineer's responsibility to clarify conflicts in requirements as may be reported to the Architect/Engineer. After bid due date, the Architect/Engineer shall determine the course to be followed for said clarification with no cost change to the Owner.

D. ADDENDA

1. Addenda may be issued before the bid opening date to clarify or modify the Contract Documents. Addenda are posted at www.middletonassociates.net
2. Addenda will be issued electronically. Email address is required to receive addenda.
3. If you have not registered your interest in the bid with the Architect, and do not receive or seek out the addendums then failure to recognize any Addendum may disqualify the bid.
4. Said addenda shall become a part of the Contract documents and supersede any conflicting specifications and/or clarify intent of same.

E. INTENT, ERRORS AND OMISSIONS

1. Any known conflict between requirements of various portions of the Contract Documents shall be reported to the Architect/Engineer prior bid due date and shall fall under the authority of Interpretation of Documents.
2. The Drawings are descriptive and directive in concept and are not intended to exhaust all detail situations required to complete the work. The procedures detailed shall establish the general character of solutions needed for typical, non-typical, and peculiar situations at the job site.
3. It is the intent of the documents that specified work and equipment be installed in a proper and finished manner, fully operational, at a minimum of generally accepted standards for good quality commercial construction. All necessary materials, labor, controls, accessories, brackets, fasteners, sealants, etc., to properly install and complete the work shall be provided unless specifically noted otherwise.
4. Each Contractor and Subcontractor shall coordinate and cooperate with the other Contractors to provide proper installation. Verify dimensions, services, installation conditions, obstacles to the work and modifications necessary to complete the work and coordinate the fit, finish and scheduling of the work.

F. DOCUMENT INTENT, PROJECT COMPLETION, FITTING AND FINISHING FULLY FUNCTIONAL, USER READY

1. It is the intent that all items of work included in the project are to be completely finished and all necessary associated components and accessories for proper completion are to be included in the work.
2. Drawings are schematic in nature; every single element needed is not necessarily labeled, dimensioned or positioned. Unless specifically exempted, the Contractor shall provide as follows:
3. Good quality fit, finish and workmanship at a level of competency and quality equal to or exceeding commercial construction in the area.

   a. Sealants, caulks, flashings, transitions, closures and

components to assure infiltration and weather tight result and finished appearance inside and out.

b. Sealants, flashings, closures at building connections.

c. Upper and lower flashings, in new construction and whenever possible, to shed water outward.

4. All components and assemblies to assure proper installation and performance of manufactured equipment, per manufacturer's or industry association standards as a minimum.

a. Mechanical equipment, plumbing, piping, ventilation, valves back checks, connections etc.

b. Mechanical and electrical coordination, coordination of installation locations, hidden where possible, routed through the construction in the most expedient but concealed manner,

1) Minor relocation of piping, equipment, installations shall be provided without cost change within 10' either way or reasonable pathways of similar distance.

c. All other equipment, kitchen, doors, hardware, windows and any other operable equipment

d. Service access, filters, repairs always allow for reasonable repair and maintenance access.

5. Proper protection of dissimilar materials or components for bond problems, galvanic action, movement, moisture, and/or chemical reaction.

6. New finished appearance for all new work and work abutting existing where applicable.

7. Code compliance:

a. All equipment and installations.

b. Electrical NEC, circuit protection, grounding, disconnecting means, GFI, and installation practices

c. Water, back checks, vacuum breakers, back flow preventers, service valves, hammer arrestors, expansion tanks.

8. Construction assembly details, setting forth special requirements, keyed to a specific section, detail or I.D. number, shall be considered applicable to similar assemblies throughout the contracted work unless specifically designated otherwise.

2.2. DRAWINGS & SPECIFICATIONS

A. OBTAINING INFORMATION

1. Drawings and Specifications may be reviewed at the office of the Architect, Middleton Associates Incorporated, 1702 W. College Ave., Suite E, Normal, IL 61761-2793, Telephone 309/452-1271, Fax

309/454-8049.

2. Contractor may purchase additional documents directly from The Copy Shop in Bloomington, or print on-line.
3. To obtain documents provide the A/E all contact information as well as an email address for delivery of addendums and bidding information during the bid period.
4. Method of document distribution is at the option of the Owner and the Architect whether it is paper, or digital.

B. RETURNING DOCUMENTS

1. All documents remain the property of the Architect and shall be promptly returned after the bidding. The low bidder may keep documents and sub bidders may retain same until awards have been made.
2. Failure to return documents within 20 days after bidding will result in loss of deposit or compensation will be required for the replacement cost in the event there was not a plan deposit.

2.3. ALTERNATES

A. The Bidder shall submit a proposal for every alternate listed in the Contract Documents. Failure to provide alternate prices may disqualify the bid.

B. See Section 00 24 13, Scope of Bids, for a description of Alternates.

2.4. BID SECURITY

A. The Bidder shall furnish bid security, along with his proposal:

1. Form of security to be bid bond or certified check payable to the Owner.
2. Amount 5% of the base bid proposal
3. Said security shall serve as a guarantee that the Contractor will enter into the Contract with the Owner as per his bid and the contract terms should the job be awarded to him.

B. Should said Contractor refuse or fail to enter into a Contract with Owner per his bid for the work included in these Contract Documents within fifteen days following notification of award and/or receipt of a contract for signature, said bid security shall become collectible, in full, by the Owner in payment for damages.

1. Failure to enter into an agreement shall mean failure to return or submit:

a. A signed agreement.
b. Owner’s protective bond(s) for Labor, materials and performance.
c. Approved subcontractor/supplier lists.

d. Certificates of insurance within stated time period.
e. Evidence that this contractor intends to pursue this contract in a timely and deliberate manner, including ordering of materials and committing or arranging for necessary manpower to accomplish the work.

2.5. WITHDRAWAL OF BIDS

A. Bids may be withdrawn by an authorized person prior to the bid due date and time, after which time no bids may be withdrawn for a period of forty-five (45) days unless a Bidder has been released by the Owner's action.

B. Authorized person shall mean an Owner or Officer of the Contractor offering the proposal or other evidence of authority.

2.6. PROPOSAL (BID) FORMS

A. Each bidder shall submit his proposal, on proposal form provided.

1. Submitted bid forms may be copied
2. All applicable blank spaces on forms shall be filled out fully.
3. Numbers shall be stated in writing where noted and in figures.
4. Signatures shall be live in longhand by person authorized to sign bids as Owner or corporate officer or shall include Power of Attorney to sign the bid.
5. **Proposals emailed to Kent Froebe (kfroebe@Lincoln27.net) PRIOR TO THE BID DUE DATE AND TIME will be read at the Bid Opening. Bids sent by email prior to Bid Opening will be retained unopened on the respective computer until 15 minutes before Bid due time.**

B. Completed forms shall be without delineation, clarification, alteration or modification.

1. Correction of contractor inserted is acceptable if clearly identified and initialed by the signatory to the bid. Irregularities of such corrections may be grounds to disqualify the bid.
2. Offers to clarify or modify may be made on voluntary alternates and substitution forms if provided in the bid package, but in no case should the base bid or requested alternate bids offered be based on anything but the document requirements.

C. Voluntary alternates or offers for substitutions may be attached on forms provided or on the bidder's letterhead. These will be considered at the Owners option. Additional information may be requested prior to consideration.

1. Voluntary alternates or substitutions cannot and will not affect or change the Base Bid Proposal. Voluntary alternates and/or substitutions will be implemented after the low bid proposal is

accepted if the voluntary alternate and/or substitutions is beneficial to the owner.

2.7. AWARD OR REJECTION OF BIDS

A. Although it is the intention of the Owner to accept the lowest qualified bid the Owner specifically reserves the right to waive all formalities and/or informalities, to reject any and all bids and/or accept the bid that, in the Owner's judgment is the lowest responsible bid.

B. Contractor will note all alternates that are applicable, or as may become applicable by addendum, should be bid. Failure to bid an alternate may be grounds to disqualify the proposal, at the Owners discretion.

C. Should the time for award exceed the time stated for the proposal's expiration period, the Owner reserves the right to continue to negotiate with bidders in the line of award succession as a prior option rather than re-bid.

2.8. RETURN OF BID SECURITY

A. After bids have been read along with alternates as applicable and a successful Bidder has been approved by Owner, a Letter of Intent will be sent to the successful bidder and bid security may be returned to the unsuccessful bidders except the deposits of the two (2) most advantageous bidders will be retained until Owner/Contractor agreements have been consummated.

B. Following the signing of the Contracts and receipt of bonds, remaining bid security will be returned. If the successful Bidder fails to accept the Contract and submit acceptable bonds, same will be grounds for forfeiture of his bid security.

2.9. OWNER'S PROTECTIVE BONDS: A 100% of value Labor and Material Payment Bond and Performance Bond including all alternates accepted is required in the Contract and shall be included in the Contractor's Proposal

A. Periodic Change Orders that may occur to the Contract shall be included in each respective bond.

B. Bonds shall cover the entire Contract without regard to the Contractor's assignment of work of Subcontractors or Suppliers.

C. Inclusive of all awarded Alternates accepted.

2.10. CONTRACT AWARD

A. The Owner will make an award based on the selection of the lowest cost responsible bidder. After award is approved by the Board of Education, the contract timeline is as follows:

1. The Architect will fill in the Contract Form of Agreement (specification

section 00 41 13). The Architect will obtain the signature of the person designated by the Board of Education.

2. The Architect will send three (3) Forms of Agreement, and the Contractor shall sign all, keep one (1) for their file, send two (2) back to Architect. This shall happen within seven (7) calendar days of the date of award.
3. When the Contractor has signed both copies of the Form of Agreement, the project starts.
4. The Contractor shall immediately obtain Proof of Insurance, Labor and Materials, Payment and Performance Bonds. All of the above to be completed fifteen (15) days after award.
5. Master Cost Breakdown (CVS), thirty (30) days after award.
6. Proposed Schedule and timeline: Contractor to present at Pre-Construction meeting, fifteen (15) days after award.
7. Contractor to send Shop Drawings and Catalog Cuts/Samples or bring same to Pre-Construction meeting.

B. Failure or refusal to provide the preceding Contract information in a timely manner may be cause for cancellation of the award or termination of the agreement if signed and the Owner will be entitled to compensation under the terms of the Bid Security for failure to execute contract terms in good faith.

2.11 SCHEDULING

A. Contractors' Master Schedule

1. The Prime Contractor shall prepare and maintain a Master Schedule, including the work of all sub contractors.

    a. Schedules can be from individual subcontractors, but the Prime Contractor accepts responsibility from all subcontractors working on job.

2. Upon preparation of a detailed schedule, same shall be reviewed by the Architect and the Owner. Once accepted, it shall become the basis for determining the on time progress of the work.

    a. Provide manpower crews, overtime double shift, and equipment as needed to maintain the schedule. The Owner will not authorize additional payment for overtime or additional manpower needed to maintain, achieve, or make up time to meet the schedule. The Prime Contractor shall notify the Architect and the Owner promptly of any deficiency in performance, which is unacceptably impacting the schedule or delaying progress, and provide a plan of action to regain performance to meet the schedule.
    b. The Subcontractor(s) shall immediately notify the Prime Contractor, in the event any trade area Contractor's progress is impeding their ability to maintain the schedule.
    c. The Prime Contractor shall immediately provide notification

of this report to the Architect and the Owner and shall include a plan of action to regain schedule.

B. Construction Schedule

1. Submittals of shop drawings shall be prepared immediately following award.
2. Material acquisition may begin immediately following Award.
3. Upon return of review submittals, schedule material and equipment for timely delivery.

a. Materials and equipment delivered on site or suitably stored with proof of insurance may be submitted for payment, subject to inspection.
b. The Owner requests that equipment and materials to do the work be on site or readily available for delivery prior to the start of operations.

C. Manning the work

1. Contractors shall work full crews or partial crews as indicated in the schedule developed for paragraph 2.11. A.

2.12. COMMENCEMENT OF CONSTRUCTION

A. Contractor shall not commence work until the agreement has been executed by both Owner and Contractor and Insurance Certificate and Owner's Protective Bonds have been accepted by the Owner and the Architect.

1. **All insurance certificates shall specifically list Lincoln Elementary School District No. 27 and the Architect, Middleton Associates Incorporated and their consultants and sub-consultants to the work, as added insureds or named insureds.**
2. The start date of the project will be May 26, 2023, or June 2, 2023 if emergency days are used. Substantial completion date will be August 17, 2023. If the Contractor cannot complete work during Summer 2023, the building must be cleaned and have heating and AC in all rooms. In this case, Final Acceptance will be 8/25/2023.
3. Work can be done at all times when students are not in the building during regular class attendance times. This would be from 7:30 a.m. to 3:30 p.m. during the regular school attendance days.
4. The Prime HVAC Contractor must order all Heat Pumps as soon as possible after the contracts have been signed.

2.13. ALLOWANCE

A. The Prime Contractor shall include in his bid an allowance of $30,000 for additional time and material or Change Order work as directed and approved IN WRITING by the Owner and A/E. $30,000 to be added to the bid.

1. This is primarily for ceiling repair and other unforeseen conditions.

2. Unused portion of allowance will be returned to owner at time of Final Payment request via Change Order.

B. This is not for assignment or use by the Contractor or Subcontractors for any work that either perceives as additional effort unless the Owner is in concurrence IN WRITING.

2.14. PROGRESS PAYMENTS

A Pay Requests must be approved by the Architect / Engineer and the District Superintendent, Kent Froebe. Submit all Pay Requests to the Architect, five (5) business days before the end of each month. Pay Requests will be accepted once per month.

B. Payment will be made within thirty (30) days following approval.

C. In accordance with the terms of the Contract periodic partial progress payments may be made monthly to the Contractor for: 90% of the value of the labor, materials, and/or equipment incorporated in the construction. Payment will be for installed materials only.

D. After Contract award and before commencement of work, the Contractor shall submit a complete master cost breakdown. Said cost breakdown shall be used by the Owner only for the purpose of checking and certifying requests for payment.

E. Pay requests shall indicate amounts completed of all items listed from the master breakdown.

F. Submit notarized Contractor's affidavits with each pay request showing that total owed on Contract by Owner (after subject request has been paid to Contractor) is more than the amount to become due the Contractor for material, subcontractors and labor.

1. 10% of each request will be retained by Owner until work has been satisfactorily completed. After 75% of the Contract has been satisfactorily completed retainage reduction will be considered.

G. All the applications for payment shall be made in two (2) copies with all copies bearing live seals and signatures, notarized and complete and accurately filled in.

1. See AIA General Conditions, Paragraph 9.3.1, 9.3.2 and 9.3.3.
2. Applications for payment shall be submitted to Architect/Engineer on AIA G-702A Forms.
3. EACH SUCCESSIVE PAY REQUEST SHALL BE ACCOMPANIED BY PARTIAL WAIVERS OF LIEN, DOLLAR FOR DOLLAR MATCHING THE PRECEDING PAY REQUEST.
4. Attach one (1) copy of Contractor’s Payroll with Pay Request in

accord with Dept. of Labor requirements. Include Payroll for the major Subcontractors and upon request any minor or intermittent on-site Subcontractor.

2.15. CHANGE ORDERS

A. Changes to the scope of work may occur after Contract Award. Contractor may initiate a Change Order by send an RFI to the Architect. The Architect and Owner may initiate a Change Order by verbal or written inquiry to the Contractor.

B. When a change to the scope must occur the following procedure shall apply:

1. The Change Order may be indicated as a fixed price or time and material. In all cases a written summation of work to be done shall be submitted to the Architect or written by the Architect. In all case the Contractor shall be provided a signed Letter to Proceed before accruing any expenses toward the Change Order.
2. The Architect will try to provide the Letter to Proceed within twenty-four (24) hours of the time of origination of the request.

C. Cost of Change Orders

1. Cost of Change Orders shall be broken down into Labor, Material and Mark-up.
2. The Mark-up will include a percentage of the cost of Labor and Material and shall include everything (bonds, insurance, project management, overhead and profit, etc.). Mark-up allowed is:

a. Prime Contractor on own labor and materials – maximum 15%.
b. Subcontractor on own labor and material – maximum 15%.
c. Prime Contractor on labor and material of Subcontractor – maximum 7.5%.
d. Change Orders may be by T & M with above add-on.

2.16. LIST OF SUBCONTRACTORS AND SUPPLIERS

A. Within seven (7) business days after notification of intent to award, and prior to the Contract being signed, the Contractor shall submit to the Architect/Engineer, a list of proposed subcontractors and major equipment suppliers and other persons or organizations to be assigned part(s) of the contract.

B. This list is subject to the review and approval of the Owner. Basis for this review may include supporting evidence the proposed Subcontractor or Supplier has experience and adequate resources to accomplish the assigned responsibilities on time and in compliance with the requirements.

1. The Owner reserves the right to request justifiable changes in the list.

2. The changes requested are intended to be made at no additional cost to the Owner.
3. If it is not possible to make requested changes at no additional cost, the Owner reserves the right to terminate the award and negotiate with the next successive bidder based on his original proposal.

2.17. MATERIALS SPECIFIED AND QUALITY OF WORK

A. Materials shall be as specified or approved equal.

1. Approved equal" and "or equal" shall mean that the Contractor shall be required to receive the approval (via the Architect) on any substitute materials.
2. Requests for substitution approval shall be submitted to the Architect/Engineer, seven (7) days prior to the bid due date.
3. Prior to considering substitutions, the Owner and/or the Architect/Engineer may require submission of samples, descriptive, technical and catalog data and lab reports of tests for verification of equivalency.
4. If approved and selected, all adaptations to fit and accommodate the substitute or equal equipment including coordinating other trades is the responsibility of the Contractor requesting the change.

2.18. PROGRESS PAYMENTS

A. Will be made not more frequently than monthly, per the Owners payment schedule.

2.19 PROJECT ACCESS: The Contractor shall be aware that the Town/City, Township, County or State has authority over various approach roads for site access and the Contractor is responsible to:

A. Observe load limits and arrange for any exceptions to load restrictions that may be required for this project.

B. Make arrangements for road cleanup, barricades and surface patches and repairs shall comply with applicable regulations and be subject to the governing authority approval.

2.20. EQUAL OPPORTUNITY EMPLOYMENT: The following clause is applicable unless this Contract is exempt under the rules and regulations of the Secretary of Labor of the State of Illinois.

A. During the Performance of this Contract, the Contractor agrees as follows:

1. The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, age or national origin. The Contractor will take affirmative action to ensure that all applicants are considered and that employees are treated, during employment, without regard to their race, color, religion, sex, age or national origin."

2.21. ILLINOIS DEPARTMENT OF LABOR AND LABOR RELATED REQUIREMENTS

A. IDLR regulations apply to all work on site without exception.

B. Publicly funded projects or projects managed by Public Bodies require the following:

1. PREVAILING WAGE 820 ILCS 130/4: The Contractor shall pay and shall require his subcontractors to pay the prevailing hourly wages as is determined by the Illinois Department of Labor pursuant to the Illinois Prevailing Wage (820 ILCS 130/1 et. seq.) included at the end of this section.

2. CERTIFIED PAYROLL REPORTS: Will be required with each successive pay application for payroll periods preceding the application date.

3. SUBSTANCE ABUSE PREVENTION ON PUBLIC WORKS 820 ILCS 265: All Contractors must be prepared to certify upon request that they have complied with the Illinois Substance Abuse Act, including a written program that meets or exceeds the requirements of this act for the prevention of substance abuse among its employees.

2.22. SALES TAX

A. Materials supplied to a public school district are exempt from state sales taxes. The Contractor shall determine the extent of exemption and shall comply with the regulations established by the Illinois Department of Revenue.

1. Sales tax exemption number for Lincoln Elementary School District No. 27 is: E99951940

2.23. TOBACCO AND ALCOHOL FOR CONSUMPTION PRODUCTS

A. Smoking, chewing, tobacco use; shall not be permitted anywhere on public school property by State Statute.

B. Alcoholic beverages, controlled substances, unauthorized prescription medication are not allowed on school property.

1. Working under the influence of any of the above and/or a legal prescription that causes impairment is not allowed.

C. Violators may be removed from the job sites subject to conditional return privileges in the future.

D. The Contractor shall comply with 820 ILCS 265/. The Contractor shall have a place in a written program that meets the requirements of the ACT.

2.24. SUBSTANCE ABUSE PREVENTION ON PUBLIC WORKS PROJECTS

A. The Contractor shall comply with 820 ILCS 265/ which establishes a process for Drug Abuse on Public Projects. The Contractor shall have in place a written program that meets the requirement of this Act.

1. Should evidence that a Contractor, or a Contractor's employee, has harassed staff, student or other individuals, that employee shall be removed from the job site permanently or until such time that the circumstances have been determined to have been resolved satisfactorily.

2.25. SEXUAL HARASSMENT POLICY

A. The Owner will not tolerate sexual harassment in any form. Sexual harassment is defined, for the purpose of this policy, as "unsolicited, deliberate or repeated sexually derogatory statements, gestures or physical or implied physical contact that cause discomfort or humiliation. Sexual harassment may involve pressure from a person of either sex against a person of the opposite sex or same sex . . ."

1. Should evidence that a Contractor, or a Contractor's employee, has harassed staff, student or other individuals, that employee shall be removed from the job site permanently or until such time that the circumstances have been determined to have been resolved satisfactorily.

2.26. BACKGROUND INVESTIGATION AND SEX OFFENDERS ON SCHOOL GROUNDS

A. Illinois Criminal Background checks are applicable to this Contract. The Contractor or subcontractor shall only send construction workers to the site that have successfully passed an Illinois Criminal Background check, per 105 ILCS 5/10-21.9 and 105 ILCS 5/14-7.02

B. The Contractor shall provide:

1. Prior to start of work; maintain a list available to the Owner of all the employees who will be or are anticipated will be employed on site. This list shall be updated when new persons not originally listed will be working on site. This list shall also include names of personnel employed by subcontractors.
2. Persons temporarily on site such as truck drivers or employees making deliveries do not need to be listed, but the Owner reserves the right to request a background check.
3. Provide an affidavit to the Owner that the Contractor or his subcontractor has performed an ISP approved background check by name on all personnel on site.
4. Copies of employee lists and affidavits shall be promptly provided to the owner upon request.

C. The Contractor shall not knowingly employ on school grounds any person who has not signed or will not sign an authorization for a criminal background check.

D. The Owner or Regional Office of Education, reserves the right to run fingerprint background checks on any or all employees on site, randomly or specifically, and the cost of this check will be borne by the Owner. Upon request, provide information, which will not be shared, as needed to complete checks. This may include SSN, home addresses, fingerprint, address, etc. and any alias or former names used.

E. The Contractor shall assume the responsibility to notify all on site employees or potential employees of this provision, and of the consequences of this provision.

2.27. BUILDING PERMITS

A. This project is exempt from local permit fees associated with the construction.

1. This Contractor shall fully cooperate with the local authorities and shall apply for and obtain all required permits and comply with local regulations and requirements. Only the fee is exempt.
2. Provide necessary permit related information to local city authorities.
3. Architect will provide Drawings and Specifications to City of Lincoln Building Safety Dept. if requested.
4. Architect will assist Owner in obtaining a Building Permit from the Regional Office of Education, DeWitt, Livingston, Logan, and McLean Counties.

2.28. CONTRACT DOCUMENTS CHECK LIST

A. Proposal

1. Proposal Form properly filled out and signed, (live signatures)
2. Bid Bond/Bid Security for 5% of base bid amount (live signatures)
3. Low bidders exempt, return of documents within fifteen (15) working days after bid due date

B. Letter of Intent

1. Supplier - Subcontractors List, (10 days after Award)
2. Employee list and criminal background affidavit, (prior to start on site.)
3. Proposal & Contract Form prepared by the Architect, (signed and returned 10 days after receipt).
4. Labor and Material Payment Bond, two copies (10 days after award)
5. Performance Bond, two copies (10 days after Award)
6. Insurance Certificates, liability and hold harmless, three copies (10 days after award)
7. CSV - Master Cost Breakdown (Preconstruction meeting)

8. Bar Graph/Progress Schedule, copies as required (Preconstruction meeting)

C. Periodically as needed

1. Update employee list and criminal background affidavit as needed.

D. Periodic Application for Payment

1. Submit per the monthly scheduling, to be determined
2. Application and Certificate for Payment, 2 copies (AIA G702A)
3. Contractor's Affidavit, 2 copies (AIA G706)
4. Breakdown Estimate, 3 copies
5. Partial Waivers of Lien, 2 copies

a. Partial Waiver of Lien from Subcontractors/Suppliers for previous payment, 2 copies.
b. Updated Progress Schedule, submit with each pay request

6. Certified Payroll for all trades employed on site. Certified Payrolls may be e-mailed to our office manager at: jhickman@middletonassociates.net.

E. Substantial Completion

1. Notification work is ready for inspection.
2. List of deficiencies or incomplete work.

F. Final Application for Payment:

1. Letter to Architect that deficiency work is complete
2. Final Lien Waiver from the Contractor, 2 copies
3. Final Lien Waivers from Subcontractors/Suppliers, 2 copies
4. Final Affidavit showing $0.00 due to Subcontractors and $0.00 due to Suppliers, 2 copies
5. Final Payment Approval Letter from Bonding Co., 2 copies
6. Certification of all guarantees, warrantees and service contracts, O & M Manual
7. Final Application & Certificate for Payment, 3 copies (AIA G702A)
8. Additional certifications as may be requested, 2 copies
9. Operating manuals & instructions, 3 copies-indexed and bound
10. Figure Bonus / Penalty and Liquidated Damages if applicable.

2.29. PREVAILING WAGE: The Contractor shall pay and shall require his subcontractors to pay the prevailing hourly wages for the type of work performed in the job locality as is determined by the Illinois Department of Labor pursuant to the Illinois Prevailing Wage (820 ILCS 130/.01 et.seq.) see section 00 0450. **Provide Certified Payroll data per Dept. of Labor and HB 188.**

2.30. FINAL PAYMENT: The final application for payment shall not be made until all work and deficiency (punch list) items have been satisfactorily completed and approved by the Architect/Engineer for documents compliance.

A. Contractor to submit Operation Manuals and As-Built Drawings to Architect, prior to Final Payment.

END 00 21 13

1. GENERAL

1.1. DESCRIPTION OF DRAWINGS AND LAYOUT

A. Drawing data is intended to be reasonably accurate, however, strict accuracy in detail is not guaranteed.

1. Drawings, particularly Mechanical and Electrical drawings are schematic in nature.
2. The Contractor must verify all of the actual conditions, measurements, dimensions, rough-in requirements; fitting of piping, conduit, wiring, and duct work and coordination necessary for each item, system or piece of equipment in the Contract Documents.
3. Verification is the Contractor's responsibility and shall be completed prior to the fabrication or installation processes.
4. Coordination of all elements of the work must be allowed for with cooperation between the trades particularly for conflicts of limited flexibility of installation. The general priority unless fixed conditions conflict is as follows: structure, placement of equipment, service access, mechanical piping, plumbing piping, and electrical piping. Trade priority in the preceding list does not supersede field cooperation to collectively and most expediently install the work.
5. All corrections necessary to provide properly installed, finished and operable system, in accordance with the intent of the Documents, shall be made at no additional cost.

B. All measurements and conditions must be verified by actual observation at the site.

1. The Contractor shall be responsible for all of his work fitting into place in a satisfactory and workmanlike manner in every aspect and detail subject to the approval of the Architect. The Contractor shall provide layout work and verification measurement at his own cost.
2. The Contractor shall perform all layout work pursuant to site, building, grades and levels, and furnish such engineering services as he may require executing the intent of the work included.

C. Before starting his work, the Contractor shall examine all Contract Area Drawings and Specifications and if discrepancies or conflicts are apparent or occur during the progress of the work:

1. Work first with the conflicting trades or installations to fit and coordinate the work.
2. If there appear to be no practical or agreeable way to coordinate the fitting of the work report same to the Architect as a Request for Instruction, RFI, and obtain direction or interpretation to proceed.

D. The Drawings are instructive and diagrammatic and shall be followed as closely as actual construction will permit. All changes from Drawings

necessary to complete the work shall be done at no added cost charge to the Owner above the amount shown on the Owner/Contractor Agreement.

1.2. OVERLOADING OF BUILDING

A. Care shall be taken that completed structures are not overloaded during Contractor operations. It shall not be the Owner's, or Architect/Engineer's responsibility to observe and check construction processes and temporary loading conditions that may temporarily occur in the pursuit of the completed installations.

1. Structural design, unless noted otherwise, is designed to accommodate design loads, per code, after completion.
2. Bracing and shoring for loading or stability prior to the installation of lateral support elements and diaphragm assemblies is the responsibility of the Contractor.
3. All structural damage done by overloading the system shall be repaired by the Contractor or Subcontractor overloading the system.

1.3. MEANS AND METHODS

A. The Architect/Engineer and Owner shall have no authority over the means, methods and procedures of the work and shall make no determination pursuant thereto nor render opinions concerning same.

1. The Architect’s Field Representative does not have authority to render opinions on structural questions.
2. If questions arise submit a Request for Information, RFI, for direction.

B. The Architect/Engineer and Owner and representatives of same shall have no authority over methods employed or safety conditions related to:

1. Erection loads and as they relate to the Contractor’s interest and shall provide no observation of same.
2. Upon request the Architect can provide the design loads employed for the final installation.
3. The contractor shall designate an employee of the contractor as the person in charge of and responsible for directing the work and safety procedures on site.

1.4. PROTECTION OF WORK AND BUILDING

A. The Contractor shall protect all work and stored materials from injury or loss caused by or resulting from operations under this Contract, including but not limited to:

1. Physical damage

a. Poor stacking practices
b. Abuse damage due to adjacent operations or exposures
c. Weather related damage

2. Failure to have reasonably secured stored and in progress work.

1.5. MOVING OF MATERIAL

A. Contractor materials which are temporarily located or stored shall be relocated as needed to allow access by the Contractor, other Contractors and the Owner's personnel in and around the construction area.

1. Prior to storing materials coordinate the operations to avoid conflicts.
2. Such moving of any material shall be at no additional cost to the Owner.

B. At no time shall tools, materials or workmen block an exit unless same has been coordinated with other trades on site and reasonable alternative options are maintained.

1.6. SHORING, BRACING, AND BARRICADES

A. The Contractor shall provide, construct and finally remove all temporary shoring, bracing, underpinning, scaffolding, needling, barricades, etc. as required by local restrictions and as necessary for to protect persons and property from damage or injury.

1. The Contractor shall determine the need for these items.
2. The Contractor shall be responsible for the performance or failure of performance of same and shall repair damages caused by failure or absence of same.

B. Specific temporary shoring supports, etc., may be noted in the Documents, such as for new openings or certain renovations in existing work.

1. All such needed shoring is always not noted but the responsibility of the Contractor or Sub Contractor making the opening or installing the new work as needed
2. Notation on the drawings is an observation that existing support conditions are being impacted by the work and shall be attended to by the Contractor as needed by conditions discovered.
3. In all cases, observe actual conditions of the work, same may be different than the anticipated conditions and may require shoring bracing and barricades.

1.7. MATERIALS, WORKMANSHIP, AND LABOR

A. All installed materials and equipment shall be new and shall be installed and completed in a first class, workmanlike manner.

B. The Architect reserves the right to direct the removal and the replacement of any item which, in his opinion, does not present a proper, orderly or reasonably neat installation. Such removal and replacement shall be done promptly when directed by the Architect or the Owner. All installations will

be subject to the Architect's and Owner's inspections, tests, and approval at all times from commencement of the work to Final Acceptance of the completed Contract.

C. Work needing correction or replacement that is not corrected with reasonable promptness shall be subject to written notice thereof by the Architect. The Contractor by virtue of having tendered his bid for the work, agrees that progress payments by the Owner may be held (no payment made) until said faults have been corrected.

1.8. ALIGNMENT BALANCING

A. The Contractor shall be responsible for supervision of the installation of equipment.

1. Level, adjust, balance and align new equipment and reinstalled or relocated equipment.
2. Provide all alignment per manufacturer set up recommendations, align and balance pumps, belts and pulleys and adjust equipment to work properly.

1.9. CLEANING UP

A. Work areas shall be maintained reasonably clear of accumulated debris, cartons and unused equipment to allow orderly pursuit of the Work.

B. All surfaces shall be cleaned of any paint, plaster, mortar, gook and other stains.

1. Care shall be taken that no surface is scratched, marred or damaged by the cleaning process.
2. Damaged, marred or scratched surfaces of any type shall be repaired to new or original condition or replaced if necessary to provide a final installation acceptable to the Architect.

1.10. OPENINGS IN CONSTRUCTION

A. Openings required for construction work shall be provided by the Contractor, complete with all necessary reinforcing, lintels, trim, finishing, etc. as shall be needed to complete the Work including openings required for electrical and mechanical work.

1. Openings to be provided for other trades must be laid out and noted by the trade needing same prior to construction of the surface through which the opening is needed.
2. Untimely note of required openings shall be the responsibility of the Contractor or Subcontractor not requesting same.
3. All sleeves, flanges and forms, etc., shall be furnished by the Contractor requiring the opening.

B. Concrete slabs, joists, concrete floors, finished floors, walls and structural

elements, and other structural items shall not be cut or disturbed, except as approved by the Architect IN WRITING.

C. Pipes or elements passing through floors or partitions shall have sufficient clearance around pipes to prevent damage to the adjacent finish from expansion and contraction.

1.11. FIRE SEALS

A. All penetrations of fire walls, smoke barriers and floors shall be properly fire sealed to prevent the passage of smoke and maintain the integrity of fire barriers.

1. Such seals are the responsibility of the contractor for whom the penetration is provided.

1.12. SUPPORTS

A. The Contractor shall provide all concrete, steel bases and anchorage except as herein specified otherwise: vibration absorbing foundation bases, hangers, platforms, anchor bolts, etc. for all equipment which he furnishes. These foundations or supports shall be as specified under their respective headings, as shown on the drawings and/or as recommended by manufacturers.

1. Materials and installation requirements for curbs and pads shall be commensurate with the need.
2. Concrete shall be 3500 psi minimum strength, air entrained 5% to 8% by volume. Install following commercial practices.
3. Framed curbs or foundations shall be properly supported.

1.13. PROTECTION OF WORK

A. The Contractor shall protect his work and adjacent existing work from injury by keeping all piping, ductwork, etc. capped, plugged, drained, or otherwise protected from injury including damage done by freezing and damage from building materials, cement and/or dirt, concrete traffic or exposure.

1.14. ELECTRICAL SERVICES TO EQUIPMENT

A. Unless otherwise specified the Contractor shall furnish and install electrical feeders of proper size, and furnish, install and complete all power wiring and the control wiring for each motor, electrified signage and/or piece of equipment affected by the Contract.

1. Although circuits may be called for on the drawings, ALWAYS verify the final equipment requirements before pulling wire in the event it needs to be increased in size.
2. Contractors providing equipment shall verify the circuits and protection level and need for safety switches matches what they are providing.

B. All electrical procedures shall comply with the National Electric Code, whether temporary or permanent.

1.15. SEALANTS

A. Provide sealants in all locations where shown on the Drawings or called for in the Specifications and as necessary for infiltration tight and weather tight building envelope and finished visual appearance.

B. Sealants shall be provided in locations as directed by the Architect, where equipment components or fixtures fit to surrounds, and when cracks between equipment and surrounds are undesirable or excessive. Provide sealants in all interior locations, as necessary to properly trim out.

C. Sealants shall be installed and tooled in strict accordance with the Sealant Manufacturer's recommendations for joint preparation, using foam rope backer bars, etc. Sealant shall be installed by the respective Contractor providing the item requiring sealant installation.

1.16. PAINTING

A. All exposed surfaces or equipment reworked and installations leaving damaged or unfinished surfaces shall be painted or have a corrosion resistant or factory applied finish.

1. Unfinished non ferrous metals such as aluminum and stainless steel do not require painting.
2. Field paint unfinished equipment and surfaces for corrosion protection and visual appearance, except where clearly stated to the contrary on the Drawings.

END 00 22 13

1. BASE BID

1.1. DESCRIPTION

A. The Base Bid is to provide the Owner with all materials equipment and labor to complete the specified contract work in a single contract.

1. Prime Contractor shall specialize in HVACP

B. Bid packages

1. Base bid proposals will be taken as follows:

a. Base bid proposal for HVAC Renovation for Central Elementary School, 100 7th Street, Lincoln, IL.
b. Deliver Bids to Mr. Kent Froebe, Superintendent, District Office, 304 8th Street, Lincoln, IL 62656 prior to 10:00 a.m. prevailing time on March 1, 2022.
c. The Owner will review the proposals and retain the right to accept or reject any and all proposals, waive minor irregularities in the bidding and award the work as deemed to be in the best interest of the District.

2. The Base Bid proposal must be for the specified work as may be modified prior to the bid time and date by addendum.

a. Do not add any additional description of what is included or excluded from the bid on the proposal form, this may disqualify the bid.
b. Fully fill out the proposal/bid form, omissions and failure to sign will disqualify the bid.

1) Minor irregularities in filling out the bid form may be considered by the Owner as inconsequential to the intended bid and may be declared as such and the bid be considered valid.

3. Voluntary Alternates or Substitutions may be offered on the Voluntary alternate and substitution form if provided or on the Contractor's letterhead if desired. Such options should not materially change the intent of the proposal. These may be considered or disregarded at the Owner's discretion without explanation.

a. See 00 21 13 paragraph 2.6.C

1.2. UNIT PRICES (not including Base Bid ceiling work)

A. Selective removal of existing ceiling grid and 2 x 4 panels (per sq. ft.). $1.50/ sq. ft. recommended

B. Install new 2 x 4 ceiling grid (per lineal ft. or sq. ft. delineate) $2.75/sq. ft. recommended

C. Provide and install new 2 x 4 ceiling panels (per sq. ft.) $4.50/sq. ft. recommended

D. Remove and reinstall 2 x 4 light fixtures (per unit)

1.3. ALLOWANCES

A. Include the following allowances for use by the A/E or Owner for work determined to be unexpected or additional work needed to accommodate unexpected conditions.

1. Project Number 25821422: $30,000
2. Authorized use will be by approved change order only, and is not to be assigned at the discretion of the contractor in any case.
3. Unexpected or additional work needed to accommodate unexpected conditions generally shall include repair of ceilings and unforeseen conditions. The determination of unforeseen conditions will be determined by the Owner, and the Architect.

1.4 ALTERNATE BIDS

A. Alternates are to provide the Owner with options expanding or reducing the project scope and content and for comparative material or equipment prices for use in determining the final construction contract.

1. Bid Form will indicate number of Alternates.

B. Work included in alternates shall be commensurate with and in compliance with all the applicable and similar project specifications and conditions and shall include all necessary adjustments and additional labor and/or material as may become apparent to properly complete the alternate into the work. No additional charge will be considered after bidding for the purposes of making additional construction or adjustments in order to accomplish alternative work which has been included in the Contract.

C. Incidental Work: All necessary adjustment in the work shall be made to accommodate accepted alternates without cost change in and above the alternate cost.

END 00 24 13

1. GENERAL

1.1. SCHEDULING

A. Master Schedule

1. The Mechanical Contractor will be the Prime Contractor and the Coordinating Pacesetting Contractor and shall maintain a Master Schedule.
2. Prior to preparation of the Master Schedule, all Subcontractors shall coordinate scheduling needs with the Prime Contractor.
3. Upon preparation of a detailed schedule, same shall be reviewed by the Architect, the Assigned Contractors, and the Owner. Once accepted, it shall become the basis for determining the on time progress of the work.

    a. Provide manpower, overtime, and equipment as needed to maintain the schedule. The Owner will not authorize additional payment for overtime or additional manpower needed to maintain, achieve, or make up time to meet the schedule.
    b. The Prime Contractor shall notify the Architect and the Owner promptly of any deficiency in performance, which is unacceptably impacting the schedule or delaying progress.
    c. The Subcontractor(s) shall immediately notify the Prime Contractor, in the event any trade area Contractor's progress is impeding their ability to maintain the schedule.
    d. The Prime Contractor shall immediately provide notification of this report to the Architect and the Owner and shall include a plan of action to regain schedule.

B. Schedule

1. Contractors proposed schedule and timeline shall be delivered for review within seven (7) days or at the Pre-Construction meeting.

    a. Schedule will be subject to review and negotiated revision after Owner and Architect input are considered.
    b. Schedule should be available for the Preconstruction meeting.

2. Submittals shall be delivered forty-five (45) days following award.

    a. This schedule is adjustable shorter or longer depending on the size and content of the project.

3. Upon receipt of review submittals, schedule material and equipment for delivery as early as possible.
4. Confirm that manpower is available and Contractor has adequate

capacity to complete the work on a timely basis.

a. Materials and equipment may be stored on site in trailers or in suitable insured warehouses in the vicinity.

b. Materials and equipment delivered on site or suitably stored with proof of insurance may be submitted for payment subject to inspection.

c. The Owner requests that equipment and materials to do the work be on site or readily available for delivery prior to the start of operations.

5. Schedule

a. Project is planned for execution over the Summer of 2023, with the schedule to be coordinated with the Owners schedule and an orderly fashion.

b. Cooperation, always include in your schedule for manning the work and planning completion, not less than five days of flex time in the event the coordination, delivery issues or unusual weather impact on the work or unexpected Owner occupancy issues occur which will impact access (See Section 00 21 13). This is over and above the allowances you might include for you own operations such as weather, vacations, delays in delivery materials or equipment and illness. There is no intent or expectation of the Owner to abuse this allowance and every intent to cooperate to get the work complete, but an unexpected or uncontrollable time impact prior to August will not change owner occupancy schedules.

c. Work to be Substantially completed Summer 2023, August 17th. Substantially complete means the building may be occupied by staff and students, the building is clean, and cooling and heating can be maintained by new equipment. Fire alarms need to be operable. Final completion, August 25, 2023. Any work by contractors after August 17, 2023 may not be done during class time, except work in Mechanical Rooms. See Specification Section 00 21 13, Paragraph 2.12.A.2 for additional information.

d. It is intended all work to be complete and fully operational 15 days after receipt of punch list.

e. See requirements for manning the work described hereafter.

C. Manning the work

1. Contractors shall work overtime, Saturday and/or double shifts if work falls one (1) week behind prepared schedule or agreed to revision and shall continue to work Saturday and double shifts, full

crews or with additional crews until lost time is recovered.

2. Prepare a plan of action to recoup lost time for the A/E and Owner.

END 03 30 30

PROJECT TITLE: Lincoln Central Elementary School HVAC Renovation

BID DATE: **Thursday, November 17, 2022** TIME: **2:00 p.m. Prevailing Time**

LOCATION OF BID: DISTRICT OFFICE
Lincoln Elementary School District No. 27
304 8th Street
Lincoln, IL 62656

NAME OF FIRM _____

PROPOSAL FOR: All work single contract

A/E PROJECT NO. 25821422

THE BID ACKNOWLEDGES THE FOLLOWING ADDENDA (as applicable):
Failure to acknowledge may cause bid rejection

NO. 1 _____, NO. 2 _____ , NO. 3_____ , NO. 4_____NO 5 _____, NO 6 _____

EACH BID SHALL INCLUDE:

A. THE BID FORMS AND CERTIFICATIONS COMPLETED AND SIGNED, (*this form may be copied.)*

B. BID SECURITY (*standard industry forms may be employed)*

C. BIDS SHALL INCLUDE ALLOWANCE – SEE 00 24 13

BASE BID – Central Elementary School HVAC Renovation. **THE BIDDER AGREES TO PERFORM ALL BASE BID WORK, INCLUSIVE OF ALL TRADES AND INCLUSIVE OF THE $30,000.00 ALLOWANCE (PER SPECIFICATION 00 24 13) FOR THE SUM OF:**

_____**Dollars $**_____
written amount

ALTERNATE #1 BID

_____**Dollars $**_____
written amount

A. Unit Price: Remove existing ceiling grid and panels. $ _____/sq. ft.

B. Unit Price: Install new 2 x 4 ceiling grid; $_____/lineal ft,
see specification Section 09 51 23

C. **Unit Price:** Install new 2 x 4 ceiling panels; see Section 09 51 23 $ _____/sq. ft

D. **Unit Price:** Remove and reinstall 2 x 4 light fixtures, not adding new fixtures. . $ _____/unit

VOLUNTARY ALTERNATES OR SUBSTITUTIONS
Did you include voluntary alternates or product substitution offers on form provided.

YES _____ **NO** _____

SEE PRODUCT SUBSTITUTION OR VOLUNTARY ALTERNATES FORM, ATTACH IF ANY ARE OFFERED. Voluntary alternates or substitutions may or may not be considered in making the award and are not required.

THE BIDDER AGREES TO:

1. Hold this bid open for forty (40) calendar days after bid opening date.
2. Enter into and execute a contract with Lincoln Elementary School District No. 27 if awarded this contract.
3. Comply with the contract and bidding documents with respect to bid security, all bonds, insurance, work requirements, schedule and Bonus / Penalty Clause
4. Comply with the Contract Documents with respect to Contract Time as specified in Scope of Bid Section 00 24 13.

THE BIDDER MAKES THE FOLLOWING REPRESENTATIONS AND CERTIFICATIONS:

A. A surety company has agreed to issue payment and performance bonds to fulfill the contracting requirements.
B. The Bidder is not barred from contracting with any unit of state or local government as a result of violating the bid rigging or bid rotating provisions contained in 720 ILCS 5/33E.
C. The Bidder is not barred from contracting with the State of Illinois as a result of a bribery conviction per 30 ILCS 505/10.2.
D. All on site labor and wage compensation provided by this contractor or his subcontractors will comply with the Illinois Prevailing Wage Act (820 ILCS 130E).
E. This proposal is made without any connection with any person making another bid for the same contract, that the bid is in all respects fair and without collusion or fraud, that no member of the Lincoln Elementary School District No. 27 School Board, other officer or any person in the employment of Lincoln Elementary School District No. 27 is directly or indirectly interested in the bid or any portion of the profit there from, except as allowed by the Illinois Law or the Illinois School Code.
F. I agree to provide a drug-free workplace as required by the Illinois Drug-free Workplace Act.
H. I do hereby certify that I am either the bidder or duly authorized agent of the referenced bidder, and I am authorized to execute the certifications hereon.
G. I certify that by submission of this proposal the bidder confirms that he is familiar with the site, existing conditions, the Bid Documents, requirements and the project schedule.

CONTRACTOR:

Firm Name: _____

Address: _____

_____

FEIN: _____

Telephone: _____

Email:

FAX: _____

Date: _____

LIST OF SUBCONTRACTORS

_____

_____

_____

SIGNATURE:

_____

TITLE:_____
For Corporations only.

END 00 40 00

1. GENERAL

1.1. DESCRIPTION

A. The alternates are to provide the Owner with optional systems and comparative material prices for determining the most advantageous construction package.

B. Work included in alternates shall be commensurate with and in compliance with all the applicable project specifications and conditions and shall include all necessary related project adjustments and additional labor and/or material as may become apparent to complete the alternative work. No additional charge will be considered after bidding for the purposes of making additional construction or adjustments in order to accomplish alternative work which has been included in the Contract.

C. All Base Bid requirements and material specifications not specifically mentioned or deleted by the alternate shall remain as originally set forth.

D. All Contract Document requirements shall apply to alternates.

E. Incidental Work: All necessary adjustment in the work shall be made to accommodate accepted alternates without cost change in and above the alternate cost.

1.2 Alternate Bids

A. There are no required alternates at time of writing this specification. Check all addendums.

END 00 40 05

The Bidder should include this form with the Bid Forms if a material substitution is offered at that time.

The Base Bid and Alternate Bids include only those products specified in the bidding documents. Following is a list of substitute products which bidder proposes to furnish on this project, with the difference in price being added to or deducted from the Base Bid or Alternate Bids.

Bidder understands that acceptance of any proposed substitution is at Owner's option. Approval or rejection of any substitutions listed below will be subject to review after Contract award. Hold open for thirty-five (35) days from Bid Date.

SUBSTITUTIONS

MANUFACTURER'S NAME AND PRODUCT	ADD OR (DEDUCT)
_____	_____
_____	_____
_____	_____
_____	_____

VOLUNTARY ALTERNATE

DESCRIPTION	ADD OR (DEDUCT)
_____	_____
_____	_____
_____	_____
_____	_____

EVALUATION. Contract award will be made in accord with Instructions To Bidders. Only the lowest responsible bidder's Proposed Product Substitution Voluntary Alternates Form will be evaluated.

Attach with herewith or submit on day of bid a general description of the proposed option being offered.

Provide detailed information promptly upon request.

END 00 40 10

OWNER - CONTRACTOR AGREEMENT
To be filled out upon award

Between:

The Owner: Lincoln Elementary School District No. 27
304 8th Street
Lincoln, IL 62656

And the General Contractor: _____

_____

_____

For the Project:

CENTRAL ELEMENTARY SCHOOL HVAC RENOVATION
FOR LINCOLN ELEMENTARY SCHOOL DISTRICT NO. 27

The Owner and Contractor agree to enter into a contract in accordance with the terms and conditions of the Documents (Plans & Specifications), A/E Project Number 25821422 and the Contractor's Bid Proposal dated November 17, 2022 which become the Contract for completion of the project as follows:

Base Bid Substantial Completion Date: **August 17, 2023**
Base Bid Final Completion Date: **August 25, 2023**

Additional Terms & Conditions: None (or as applicable)

Addenda: #1____ #2____#3____#4____#5____ #6____ (list as applicable)

Contract Amount: (to be listed as appropriate)

Base Bid Proposal	$_____
Alternate Bids as awarded to be listed	$_____
Total Contract Amount	$_____

(Written)_____ Dollars

Date of Agreement:_____

Signatures:

Owner: **Lincoln Elementary School District No. 27**	**Contractor:**
_____	_____
_____	_____
Date: _____	**Date:** _____

Contractor's Seal
(Corporation Only)

This Agreement must be signed and returned with the Contractor's Performance Labor and Materials Payment Bonds within fifteen (15) days of notice or the Contractor will be considered in default on acceptance of the award.

END 00 41 13

1. GENERAL

1.1. GENERAL CONDITIONS

A. The conditions outlined in this and following paragraphs are to supplement and complement the conditions found in the articles of the AIA Document A201, 2007 Edition.

1. Included in these Specifications by reference is AIA Document A201 General Conditions.

B. AIA Document A201, 2007 Edition, can be purchased directly on line from a variety of vendors including the AIA and are available in electronic format as well as printed.

1. AIA A201 2007 version can be reviewed at the Architects office without charge.

C. To the page one of the AIA A201 General conditions Document:

1. Project: HVAC Renovation
   Central Elementary School, 100 7th Street, Lincoln, IL 62656
2. The Owner: Lincoln Elementary School District No.27, 304 8th Street, Lincoln, IL 62656
3. The Architect: Middleton Associates Incorporated, 1702 W. College Ave., Suite E, Normal, IL 61761

1.2. SIGNING OF DOCUMENTS AND INSTRUMENTS OF THE CONTRACT

A. All documents shall be signed by persons fully and duly authorized to so sign. Any documents signed by a person other than person prescribed by the Contractor's legal organization shall enclose with his signature the evidence of "Power of Attorney."

2. SUPPLEMENTARY GENERAL CONDITIONS

2.1. SUPPLEMENTS TO AIA DOCUMENT A201 (2007 EDITION) THE GENERAL CONDITIONS OF THE CONTRACT.

A. The following sections represent modifications or additions to the AIA A201 - 2007 Document.

B. TO ARTICLE 2/OWNER

1. Add Subparagraph 2.2.2.1 Easements off site required by the Contractor to execute the work, such as space for storage, access, scaffolding, lane enclosure, etc., shall be arranged for by the Contractor and included in the contract amount.

C. TO ARTICLE 3 CONTRACTOR

To Subparagraph 3.3.1, delete the last two (2) sentences listed under 3.3.1 in their entirety.

1. To Subparagraph 3.3.1 insert: If the Contractor determines that such means, methods, techniques, sequences or proceedings may not be safe, or may not be appropriate to the equipment and task as becomes apparent, then said Contractor shall have included in his proposal amount allowance to complete this work per a revised plan for which he can assume responsibility and shall notify the Owner and Architect before proceeding. In no case do the Owner and Architect take responsibility for directing Contractor Operations.
2. To Subparagraph 3.12

    a. Add 3.12.6.1 Submittals unmarked will not be reviewed at the Architect's option. Said unmarked submittals may be returned to the Contractor for re-submittal and the time loss shall not extend the time of completion of the project.
    b. Add 3.12.6.2 Submittals reviewed by the A/E and returned or held as a record copy presume the Contractor responsibilities in paragraph 3.12.6 have been included whether noted or not.

D. TO ARTICLE 5 SUBCONTRACTORS

1. To Subparagraph 5.2

    a. Add 5.2.5 The assignment of work or a portion of the work by the Contractor to Subcontractor(s) is the election of the Contractor and in no way changes or reduces the Contractor's obligations under the Contract to properly complete the work and/or provide clear title to the work, including the work by said Subcontractor(s).

E. TO ARTICLE 7 CHANGES IN THE WORK

1. To Subparagraph 7.1.2

    a. Add 7.1.2.1 The Contractor and/or his Subcontractor shall not proceed with any work, directive or change for which he intends to claim extra cost without providing written notice to the Architect.
    b. Add 7.1.2.2 The Architect and Owner shall provide response to claims for additional cost within a reasonable time period upon receipt of notice or quote.
    c. Add 7.1.2.3 Work for which an agreement cannot be reached prior to implementation can proceed as time and material work with all parties to agree on what is additional work over that which should have been included to complete the work as originally intended.

2. To Subparagraph 7.2.2

a. Add 7.2.2.1 Change Order quotes shall be based on an approved quote or estimate which shall be based on labor and material cost, actual or estimated as prior agreed upon, and:

b. Add 7.2.2.2 Overhead and profit may be charged proportional to this category of work on the Contractor's CSV or not to exceed the greater of:

1) Fifteen percent (15%) for the Contractor's own work forces
2) Seven and ½ percent (7.5%) Subcontractor plus ten percent (10%) Contractor, for seventeen and ½ percent (17.5%) total for work completed under a Subcontractor arrangement.
3) These allowances shall include all off site and indirect costs, including insurance, project management, bonds and profit.

F. TO ARTICLE 9 PAYMENT AND COMPLETION

1. To Subparagraph 9.6.1

a. Add 9.6.1.1 Wherein the Owner is governed by a public Board, payment requests must be received by the A/E 5 days prior to the end of the month prior to the next monthly Board Meeting. Payments will be made within twenty-five (25) days following Board approval. Failure to make agenda dates will result in a minimum one (1) month delay in payment.

G. TO ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

1. To Subparagraph 10.2.1

a. Add 10.2.1.4 The Contractor shall be responsible to provide and maintain on site MSDS Sheets for all required materials to be brought on site.

1) These sheets shall be readily available upon request to the owner on remodeling renovation projects which are Owner occupied.
2) Comply with VOC regulations.
3) Comply with IEPA regulations.

2. To Subparagraph 10.2.3

a. Add 10.2.3.1 Provide for the general safety of public and Owners employees, such safety provision shall be adjusted as appropriate to the age and volume of public anticipated in

the project vicinity.

b. Add 10.2.3.1 Provide for traffic safety as appropriate to the operations; cooperate with the governing authorities on road activities, lane closures, excavations, surface cleaning etc.

H. TO ARTICLE 11 INSURANCE & BONDS

1. To Subparagraph 11.1.2

a. Add 11.1.2.1 Minimum Limits of Liability for preceding coverage are:

1) Workers Compensation - Statutory Limit
2) Applicable Federal *(such as Longshoreman's)* Statutory limits.
3) Liability Insurance may be written as Comprehensive General Liability policy form or Commercial General Liability policy form with the following coverages:

a) Bodily Injury - $1,000,000 each occurrence, $2,000,000 aggregate
b) Property Damage - $1,000,000 each occurrence, $5,000,000 aggregate.
c) Property Damage – Broad Form - $1,000,000 each occurrence, $2,000,000 aggregate.
d) Personal injury (*with employment clause deleted*) $1,000,000 aggregate.
e) Products and completed operations $1,000,000 to be maintained one year following final completion.
f) Business Automobile Liability, (*including owned and non-owned and hired vehicles*)
g) Bodily Injury and Property damage $1,000,000 each person, $1,000,000 each occurrence.

4) Umbrella Insurance $10,000,000 over primary insurance limits.
5) $10,000 Retention for self insured hazards each occurrence
6) In the event that a claim is filed or a settlement reached whether related to this project or not which compromises the aggregate limits of liability then the Owner and Architect shall be notified and arrangements shall be made to provide additional insurance as needed to keep aggregate limits in force for the remainder of the Contract.

2. To Subparagraph 11.1.4

a. Add 11.1.4.1 The Owner, Architect, and Consulting

Engineers including their employees and representatives shall be included as Additional Insureds or Named Insureds on the insurance and shall be shown as such on the Certificate.

3. To Article 11

   a. Add 11.1.5 Contractor's insurance shall be maintained in force through basic warranty and guarantee periods, not less than one (1) year following Final Completion.

4. To 11.3. Property Insurance

   a. Add 11.3.1.1 The Owner's property and vandalism insurance has $1,000 deductible. The Contractor shall insure and thus pay the costs not covered by the Owner's deductibles.
   b. Add 11.3.1.2 The Owner's Builder's Risk will cover only normally included Owner risks, on site, Owner's interest only, excluding tools and property of the Contractor and improperly stored or unsecured materials.

5. To Paragraph 11.4.1 add the following Subparagraphs:

   a. Add 11.4.1.1The Contractor shall furnish Performance and Labor and Material Payment Bonds covering the faithful performance by the Contractor of the work specified in accordance with the plans and specifications and according to the time and terms and Conditions of the Contract, and also that the Contractor shall properly pay all debts incurred in the prosecution of the work, including those for labor and materials furnished and including labor obligations as interpreted by the Illinois Department of Labor and/or the courts.
   b. Add 11.4.1.2 The cost of each bond shall be included in the Contract Sum plus any changes to the Contract Sum. The Contractor shall include in all bonds provisions as will guarantee faithful performance of the prevailing wage provisions of the Contract if applicable.
   c. Add 11.4.1.3 Bonds shall be written by surety, approved by Owner, with a minimum rating of B or better, Financial Class V, or higher, in A.M. Best's Insurance Guide, current edition. The company must also be licensed in the State of Illinois.
   d. Add 11.4.1.4 The Contractor shall require the attorney-in-fact who executes the bonds on behalf of the surety to affix thereto a certified and current copy of power-of-attorney.
   e. Add 11.4.1.5 The Contractor shall deliver the required bonds to the Owner not later than fifteen (15) days following the date the agreement is executed.

I. TO ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

1. To Subparagraph 12.2.2.1 After Substantial Completion:

    a. Add 12.2.2.1.1 Latent Defects, for a period of 10 years after Substantial Completion, upon demand by the Owner, the Contractor shall promptly repair or replace, including associated work repairs and cleanup necessary, defective or non-conforming work resulting from or constituting latent defects, fraud, fraudulent concealment or gross negligence.
    b. Add 12.2.2.1.2 Seasonal equipment such as temperature controls and building systems subject to seasonal loads such as heating equipment and air conditioning, shall be warranted to perform as intended for two years. Exception would be equipment damaged by incorrect operation or maintenance procedures, specifically covered in training, but improperly implemented by the Owner.
    a. Add 12.2.2.1.3 Prompt Repair. Upon notice from the Owner or Architect of defects or nonconforming work, the Contractor shall promptly visit the site in the company of the Owner's representative to determine the extent of all defects or nonconforming work. The Contractor shall provide all labor, material and equipment to promptly repair or replace the defective or nonconforming work. The repair shall include all adjacent work not necessarily provided by the Contractor, but damaged as a result of correcting or remedying such defects or non-conforming work. If the Contractor does not promptly pursue correction, the Owner may repair or replace such work and charge the cost to the Contractor. Work which is repaired or replaced by the Contractor shall be inspected and shall be warranted by the Contractor in accordance with this Article.
    b. Add 12.2.2.1.4 The warranties set forth herein are in addition to all warranties or guarantees expressed or implied by operation of law, statute or ordinance.

2. To Subparagraph 12.2.2.3, Delete the word ‘not’. Clarification; all materials and equipment are expected to perform satisfactorily for one year, items or equipment needing periodic attention during the first year of use, shall continue to be serviced by the Contractor until such time that the material, item or equipment is deemed to be doing its intended purpose without repeated service.

3. To Subparagraph 12.2.5

    a. Add 12.2.5.1 Extended Warranties and Commercial Warranties. The Contractor shall deliver all commercial and extended warranties received from manufacturers to the A/E prior to Final Payment. Extended warranties and guarantees will be as described under the various trade work sections of these documents, and may be the responsibility of third parties to the contract such as dealers or manufacturer’s from whom such extended coverage is specified or as

advertised such as a commercial limited warranty of performance or service. Such extended warranties may or may not include labor unless specified, or in the case of commercially advertised warranties as offered by the party selling the product or equipment.

b. 12.2.5.2 Prompt Repair. Upon notice from the Owner or Architect of such defects or nonconforming work, the Contractor shall promptly visit the site in the company of the Owner's representative to determine the extent of all defects or nonconforming work. The Contractor shall provide all labor, material and equipment to promptly repair or replace the defective or nonconforming work. The repair shall include all adjacent work not necessarily provided by the Contractor, but damaged as a result of such defects or non-conforming work or as a result of remedying them. If the Contractor does not promptly repair or replace defective or non-conforming work, the Owner may repair or replace such work and charge the cost thereof to the Contractor. Work which is repaired or replaced by the Contractor shall be inspected and shall be warranted by the Contractor in accordance with this Article. The warranties set forth herein are in addition to all warranties or guarantees expressed or implied by operation of law, statute or ordinance.

J. TO ARTICLE 13 MISCELLANEOUS PROVISIONS

1. To Subparagraph 13.1

a. Add 13.1.1 Location of the project is Illinois.

b. Add 13.1.2 The Contractor shall, to the best of his knowledge and capability, perform all work encompassed by the documents, in compliance with the Environmental Barriers Act (Ill. Rev. Stat. 1985, ch. 111-1/2, pars. 3711 et seq. as amended), the Illinois Accessibility Code, 71 Illinois Administrative Code 400; The Uniform Federal Accessibilities Standards (UFAS); Section 504 of the Rehabilitation Act of 1973, and the Americans with Disabilities Act of 1990 (effective January 26, 1992) known as ADA requirements. This obligation shall apply to the contractual work described as the project and the conduct of work processes initiated to accomplish the work.

c. Add 13.1.3 All parties to this Contract are subject to the rules and regulations of the Illinois Department of Human Rights and the statutory requirements thereof, including the requirement that every party to a public contract shall have adopted written sexual harassment policies (PA 87-1257).

d. Add 13.1.4 It shall be mandatory that the Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, national origin or ancestry, age, marital status, physical or mental disabilities.

e. Add 13.1.5 Illinois Department of Labor requirements. It shall be mandatory upon the Contractor to whom the Contract is awarded and upon any Subcontractors thereof to be in compliance with applicable wage and reporting regulations. This project is a Prevailing Wage Public Works contract.

2. To Subparagraph 13.3.

a. Add 13.3.1 Notice served by facsimile (fax) to facsimile number used during bidding and construction shall be official written notice.
b. Add 13.3.2 Notice served by electronic means (email) to the electronic address used during bidding and construction shall be official written notice.
c. Add 13.3.3 The Bidder shall notify the Architect and/or the Owner at anytime of changes in the facsimile or electronic contact addresses that will reach the contractor. Failure to so notify is the Contractors responsibility.

K. TO ARTICLE 15 CLAIMS AND DISPUTES

1. To Subparagraph 15.3.1 Delete the word ‘SHALL’ and Insert the word ‘MAY’.

a. Add 15.3.1.1 Mediation may be employed to resolve disputes if agreed to by both parties to the Contract.

2. To Subparagraph 15.4.1 Delete the word Shall and insert the word ‘MAY’.

a. Add15.4.1.1 Arbitration may be employed to resolve disputes if agreed to by both parties to the Contract.

End 00 70 00

1. GENERAL

1.1. REQUIREMENTS INCLUDE

A. Base Bid: Central Elementary School, approximately 47,320 sq. ft. Contractor verify sq. ft. The existing heating system is supplied hot water to VAV boxes throughout the building from 3 (2 almost new) condensing boilers. The three condensing boilers will be turned over to the School District. Existing cooling is provided by one chiller. The piping to VAV boxes is 4 pipe supply and return. The Mechanical Room is adjacent to the Gym. There are two Fan Rooms, one above the stage and one above the 2nd floor corridor.

1. Provide demolition of all components of the existing heating and cooling system including piping, pumps, boilers, and return, intake, and exhaust equipment as shown, except the Air Handler units in both Fan Rooms are to be abandoned in place.

a. Electrical Demolition and Re-Installation

1) Room 101: 1 – 2x4 light fixture; Room 103: 1 – 2x4 light fixture, 1 speaker; Room 104: 2 – 2x4 light fixture; Room 105: 5 – 2x4 light fixture, 1 speaker, 2 emergency light fixture; Room 111: 9 – 2x4 light fixture, 4 speakers, 2 emergency light; Room 112: 1 – 2x4 light fixture; Room 117: 1 – 2x4 light fixture; Room 122: 1 – 2x4 light fixture; Room 125: 1 – 2x4 light fixture; Room 130: 4 – 2x2 light fixture; Room 131: 2 – 2x4 light fixture; Room 132: 2 – 2x4 light fixture; Room 133: 1 – 2x4 light fixture; Room 135: 4 – 2x4 light fixture, 2 speakers; Room 136: 7 – 2x4 light fixture, 2 speakers, 3 emergency lights; Room 137: 2 – 2x4 light fixture; Room 139: 1 – 2x4 light fixture; Room 149: 1 – 2x4 light fixture; Room 157: 5 – 2x4 light fixture, 2 speakers, 2 emergency lights; Room 165: 1 – 2x4 light fixture; Room 201: 1 – 2x4 light fixture; Room 202: 10 – 2x4 light fixture, 4 speakers, 3 emergency lights; Room 206: 1 – 2x4 light fixture; Room 212: 1 – 2x4 light fixture; Room 217: 1 – 2x4 light fixture

b. HVAC Demolition and Re-Installation

1) Room 105: 2 – 2x2 air diffusers; Room 111: 1 – 2x2 air diffuser; Room 133: 1 – 2x2 air diffuser; Room 135: 2 – 2x2 air diffusers; Room 136: 3 – 2x2 air diffusers; Room 137: 1 – 2x2 air diffuser; Room 139: 1 – 2x2 air diffuser; Room 157: 3 – 2x2 air diffusers; Room 164: 1 – 2x2 air diffuser; Room 202: 3 – 2x2 air

diffusers.

2. Provide new building loop piping system. Install branch piping to heat pumps. Remove and reinstall lay in ceiling as shown. Demolish piping as indicated; remove existing VAV units in rooms.
3. Modify (remove, alter, install) electrical system as noted on plans and/or to make new system operable.
4. Install new loop piping and branch piping to heat pumps for new HVAC system.
5. Install new heat pumps with copper condensate lines (except as noted on plans), new exhaust fans, and new energy recovery units as shown.
6. Install new controls as provided by heat pump manufacturer, or as specified herein.
7. Provide improvements to accommodate new equipment as noted.
8. Cover abandoned openings with masonry material to match surrounding walls. Repair ceilings with new grid and panels in areas indicated. Remove existing rooftop exhaust or F.A. intake equipment and install new equipment as indicated and repair roof.
9. Remove existing exhaust fans and replace with new as noted.

B. The Bore field to supply tempered water to the geothermal loop piping system will be installed by other Contractor in this contract.

1. The purge pit will be supplied and installed in the Bore field contract.
2. The Bore field contractor will bring the Bore field loop into the purge pit.
3. The Bore field Contractor will fill the vertical and horizontal Bore field piping and leave filled with fresh water.

1.2. PRODUCTS FURNISHED BY OTHERS: All products, components, spaces, and equipment furnished by the Owner are currently in place and are to be relocated, disconnected and reconnected as set forth in these Documents (Specifications and Drawings) and/or required to accomplish these Documents. All added components shall be new and furnished by the Contractor.

A. Contractor's Incidental Duties

1. Designate specific delivery date for each product in approved construction schedule.
2. Promptly inspect delivered products, report damaged or defective items.
3. Handle material at site, including unloading, uncrating, and storage.
4. Protect from exposure to elements, from damage.
5. Repair or replace items damaged as result of Contractor's operations.
6. Install, connect and finish products in assembly function ready including incidental related work.

1.3. WORK SEQUENCE

A. The Owner will occupy the adjacent school facilities at varied occupation levels (full occupation during school year minimal occupation summer) during construction.

B. It is anticipated that the entire building can be completed in the Summer of 2023. If that cannot be accomplished, the contractor must accomplish at least 50% of the work, and must leave the building by August 17, 2023 in a clean and operable condition. The project completed by August 25, 2023.

1. If the project is not completed by August 17, 2023, the building's new or existing mechanical system must be capable of providing hot and cold air to all rooms.

C. Coordinate the work schedule with the Owner and building administrator.

1.4. SCHEDULE

A. Work may commence: See Section 00 21 13 paragraph 2.12

B. Project Schedule: See Specification Section 00 21 13 paragraph 2.12 and Section 00 30 00.

1. Substantially Complete: **August 17, 2023** (building must be occupied for 2023-2024 school schedule).
2. Final Completion: **August 25, 2023**
3. **All work after classes begin must be scheduled for second shift.**

C. Work not completed prior to student occupancy to be completed:

1. Second shift
2. Weekends
3. Arrange schedule with Owner that will not disturb the learning environment.

1.5. CONTRACTOR USE OF PREMISES

A. Confine operations at site to areas permitted by:

1. Law
2. Contract
3. The Owner's Representative, per 1.3.B. above.

B. Do not unreasonably encumber site with materials or equipment. Do not block the Owner's pedestrian traffic patterns except as prior arranged with the Owner's approval.

C. Do not load structure, or components thereof, with weight that will endanger or damage structure.

D. Assume full responsibility for protection and safekeeping of products stored on premises.

E. Move and relocate as necessary all stored products or equipment that interferes with operations of the Owner.

F. Obtain and pay for use of additional off site storage or work area needed for operations.

G. Limited use of site for work and storage

1. Use public access ONLY, now in service. Parking ONLY as prearranged with the Owner.
2. All vehicular on site activity shall have been prearranged and approved by the Owner.

H. Cooperate with the Owner's use of the premises and other Contractors providing work on site under separate Contracts with the Owner.

1.6. CONTINUOUS OCCUPANCY BY OWNER

A. Owner will occupy areas for purposes of conducting educational, athletic, physical education, and general maintenance during construction.

1. Generally the school class day is from 8:15 a.m. to 4:15 p.m.

B. Contractors shall provide

1. Access by Owner's personnel and pupils when applicable.
2. Operation of Mechanical and Electrical systems with a minimum of down time.
3. Operation of exhaust systems with a minimum of down time.
4. Adequate security of the premises in which work is in progress.

C. Upon (after) the work being completed and accepted by Owner, the Owner shall provide:

1. Custodial services
2. Security
3. General custodial maintenance

1.7. ASBESTOS

A. This building was built in 2003. No ACM should be in the building.

B. The Contractor may deem it advisable to contact the Office of Superintendent of Schools and request access to the Asbestos Management Survey applicable to the building pursuant to Section 855.30 (including updated amendments thereto) of AN ACT KNOWN AS THE ASBESTOS ABATEMENT ACT: P.A. 83-1325, approved and eff. Sept. 5, 1984, amended by P.A. 84-0951, approved and eff. Sept. 20, 1985, and amended by P.A. 84-1096, approved eff. Dec. 9, 1985, amended by P.A. 84-1245, approved and eff. July 29, 1986, amended by P.A. 84-1346, and approved

and eff. Sept. 10, 1986, inclusive of such amendments and regulations applicable since 1986.

1. Upon determination prior to bidding, or after bidding discovery by the Contractor that an asbestos hazardous condition does exist in the path of execution of the work of his Contract, he shall so notify the Owner IN WRITING.
2. Pursuant to Item 1.6.B.1 above, the Owner may implement the following action:

    a. Eliminating that portion of the work by revision and change order to these documents.
    b. Institute removal or acceptance encapsulation.

3. Wherein concealed asbestos is discovered, the Contractor shall notify the Owner of the existence of said apparent asbestos which may require analysis for hazardous determination. This notification shall be IN WRITING at no cost to the Owner. Should analysis indicate that hazardous substance does prevail the procedure shall be set forth under Item 1.6.B.2. above.

    a. NOTE: DELAY IN THE CONTRACTOR'S WORK DUE TO SUCH CONCEALED DISCOVERY AND/OR OWNER RESPONSE THERETO SHALL NOT BE GROUNDS FOR CLAIM FOR EXTRA EXPENSE BY THE CONTRACTOR CHARGEABLE TO THE OWNER AS AN EXTRA TO THE CONTRACT AMOUNT.

1.8. COORDINATION AND COOPERATION

A. It is the intent and purpose of the Owner to cooperate with the Contractor to the extent feasible under existing applicable laws and regulations and the Owner and the Contractor alike shall not construe this portion of the documents, that is, Section Paragraph 1.6.A, and B to the disadvantage of the other.

B. Should the bidding Contractor not understand the foregoing, he shall notify the Architect/Engineer for clarification prior to bidding in accordance with Section 00040, Paragraph 1.3, 1.4, and 1.15.

C. This Contractor shall cooperate with other Contractors and their Subcontractors working on site duly employed by the Owner to perform service related and unrelated to work outlined by these Documents.

D. The Owner has the right to employ other contractors or his own forces to be working on site in concurrence with this Contractor’s work. Coordinate and cooperate to the extent reasonable under the contract so all parties can collectively accomplish the work scheduled.

1.9. FITTING AND FINISHING THE WORK

A. Contractor shall verify all field conditions, dimensions, elevations that relate to the work and properly accommodate these in the work as appropriate to the intended result within the Contract amount.

1. In place construction, obstacles and site conditions and elements which can be seen and reasonably inferred.
2. New construction, obstacles and conditions that can be seen or are to occur in the completion of the work.
3. Allow to fit structural elements and all equipment as occur or will occur during the implementation of the Contract.
4. Make adjustments as needed to fit and properly complete the work. This includes coordination of work by all trades.

B. Contractor and his Subcontractors shall coordinate, accommodate, adjust and fit as appropriate all work to achieve the intended finished intent to normal commercial industry standards.

1. Provide finishing elements, trim, sealants, scribes, receivers and accessories necessary and normal to the installations proposed and as recommended by manufacturers for proper use of products.

2. All construction (all trades) to be weather and infiltration tight. Include appropriate weather seals, infiltration barriers, sealants, non-corrosive flashings and sealants to properly complete the intent of the project.
3. Provide all necessary work to complete all installations, equipment and parts of the work to be complete and properly operable, under control for motorized equipment, in a finished appearance and condition, unless specifically noted otherwise.

    a. Conceal piping and conduit to the extent possible
    b. Run piping and conduit and supports parallel and/or perpendicular to main structural elements when possible.
    c. Avoid creating trip hazards or low headroom hazards when possible
    d. Always allow for service access.

4. Where existing VAV boxes are removed, new heat pumps will be installed.

5. Always comply with the Illinois Energy Code

    a. Infiltration tight
    b. Watertight
    c. Insulation and continuous insulation, types and assembly U or R values as well as component ratings.
    d. Air barriers continuous to the extent possible at assembly junctures, windows to walls, walls to roof assembly, walls floor to floor.

END 01 01 00

1. GENERAL

1.1. SUPERINTENDENT OF THE PROJECT WORK

A. The Contract shall designate a person who shall be the General Superintendent of on site construction work encompassed by the Contract Documents.

1. Said designated superintendent shall have prior served as project superintendent of construction of similar nature and size. Qualifications shall be subject to the Owner's and Architect's review.
2. Superintendent shall remain superintendent for the duration of the project unless said persons shall become disabled, no longer employed and/or the Contractor provides notice to the Architect and the Architect approves the change.
3. Owner can request superintendent replacement for cause at any time

1.2. DESCRIPTION OF DRAWINGS AND LAYOUT

A. Drawing data is intended to be reasonably accurate, however, strict accuracy in detail is not guaranteed. The Contractor must verify all of the conditions, measurements, dimensions, rough-in requirements, piping, conduit, wiring, duct work requirements and coordination necessary for each item or piece of equipment in the Contract Documents. Verification is the Contractor's responsibility and shall be completed prior to the fabrication or installation processes. All corrections necessary to provide properly installed, finished and operable system, in accordance with the intent of the Documents, shall be made at no cost beyond the contract agreement.

B. All measurements and conditions must be verified by actual observation at the building and the Contractor shall be responsible for all of his work fitting into place in a satisfactory and workmanlike manner in every aspect and detail subject to the approval of the Architect. The Contractor shall provide layout work and verification measurement at his own cost.

C. Before starting his work, the Contractor shall examine all Contract Area Drawings and Specifications and if any discrepancies occur, he shall report same to the Architect IN WRITING and obtain WRITTEN INSTRUCTIONS for interpretation of the work. The Contractor shall perform all layout work pursuant to site, building, grades and levels, and furnish such engineering services as he may require to execute the intent of the work included.

D. The Drawings are instructive and diagrammatic and shall be followed as closely as actual construction will permit. All changes from Drawings necessary to make the work of the Contractor conform to the documents shall be done at no added cost charge to the Owner above the amount shown on the Owner/Contractor Agreement.

1.3. PROJECT ACCESS

A. The Contractor shall be aware that the Town/City, Township, County or State has authority over various approach roads for site access and the Contractor is responsible to:

1. Observe load limits and arrange for any exceptions to load restrictions that may be required for this project.

2. Make arrangements for road cleanup, barricades and surface patches and repairs shall comply with applicable regulations and be subject to the governing authority approval.

1.4. OVERLOADING OF BUILDING

A. Care shall be taken that completed structures are not overloaded during Contractor operations and the Contractor shall promptly remove all materials, which, in his opinion, may overload any part of the work. It shall not be the Owner's, or Architect/Engineer's responsibility to observe and check construction processes and temporary loading conditions that this Contractor may implement as director of his operations.

B. Structural design, unless noted otherwise, is designed to accommodate design loads, per code, after all bracing and construction is in place.

1. Temporary bracing and shoring for erection loads is the responsibility of the Contractor.
2. Bracing and shoring for loading prior to the installation of lateral support and diaphragm assemblies is the responsibility of the Contractor.

C. All structural damage done by overloading the system shall be repaired by the Contractor overloading the system.

D. The Architect/Engineer shall have no authority over the means, methods and procedures of the work and shall make no determination pursuant thereto nor render opinions concerning same.

1. The Architect’s Field Representative does not have authority to render opinions on structural questions.

E. The Architect/Engineer and members of his staff shall have no authority over safety conditions related to erection loads and as they relate to the Contractor’s interest, shall provide no observation of same, and make no comment regarding same.

1. The contractor shall designate an employee of the contractor as the person in charge of and responsible for safety procedures on site.

1.5. PROTECTION OF WORK AND BUILDING

A. The Contractor shall protect all work and stored materials from injury caused by or resulting from operations under this Contract, including physical damage or weather-caused damage through the opened up areas.

1.6. MOVING OF MATERIAL

A. Contractor materials that are temporarily located or stored shall be relocated as needed to allow access by the Contractor, other Contractors and the Owner's personnel in and around the construction area. Such moving of any material shall be at no additional cost to the Owner.

B. At no time shall tools, materials or workmen be allowed to block an exit.

1.7. SHORING, BRACING, AND BARRICADES

A. The Contractor shall provide, construct and finally remove all temporary shoring, bracing, underpinning, scaffolding, needling, barricades, etc. as required by local restrictions and as necessary for general safety to protect all property and persons from damage or injury. The Contractor shall determine the need for these items and shall be fully responsible for the performance or failure of them and shall make good damages caused by failure or absence of same.

B. Specific temporary shoring, supports, etc., called for elsewhere in the Documents shall be considered a minimum but shall not override Contractor's responsibility to provide adequate shoring, if actual construction conditions and processes so dictate.

1.8. MATERIALS, WORKMANSHIP, AND LABOR

A. All installed materials and equipment shall be new and shall be installed and completed in a first class, workmanlike manner.

B. The Architect reserves the right to direct the removal and the replacement of any item which, in his opinion, does not present a proper, orderly or reasonably neat installation. Such removal and replacement shall be done promptly when directed by the Architect or the Owner. All installations will be subject to the Architect and Owner's inspections, tests, and approval at all times from commencement of the work to Final Acceptance of the completed Contract.

C. Work needing correction or replacement that is not corrected with reasonable promptness shall be subject to written notice thereof by the Architect. The Contractor by virtue of having tendered his bid for the work, agrees that progress payments by the Owner may be held (no payment made) until said faults have been corrected.

1.9. CLEANING UP

A. All surfaces shall be cleaned of any paint, plaster, mortar, gook and other stains. Care shall be taken that no surface is scratched, marred or damaged in cleaning.

B. Damaged, marred or scratched surfaces of any type shall be made right, sanded smooth (to bright metal for metal surfaces) and primed and painted as directed or replaced if necessary to provide a final installation acceptable to the Architect.

1.10. OPENINGS IN CONSTRUCTION

A. Openings required for construction work shall be provided by the Prime Contractor or his subcontractor, complete with all necessary reinforcing, lintels, trim, finishing, etc. as shall become applicable including openings required for electrical and mechanical work.

B. Concrete slabs, joists, concrete floors, finished floors, walls and structural elements, and other structural items shall not be cut or disturbed, except as approved by the Architect IN WRITING. The Contractor shall be held responsible for and correct any such damage that he may cause.

C. Pipes passing through floors or partitions shall have sufficient clearance around pipes to prevent damage to the adjacent finish from expansion and contraction. All sleeves, flanges and forms, etc., shall be furnished by the Contractor requiring the opening.

1. A Contractor or Subcontractor penetrating a wall, floor or ceiling surface shall provide sleeves, flanges and trim to provide a finished installation.

1.11. SUPPORTS

A. The Contractor shall provide all concrete, steel bases and anchorage except as herein specified otherwise: vibration-absorbing foundation bases, hangers, platforms, anchor bolts, etc. for all equipment which he furnishes. These foundations shall be as specified under their respective headings or shown on the drawings and/or as recommended by Equipment Manufacturer.

1. All such supports which penetrate the roof shall be flashed in to meet roof material warranty requirements.

B. Materials and installation requirements for curbs and pads shall be commensurate with the need. Concrete shall be 4,000 PSI minimum strength, installed at a slump not exceeding six inches (6"). Concrete shall not be retempered sixty (60) minutes after that time at which water was first added to the mix. Air entrainment additives shall be employed to provide a seven percent (7%) by volume air content at time of placement.

1.12. PROTECTION OF WORK

A. The Contractor shall protect his work and adjacent existing work from injury by keeping all piping, ductwork, etc. capped, plugged, drained, or otherwise protected from injury including damage done by freezing and damage from building materials, cement and/or dirt and concrete.

1.13. MOVING OF MATERIALS

A. Moving of in-place materials that are located or stored in the path of construction shall be relocated as needed to allow construction and construction access in and around the construction area. Relocation of said materials shall be subject to Owner approval and whereby relocation is Owner designated as temporary, a post construction final location shall be determined by the Owner. Such moving of material shall be at no additional cost to the Owner.

1.14. ELECTRICAL SERVICES TO EQUIPMENT

A. Unless otherwise specified (see 01 01 00 Summary of Work) the Contractor shall furnish and install electrical feeders of proper size, and furnish, install and complete all power wiring and the control wiring for each motor, electrified signage and/or piece of equipment affected by the Contract.

B. All such electrical procedures (temporary and permanent) shall comply with the National Electric Code, whether temporary or permanent.

C. The Contractor shall extend or install temporary electrical service for his use during construction or he shall provide his own portable generator at his own expense. Wherein the Owner's electrical services are used, extended or tapped, the current consumed shall be at the Owner's expense provided same is metered through the Owner's meter.

1.15. SEALANTS

A. Provide sealants in all locations where shown on the Drawings or called for in the Specifications and as necessary for infiltration-tight/weathertight building envelope and good visual appearance.

B. Sealants shall be provided in locations as directed by the Architect, where equipment components or fixtures fit to surrounds, and when cracks between equipment and surrounds are undesirable or excessive. Provide sealants in all interior locations, as necessary to properly trim out.

C. Sealants shall be installed and tooled in strict accordance with the Sealant Manufacturer's recommendations for joint preparation, using foam rope backer bars, etc. Sealant shall be installed by the respective Contractor providing the item requiring sealant installation.

D. See the Sealant Specification Section 07900 or consult the Architect for the type of sealant materials to be employed.

1.16. PAINTING

A. All exposed surfaces or equipment reworked and installations leaving damaged or unfinished surfaces shall be painted or have a corrosion resistant factory-applied coating or finish.

1. Aluminum and stainless steel shall not require painting.

B. Field paint unfinished equipment and surfaces for corrosion protection and visual appearance, except where clearly stated to the contrary on the Drawings.

C. The Contractor shall paint specific components indicated in the contract documents.

1.17. ALIGNMENT

A. The Contractor shall be responsible for supervision of the reinstallation of equipment, as applicable to these Documents.

END 01 04 00

1. GENERAL

1.1. DESCRIPTION

A. Related work specified elsewhere

1. Always verify existing conditions prior to start of work.

1.2. WORK INCLUDED

A. Execute cutting (including excavating), filling or patching of work, required to:

1. Make several parts fit properly.
2. Uncover work to provide for installation of ill-timed work.
3. Remove and replace defective work.
4. Remove and replace work not conforming to Contract requirements.
5. Remove existing construction as needed.
6. Install specified work in existing construction.
7. Install lintels in masonry opening cut by mechanical trades including masonry work.

B. In addition to Contract requirements, upon written instruction of Architect/Engineer:

1. Uncover work to provide for observation of covered work.
2. Remove samples of installed materials for testing when required.
3. Remove work to provide for alteration of existing work.

C. Do not endanger structural work by cutting or altering steel members unless indicated on Drawings.

D. Do not cut or alter work of another contractor without WRITTEN CONSENT of the Architect/Engineer.

E. Where the Contractor hauls material or drives trucks or equipment over sidewalks, pavement, streets or curbs, he shall protect same from damage and where such surfaces have been damaged, he shall neatly cut out, remove and replace same. Where the Contractor damages or defaces streets, sidewalks or curbs, he shall, as a part of his Contract, re-lay all such surfaces at the same thickness and manner as the original pavement, sidewalk or curb and in a manner that will be approved and accepted by the Owner, Architect/Engineer and governing authority.

F. The Contractor shall provide such cutting and patching as shall be needed to complete the Contract to make the various and several parts and/or components fit together.

1.3. SUBMITTALS

A. Prior to cutting which affects structural safety to project submit WRITTEN NOTICE to the Architect/Engineer requesting consent to proceed with cutting, including:

1. Project identification.
2. Description of affected work.
3. Necessity for cutting.
4. Effect on other work and structural integrity of project.
5. Description of proposed work. Designate:

a. Scope of cutting and patching.
b. Contractor and trades to execute the work.
c. Products proposed to be used.
d. Extent of refinishing.

6. Alternatives to cutting and patching.
7. Designation of party responsible for cost of cutting and patching.

B. Prior to cutting and patching to implement change order work in contract scope, done on instruction of Architect/Engineer, submit cost estimate to the Architect/Engineer.

C. Should conditions of work or schedule indicate change in materials or methods, submit recommendation to Architect/Engineer including:

1. Condition indicating change.
2. Recommendation for alternative materials or methods.
3. Submittals as required for substitutions.

D. Submit WRITTEN NOTICE to Architect/Engineer designating time work will be uncovered to provide for observation.

1.4. PAYMENT OF EXTRA EXPENSE

A. Costs caused by ill-timed work, defective work or work not conforming to Contract Documents, including costs for additional services of the Architect/Engineer, shall be borne by the Contractor.

B. Work done on instruction of the Architect/Engineer (by change order) other than defective or nonconforming work shall be paid for by Owner pursuant to prior written agreement via change order.

2. PRODUCTS

2.1. MATERIALS: Materials for replacement of work removed shall be equal to original and to match surrounds or shall comply with specifications for the type of work being replaced, whichever is the most stringent requirement.

3. EXECUTION

3.1. PREPARATION PRIOR TO CUTTING

A. Prior to cutting

1. Provide shoring, bracing, and support as required to maintain structural integrity of project or surrounds.
2. Provide protection for other portions of the project.
3. Provide protection from elements, if applicable.

3.2. PERFORMANCE

A. Execute fitting and adjustment of products to provide finished installation to comply with specified tolerances, finishes, etc.

B. Execute cutting and demolition by methods which will prevent damage to other work, and will provide proper surfaces to receive installation of repairs and new work.

C. Execute excavating and backfilling by methods that will prevent damage to other work and will prevent settlement.

1. Coordinate with Borefield Contractor to connect exterior loop piping and interior loop piping.
2. Coordinate with Borefield Contractor to arrive at proper Glycol amount for entire system.

a. The correct amount of Glycol to provide 15% dilution shall be the responsibility of the Prime Contractor with information provided by the Engineer and Borefield subcontractors.

D. Restore work that has been cut or removed; install new products to provide completed work in accord with Contract Documents.

E. Refinish entire surfaces as necessary to provide an even finish.

1. Continuous surfaces: To nearest intersection(s).
2. Assembly: Entire refinishing.

F. Refinish entire surfaces as necessary to provide an even finish.

1. Continuous surfaces: To nearest intersection.
2. Assembly: Entire refinishing.

END 01 04 50

1. GENERAL

1.1. DESCRIPTION

A. Provide adequate anchorage and fastenings throughout the work commensurate with the installation conditions, and manufacturer warranties.

B. Anchorage systems shown on the Drawings or specified herein shall be considered a minimum based on theoretical design conditions. The actual field conditions may require additional fastenings to properly accomplish the work.

C. NOTICE:

1. THESE DOCUMENTS DO NOT PERMIT THE INSTALLATION OF PLASTIC ANCHORS UNLESS SPECIFICALLY ASSIGNED.
2. THE DOCUMENTS REQUIRE THAT IMPACT ANCHORAGE (DRIVEN NAILS AND PNEUMATICALLY DRIVEN ANCHORS) ARE TO BE NON-CORROSIVE TYPE, STAINLESS STEEL AND ¼" DIAMETER MINIMUM.

1.2. SUBMITTALS

A. The Contractor shall identify all fastening systems he intends to employ, and provide specification sheets on the fasteners upon request.

1.3. QUALITY CONTROL

A. All anchorage, fastenings and support systems are the Contractor's responsibility.

B. All devices, components and associated parts shall be made secure against in-service failure. In no installation shall the fastenings, anchorage and support system be less than what is specifically called for on the Drawings or set forth in the Specifications.

C. In no case, however, shall the fastenings, anchorage and support systems be less than the Product Manufacturer's recommendations pursuant to the stability of finished assembly or component thereof.

1. Securing of wood framework shall be in accordance with the carpentry trade industry practice, Drawings or the recommendations of the Manufacturer, whichever is the more demanding.
2. Securing of the structural steel systems, steel joists, and the decking shall be performed in accordance with industry practice, standards set forth in the specific Specifications section, the Drawings, and the recommendations of the Manufacturer, whichever is the more demanding.

D. The Contractor shall replace, rework, or reinforce or otherwise correct the fastenings which do not perform adequately.

E. In general, fastening sizes and spaces are set forth on the Drawings. Wherein same are not, the Architect shall make a determination.

2. PRODUCTS

2.1. MATERIALS

A. Generally, nails shall be appropriately selected for the service condition.

1. Interior or protected framing: cement-coated box nails.
2. Exterior framing: galvanized box nails.
3. Interior finish work: finish nails.
4. Exterior finish work: painted galvanized box nails for wood and aluminum nails for securing aluminum to wood such as cladding.
5. Interior construction subject to corrosion: nails for exterior work.
6. See Drawings for specific overriding designations materials and spacing limitations.

B. Generally, screws shall be appropriately selected for the service condition to minimize corrosion, galvanic action or loosening. This includes wood screws, sheet metal screws and machine screws.

1. Interior or exterior protected areas: cadmium plated screws.
2. Exterior weathering conditions: stainless steel, aluminum, or brass screws. See specific designation on Drawings.
3. Head type shall typically be flat head except as detailed, for conditions such as sheet metal or for equipment mounting.
4. Stop bead washers, surface and/or countersunk, shall be provided wherever practical and as specifically called out.
5. See Drawings for specific overriding designations materials and spacing limitations.

C. Bolts shall be selected for the applicable service condition. In general, bolts shall be cadmium or galvanized A 307 NC thread, except as specified otherwise. Structural bolts shall be as specified. Provide washers for all bolts, and provide lock washers where appropriate. Embedded anchor bolts may be unplated, except where specified otherwise.

D. Pop rivets may be employed only as specifically approved by the Architect. In general, pop rivets shall be aluminum alloy. Use the largest size pop rivets which can be adapted to the work.

E. Pneumatic driven hardened steel anchors may be used where specifically approved. Provide washers.

2.2. ASSOCIATED MATERIAL REQUIREMENTS

A. Washers shall be provided at all locations where practical.

B. Washers shall be of like material to the fasteners selected.

C. Use self-sealing neoprene washers at all applications required to be environment-proof.

D. Use self-sealing neoprene washers wherever galvanic action is possible under normal circumstances. Isolate between unlike fastened material with minimum 20 mil duct tape material or similar.

E. Select appropriately pre-finished, plated, or use base material for the visual exposure condition where fasteners are exposed to view.

F. All exposed screws and bolts shall be coordinated with the hardware finish. In place field finish to achieve coordination with the hardware finish where necessary.

2.3. PRODUCT SELECTION

A. Fastener materials shall be as specified previously. The most appropriate selection shall be made from the table below. The fasteners listed are not interchangeable, unless so approved by the Architect/Engineer.

1. FASTENER RECEIVING MATERIAL: APPROPRIATE FASTENER
2. Wood framing: cement coated nails, galvanized nails, screws, lag bolts, thru bolts.
3. Steel: thru bolts, pneumatic driven fasteners, where detailed or where prior approval is made.
4. Sheet metal: sheet metal screws, thru bolts.
5. Masonry: embedded anchor bolts, pneumatic driven fasteners where approved, metallic expansion anchors, metallic wedge anchors, or toggle bolts.
6. Concrete: embedded anchor bolts, pneumatic driven fasteners where approved, metallic expansion anchors, or metallic wedge anchors.
7. Drive-pins **(NOT USED);** only detail specific if used at all.
8. Screws located where they are accessible to people, USE OVAL HEAD SCREWS.

2.4. SPECIAL ANCHORAGE & FASTENERS

A. Self Tapping Cap Screw - Pre-Tap Drill.

1. CF #14 X required length, "B" carbon structural tap seal screws.
2. Counter bore wood to receive head and washer to flush.
3. Tap-cons as listed on Drawings (stainless steel or high carbon).

3. EXECUTION

3.1. INSTALLATION

A. The anchor receiving construction material shall be substantial and have the capability to withstand the in-service stress demand placed upon it.

B. Fastener size shall be appropriate for the intended service. Verify all conditions in the field and increase the anchorage as needed.

C. Anchorage patterns shall be appropriate to resist wiggling or prying loose during service. Use a uniform anchorage pattern for all exposed-to-view conditions; offset from centers as needed for maximum strength. A minimum of two (2) anchors shall be provided in each segment length or piece of material.

D. Replace any fasteners which are crooked or do not properly engage the base material.

E. Provide isolators between adjacent materials or fasteners and materials where electrolytic action is possible.

END 01 05 50

1. GENERAL

1.1. SPECIFIED PRODUCTS

A. All bids shall be based on providing products exactly as specified or equal as prior approved.

B. Products specified only by reference or performance standards, shall be met or exceeded by the standards of any manufacturer's material and subject to the Architect/Engineer's approval.

C. Products specified by naming several products or manufacturers shall be selected from any product and manufacturer named.

1.2. SUBSTITUTIONS, BIDDER/CONTRACTOR OPTIONS

A. PRIOR TO BID OPENING - The Architect/Engineer will consider requests to amend the bidding documents to add products not specified, provided such requests are received in adequate time prior to bid opening date.

1. Requests received after ten (10) days before bid due date will not be considered.
2. If a request is approved, the Architect/Engineer will endeavor to issue an appropriate addendum not less than three (3) calendar days prior to bid opening date.
3. Ten (10) days is based on the start bid date, and will not be extended by bid extension unless same is extended more than ten (10) days.

B. WITH BID - Substitutions will not be considered with the base bids, but may be offered on voluntary forms.

C. AFTER AWARD OF CONTRACT - No substitutions will be considered after Notice of Award, except under one or more of the following conditions:

1. Substitution is required for compliance with final interpretations of code requirements or insurance regulations.
2. Unavailability of specified products, through no fault of the Contractor.
3. Subsequent information discloses inability of specified product to perform properly or to fit in designated space.
4. Manufacturer/fabricator refusal to certify or guarantee performance of specified product as required. This does not alter the requirement.
5. When a substitution would be substantially to the Owner's best interest.

1.3. SUBSTITUTION REQUIREMENTS

A. Submit four (4) copies of each request for substitution. Include in each request for substitution:

1. Complete data substantiating compliance of proposed substitution with Contract Documents.

2. For products:

a. Product identification, including Manufacturer's name and address.
b. Manufacturer's literature.

1) Product description.
2) Performance and test data.
3) Reference standards.

c. Samples, if applicable.
d. Name and address of similar projects on which product was used and date of installation.

3. For construction methods substitution:

a. Detailed description of proposed methods.

4. Itemized comparison of proposed substitution with product or method specified, including accurate and true cost data on proposed substitution in comparison with product or methods specified.
5. Data relating to changes in construction schedule.
6. Identify:

a. List other contracts affected, if applicable.
b. List changes or coordination required.

B. In making requests for substitution, bidder/contractor represents:

1. He has personally investigated proposed product or method and determined that it is equal or superior in all respects to that specified.
2. He will provide the same guarantee for substitutions as for product or method specified.
3. He will coordinate installation of accepted substitutions into work, making all such changes as may be required for work to be complete in all respects.
4. He will provide complete cost data including all related costs under his contract (and other Prime Contract's, as applicable) whose work may also be affected by the substitution in product or method.
5. He will assume full responsibility for all additional costs and expenses to the Owner, Architect/Engineer (and other contractors employed on the same project, as applicable).
6. The Contractor agrees that it is the Contractor's sole responsibility to stand any costs that may be attributable to an allowed substitution

that may surface as construction proceeds toward finalization.

C. Substitution will not be considered if:

1. It is indicated or implied on shop drawings or product data submittals without formal request submitted in accordance with Paragraph 1.4 above.
2. Acceptance will require substantial revision of Contract Documents.

END 01 25 00

1. GENERAL

1.1. MANAGEMENT OF THE CONTRACT

A. The Prime contractor shall provide necessary project support to manage necessary support documentation in an accurate and timely fashion.

1. Following award, ten (10) calendar days, submit two (2) copies:

   a. Signed contracts
   b. Insurance
   c. Bonds, Labor and Material payment and Performance or approved Owner protective bond.
   d. Subcontractor/supplier List – provide promptly prior to signing the of contract
   e. Contractor Schedule of Values, labor and materials and by trade and task breakdown.

2. Preconstruction meeting:

   a. Provide proposed schedules
   b. Project access for remodel/renovation projects
   c. Project security plans, fences, storage facilities, public access control.
   d. Proposed schedule
   e. Contact information
   f. Identify Project management team, Superintendent of the work,

3. Prior to start of the work on site:

   a. NOI permit from IEPA as applicable on projects excavating over 1 acre or more.
   b. Background check information as applicable to this project.
   c. Permits
   d. Have in place the safety plan and assigned safety person on the site. Safety is the responsibility of the contractor, and is not monitored or directed by the Owner or the A/E except in apparent emergency situations where the Owner or the A/E might assist in determination of safety accommodations as identified by the contractor.
   e. Have in place the fences and barricades to control public or non-contractor access to the site.

1.2. SUPERINTENDENT OF WORK

A. The Contract shall designate a person who shall be Prime Superintendent of on site construction work encompassed by the Contract Documents.

1. Said designated superintendent shall have prior served as project superintendent of construction of similar nature and size. Qualifications shall be subject to the Owner's and Architect's review.

2. Superintendent shall remain superintendent for the duration of the project unless said person shall become disabled, no longer employed by the Contractor. The Contractor shall provide notice to the Architect and the Architect and Owner shall approve the personnel change.
3. Owner can request superintendent replacement for cause at any time.

1.3. AWARD AND LETTER OF INTENT

A. The Owner will make an award based on the selection of the lowest cost responsible bidder that has demonstrated past experience and evidence of adequate resources to accomplish the work. After the award, and the issuance of a Letter of Intent, the contract timeline is as follows:

1. Return signed agreement seven (7) days
2. Sub Contractor, Supplier, or any entity to be assigned a part of the work, provide list, addresses and contact information. Seven (7) days. Provide references upon request. Seven (7) days:
3. Labor and Materials, Payment, and Performance bonds, 15 days
4. Insurance, 15 days
5. Master Cost Breakdown (CSV), 15 days
6. Proposed Schedule and time line, 15 days

B. Failure or refusal to provide the preceding Contract information in a timely manner may be cause for cancellation of the award or termination of the agreement if signed and the Owner will be entitled to compensation under the terms of the bid security for failure to execute contract terms in good faith.

1.4. MATERIALS SPECIFIED AND QUALITY OF WORK

A. Materials shall be as specified or approved equal.

B. "Approved equal" and "or equal" shall mean that the Contractor shall be required to receive the Owner's approval (via the Architect) on any substitute materials seven (7) days prior to the bid due date.

C. Requests for substitution approval shall be submitted to the Architect/Engineer.

1. Prior to considering substitutions, the Owner and/or the Architect/Engineer may require submission of samples, descriptive, technical and catalog data and lab reports of tests for verification of equivalency.
2. Said submittals shall be presented to Architect/ Engineer.

1.5. PROGRESS PAYMENTS

A. All payments by the Board of Education require Board approval.

1. Payment requests must be submitted prior to the first Monday of the month for consideration and entry into the agenda.
2. Untimely submission of payment request will result in a one (1) month delay for consideration.
3. The Contractor will be notified of the regular Board meeting schedule upon request.
4. Payment will be made within twenty (20) days following board approval, or a notice of board concerns will be provided.

B. In accordance with the terms of the Contract periodic partial progress payments may be made monthly to the Contractor for: 90% of the value of the labor, materials, and/or equipment incorporated in the construction.

1. Payment will be for completed progress materials only.
2. Materials properly stored and protected on site may be billed
3. Payment for Materials off site may be considered if properly warehoused, dedicated to this project and insured, Submit all information and same will be reviewed and may be approved or denied for payment.
4. Progress pay requests shall indicate amounts completed of all items listed from the master breakdown.
5. 10% of each request will be retained by Owner until work has been satisfactorily completed.
6. Submit lien waivers for preceding payments made.
7. Submit lien waivers from subcontractors and suppliers.
8. Submit notarized Contractor's affidavits with each pay request showing that total owed on Contract by Owner (after subject request has been paid to Contractor) is more than the amount to become due the Contractor for material, subcontractors and labor.

C. All the applications for payment shall be made in three (3) copies with all copies bearing live seals and signatures, notarized and complete and accurately filled in.

1. Applications for payment shall be submitted to Architect/Engineer on AIA G-702A Forms or other standard formats containing similar information.

D. Public Projects only: Attach one (1) copy of Contractor’s Certified Prevailing Payroll with Pay Request in accord with Dept. of Labor requirements. Include Payroll for the major Subcontractors and upon request any minor or intermittent on-site Subcontractor.

1. Submit beginning with the first application for payment for all workers employed on site
2. Submit for each successive month with each pay request.

1.6. FINAL PAYMENT: The final application for payment shall not be made until all work and deficiency (punch list) items have been satisfactorily completed and approved by the Architect/Engineer for documents compliance.

1.7. EMPLOYEE-STUDENT RELATIONSHIPS

A. Except in an emergency situation involving safety, there is to be no intermingling of the Contractors' employees and the school faculty, staff and students violating this requirement shall be removed from employment at this site. Contractor employees experiencing problems with students or faculty shall report same to their project superintendent, who shall promptly report the problem to an authorized representative of the Owner and the Architect/Engineer.

1. Avoid profanity and inappropriate subject matter in conversation as students and staff may be within audible range and walls or ceiling spaces may allow sound transmission.
2. Verbal or physical action interpreted as sexual or sexually suggestive in nature or as sexual harassment will be grounds for removal of the employee from the site. Further legal action remains the option of the persons affected.
3. In all aspects of this provision, the Contractor’s employees as adults have the greater responsibility and should not respond to inappropriate student behavior.

B. Authorized agents of the Owner include the District Superintendent and the Architect/Engineer. The School Principal is authorized to discuss concerns regarding operations on site, but is not authorized to order changes in the work.

End 01 30 00

1. GENERAL

1.1. DESCRIPTION

A. Prior to commencing the work, the Contractor shall provide submittals on all materials and equipment proposed for the work.

1.2. Shop Drawings, Submittals, and Submittal Brochures

A. Submit four (4) copies minimum unless notes otherwise in a particular section.

1. Contractors who wish to send shop drawings and RFI's electronically: send to middleton@middletonassociates.net – please do not send through 3rd party facilitator sites, because shop drawings and RFI's probably will not be answered in a timely manner.
2. HVAC shop drawings and RFI's may be sent to: wayne@mmeaeng.com

B. Architect and/or Owner will retain two (2) copies.

C. Contractor will receive remaining copies for his use.

D. Shop drawings and material schedules shall be accompanied by catalog cuts or literature providing all data, description, function, and capacity of item or component submitted.

E. Catalogs and fliers with multiple component descriptions shall be clearly and precisely marked as to submittal item. The Architect/Engineer's office will provide no sorting to assure the submittals match with documents requirements.

1.3. Samples

A. When samples are requested submit two (2), minimum.

B. All samples will be retained unless otherwise noted in the documents or requested by the vendor. Samples for return may be held until the material is installed on site.

1.4. Project record information

A. The Contractor shall, within seven (7) days of Notice of Award, submit to the Architect the following:

1. Name of person under Contractor employment at the job site in charge of the work and safety.
2. Provide a contact list including emergency contact information for all relative parties to the work, including the superintendent, the project

manager, subcontractors, and major vendors.

1.5. Project Record Documents

1. Operating and Maintenance Manuals.

a. Submit three (3) bound, indexed copies minimum.

b. These manuals shall include all Shop Drawings and all Submittals, all Equipment Brochures, Operating Manuals, Operating Instructions, names, addresses, and telephone numbers for guarantee work, all bound into a good quality binder or loose-leaf notebook, clearly labeled.

c. THE SHOP DRAWINGS RETAINED BY THE OWNER AND ARCHITECT ARE NOT AVAILABLE FOR PREPARING THESE MANUALS. If additional copies are required for this, the Contractor shall make allowance and copy additional sets.

d. Include warranty information and warranty contact information.

2. Record drawings: Maintain as work proceeds record drawings marked to show any variances in installations, particularly underground and concealed services.

1.6. AS-BUILT DRAWINGS

A. The Contractor shall provide the Architect/Engineer's Office with one marked set of drawings showing changes from the original drawings. Marked As-Built Drawings shall be submitted upon progress having Substantial Completion progress.

1. Preferably markings should be in red, clearly legible and easily understood.
2. Clearly and boldly label the set As Built or Record Drawings.
3. Do not send electronically through third party facilitator websites.

1.7. IDENTIFICATION OF SUBMITTALS

A. The Contractor shall clearly mark each submittal of the Shop Drawings, Catalog Cuts, Pamphlet, or Specification Sheet for identification and record, for example:

a. DATE: As submitted
b. BUILDING: Project Name
c. LOCATION: City
d. TYPE OF EQUIPMENT: (Example – AHU 1)
e. SUBMITTED BY: Contractor's Name and contact information for questions.

2. Data shall also indicate model number selected for furnishing and indicate capacities or conditions or operation.

    a. Catalog data of general advertising nature, without specific outline or rating for equipment, will be rejected.
    b. Marked product manufacturer's catalogs and engineering data shall accompany the submittal.

1.8. REVIEW OF SUBMITTALS

1. Submittals will be reviewed by the Architect and/or the Owner and will be checked for Contract compliance and the basic fabrication methods.
2. The Contractor must verify all the dimensions, field conditions, field clearances, and rough-in requirements with adaptations as necessary.
3. Submittals are to be reviewed and corrected first by the Contractor. If submittals contain obvious oversights or conditions that make it apparent they have not been checked, they will be returned for re-submittal.
4. Architect/Engineer review of a submittal shall not relieve the Contractor of contract compliance unless any variance is specifically brought to the attention of the Architect and/or Owner IN A LETTER FORM attached to the submittal data and subsequently approved by the Architect/Engineer IN WRITING.
5. An omission on the shop drawings or a review oversight by the Architect/Engineer shall not be construed as the calling of specific attention thereto.
6. It is not the responsibility of the Architect Engineer to request submittals, failure to submit presumes contract compliance is understood.
7. It is not the responsibility of the Architect Engineer to provide rapid review turnaround on a delayed submittal to maintain schedule. The Contractor shall make submittals in a timely manner generally allowing at least ten (10) days for review.

END 01 33 00

1. GENERAL

1.1. REQUIREMENTS INCLUDE

A. Prime Contractor:

1. Coordinate work of all crafts including that of subcontractors and his crafts as applicable.
2. Schedule elements of remodeling and renovation work to expedite completion.
3. Schedule noisy or hazardous work to avoid problems with the Owner's day-to-day building functions and general maintenance operations.
4. In addition to required incidental demolition specified in various sections, and that shown on Drawings, cut, move or remove existing construction to provide access or to allow remodeling and new work to proceed. Include:

    a. Removal of temporarily or permanent Electrical and Plumbing devices, circuits and piping plus the reinstallation of same as required to continue service.
    b. Removal of unsuitable or extraneous materials and non-functioning components not marked for salvage, such as abandoned furnishings and equipment, and debris such as rotted wood, rusted metals, abandoned electrical and mechanical components, and deteriorated concrete.
    c. Cleaning of surfaces. Remove surface finishes to install new work and finishes.

5. Patch, repair and refinish existing items to remain, to the specified condition for each material, with a neat transition to adjacent new construction. See Section 01 01 00, Paragraph 1.9.B.5.
6. Move room furnishings to allow access to specified floor, wall and ceiling work. Relocate same in place at the completion of specified rehab work.
7. Cooperate with the Owner and schedule ahead pursuant to rehab work at locations involving preparatory work by Owner - see 1.1.B. of this section.

B. Owner:

1. Remove, store and replace books and files to allow Contractor access to HVAC equipment, floors, walls and ceiling, room by room, on schedule determined by the Prime Contractor.
2. Cooperate with the Contractor pursuant to providing Contractor access to rooms and areas scheduled for rehab - see 1.1.A. 6 & 7 this section.

1.2. RELATED REQUIREMENTS

A. Specified elsewhere:

1. DIVISION 0 - PROCUREMENT REQUIREMENTS
2. DIVISION 1 - ADMINISTRATIVE REQUIREMENTS

1.3. SEQUENCE AND SCHEDULES: Schedule work in sequences within times specified in 01 10 00.

1.4. ALTERATIONS, CUTTING AND PROTECTION

A. Assign moving, removal, cutting and patching work to crafts qualified to perform the work in a manner to cause least damage to each type of work, and provide means of restoring surfaces to appearance of new work.

B. Perform cutting and removal work to minimize removals, and in a manner to avoid damage to adjacent work.

1. Cut finish surfaces such as masonry, tile, plaster or metals by methods to terminate surfaces in a straight line at a natural point of division.

C. Perform cutting and patching in accordance with the general and supplementary General Conditions.

D. Protect from damage existing finishes, equipment and adjacent work which is scheduled to remain.

1. Protect existing and new work from weather and temperature extremes.
2. Provide weather protection, waterproofing, heat and humidity control to prevent damage to remaining existing work and to new work.
3. Existing cabinets and countertops will need to be cut. Provide the straightest and smoothest cut possible.
4. Provide visually pleasing repairs to cut joints. Use smallest .050 aluminum break metal angles to transition from existing repairs to new adjacent surfaces (mostly new Heat Pumps).

2. PRODUCTS

2.1. SALVAGED MATERIALS

A. The Contractor shall:

1. Remove all existing demolished material including boilers, chillers, and piping from the site. Removed material will become property of contractor unless noted in other specification sections.

2.2. MATERIALS FOR PATCHING, EXTENDING AND MATCHING

A. Ensure that work is complete:

1. Provide same materials or types of construction as that in existing structure, to patch, extend or match existing work.

a. Contract Documents may not define products or standards of workmanship present in existing construction.
b. Consult the Drawing Details and/or consult the Architect/Engineer.

2. Presence of a product, finish or type of construction requires that patching, extending or matching be performed to make work complete and consistent to identical or better quality standards.

3. EXECUTION

3.1. REMOVE EXISTING CONSTRUCTION

A. Consult the drawings for removals and replacements as set forth.

3.2. PERFORMANCE

A. Patch and extend existing work using skilled craftsmen capable of matching existing quality of workmanship.

B. For patched or extended work, provide quality equal to that specified for new work.

3.3. ADJUSTMENTS

A. Where existing construction and components are removed, patch floors, walls, doors, trim, and ceilings with finish materials to match existing as closely as possible.

3.4. DAMAGED SURFACES RESULTING FROM CONTRACTOR WORK

A. Patch and replace all portions of the existing finished surfaces found to be damaged, lifted, discolored or showing other imperfections, with matching material.

1. Provide adequate support prior to patching the finish.
2. Refinish patched portions of painted or coated surfaces in a manner to produce uniform color and texture over entire surface.
3. When existing surface cannot be matched, refinish entire surface to nearest intersections.

3.5. TRANSITION FROM EXISTING TO NEW WORK

A. When new work abuts or finishes flush with existing work, make a smooth transition. Patched work shall match existing adjacent work in texture and appearance as closely as possible.

1. When finished surfaces are cut in such a way that a smooth transition with new work is not possible, terminate existing surface in a neat manner along a straight line at a natural line of division, and provide trim appropriate to finished surface.

2. Refinished surfaces must be weathertight as appropriate to the exposure

3.6. CLEANING

A. Perform construction cleaning.

1. Clean Owner occupied areas, where work prevails, daily.

2. Clean all spillage, overspray and heavy dust collections in Owner's occupied areas immediately.

B. At completion of work of each craft, clean area and make surfaces ready for work of successive crafts.

C. At completion of alterations work in each area, provide final cleaning for occupancy and return space to a condition suitable for use of Owner.

END 01 35 16

1. GENERAL

1.1. GENERAL TERMS USED IN THE CONTRACT

A. OWNER: Lincoln Elementary School District No. 27
304 8th Street
Lincoln, IL 62656
Telephone: 217/732-2522 Fax: 217/732-2198

B. CONTRACTOR: A person, firm or corporation with whom a Contract or Agreement is made by the Owner.

C. GENERAL CONTRACTOR: The General Contractor furnishes all of the work in the documents. Pursuant to these Documents the Designating Contractor, General Contractor and Prime Contractor shall be one and the same.

D. ARCHITECT OR A/E: Middleton Associates, Incorporated, 1702 W. College Ave., Suite E, Normal, IL 61761 - Telephone 309/452-1271, Fax 309/454-8049, e-mail: rand@middletonassociates.net

E. ENGINEER: Mid MO Engineering Alliance, 203 Eastland Dr., Jefferson City, MO 65101 – 573-636-2116 E-mail: wayne@mmeaeng.com

F. DOCUMENTS: The Drawings, Specifications and Contract as apply to all areas of the work.

1. Shop drawings do not become part of the Contract Document.

G. WORK: All obligations undertaken by the Contractor, pursuant to the Contract Documents.

1. Work includes, but is not limited to, the furnishing of all of the materials, labor, equipment, supplies, plant, tools, scaffolding, transportation, unloading, superintendence, insurance, bonds, taxes and all other services, facilities, required demolition (major and minor as applicable) and expenses necessary for the full performance and completion of requirements of the Contract Documents.
2. Work also means that which is produced, built, or constructed, pursuant to the Contract Documents.
3. Work includes all labor and materials to properly install and make functional.

H. PROVIDE: Furnish and install (including materials, accessories and labor) ready for the Owner's use. Comply with manufacturer's installation requirements as minimum standard, Drawings and Specifications where installation requirements exceed manufacturer's recommendations.

I. EQUAL, APPROVED EQUAL: Alternative products meeting or exceeding the base specification product or process and approved by the Architect/Engineer IN WRITING as suitable for this application. If not accepted prior to bidding, acceptance is discretionary.

J. SUBSTANTIALLY COMPLETE: When work progress has arrived at the point where the Owner may have full use of the installation for the purpose for which the same was installed, all components installed, equipment operating under control and minimum code compliance achieved, then, the work may be declared substantially complete if so requested by the Contractor and specifically approved by the Owner.

K. PUNCH LIST: Those items, components, installation inclusive of labor and materials (in place) which, in the opinion of the Architect/Engineer or the Owner do not conform to the intent of the Contract Documents and/or adequately satisfy the purpose and intent of the Owner.

L. DESIGNATED WORK: Wherein the documents designate that one contractor shall provide specified material and labor for another trade area contractor, the cost of the work and material shall be included in the bid of the contractor that is designated to provide the material and labor.

M. AND/OR: Wherein employed in the documents shall be either and both, singularly and together, as applicable to the intent of the Project Documents.

N. CONCEALED: Concealed building components, services, and obstacles subject to Change Orders, shall be limited to those components, services, obstacles, etc., not designated or known to exist, not typical to the type of construction observed and not available for inspection without destructive action. Opening of access panels, looking above accessible ceiling systems or inside chase walls is not considered concealed items.

1.2. In general, definitions of words employed in the Contract Documents shall be as defined in "Webster's New World Dictionary" the latest edition. The Architect shall be the interpreter in the case of multiple meanings. Exceptions to this shall include longstanding meanings in the construction industry but have not been so defined in Webster's Dictionary. Determination shall be in accordance with these Specifications.

END 01 42 16

1. GENERAL

1.1. WORK INCLUDES BY PRIME CONTRACTOR OR ASSIGNED SUBCONTRACTOR

A. Contractor shall provide and maintain specified temporary utilities.

B. Contractor may extend electrical and water services from Owner's existing sources.

1. Tap on and extension of services shall be implemented and paid for by the Contractor requiring utility.
2. Return tap on surrounds to original or contracted configuration and circumstances at close of job by the Contractor.
3. Extension shall not compromise Owner’s operations.

C. Contractor shall furnish (included in his Base Bid):

1. The cost of all utilities required by him which:

a. Are in excess of existing available at the building and are necessary for the completion of his work.
b. Exceed the capacity of existing or permanent systems and are necessary for the completion of his work.
c. Required prior to permanent enclosure.

2. Extension cords, extension lights and lamps from approved temporary power centers to his work.
3. Ventilation for his storage spaces containing volatile or hazardous materials.
4. Security for materials and equipment.
5. Heating as needed to protect construction form freezing or frost damage.

D. Furnished by Owner

1. Authorization of existing facilities for temporary use.

a. Electrical power service
b. Water service extended from existing outlets by the Contractor

2. Owner will pay all costs of power and water consumables used for construction purposes for utilities properly extended.
3. The Contractor requiring Owner-furnished services, shall provide and pay for extension or modification of services to perform the work and for restoration of services and Owner equipment at completion of the work.

4. Heating consumables

    a. Only after building is fully enclosed with finished envelope elements, windows, doors, etc.
    b. Only through Owner's equipment and/or new equipment.
    c. Only when under control, 55 deg. max.
    d. Only when protected from damage, dirt, infiltration, etc.
    e. Do not extend the Owner's utilities for temporary heat.

E. Enclosure - Definition

1. Temporary: Sufficient preliminary enclosure of an area structure, or of an entire building, to prevent entrance or infiltration of rainwater, wind and other elements, and which will prevent undue heat loss from within enclosed areas.
2. Permanent: Stage of construction at which all moisture and weather protection elements of construction have been installed in accordance with the Contract, either for a portion of structure or for entire building.

F. Lighting: The Contractor shall provide the specified minimum lighting levels required by OSHA for the type of work under construction.

1. Adequate illumination for safe movement of authorized persons through project.
2. Adequate illumination for public safety.
3. Special warning lighting for hazardous conditions.
4. Task lighting by crew requiring same.

G. Security: To protect project from unauthorized entry.

H. Communication: Contractor provide communication services via cell or laptop.

I. Water Service:

1. For construction purposes:

    a. The Contractor shall provide and maintain temporary water service connection throughout construction period.
    b. The Contractor shall supply adequate water hoses from hose bibbs to the point of his operations.

2. For temporary fire protection and cleaning.
3. Maintain adequate volume of water for all purposes.
4. The Contractor provides drinking water for his own forces.
5. Water source: On or off site.

J. Toilets: Contractors' personnel may use existing restroom facilities at the building in the construction project, provided that:

1. Facilities are kept clean, otherwise provide portable toilets.

K. Heating Consumables

1. Provide appropriate temporary heating and distribution to protect new construction from damage at Contractor's expense prior to permanent enclosure.

1.2. COST OF INSTALLATION, OPERATION, MAINTENANCE & CONSUMABLES

A. Installation, operation and maintenance:

1. The Contractor requiring service extensions shall pay all costs of installation, operation, maintenance, restoration and equipment warranty extension of temporary utilities for designated time periods.
2. The Contractor shall not overload the system.

B. Consumables:

1. Contractor pay all costs of consumables for temporary utilities, as designated:

a. Heating Fuel via Temporary Heating Units: Contractor requiring same.
b. Heating
c. Electrical Energy Contractor except as properly extended.
d. Lamps: Contractor requiring same.
e. Water: Owner as properly extended.
f. Toilets and Supplies: Contractor.

1.3. MONITORING OF TEMPORARY UTILITIES

A. The Contractor extending or providing a temporary utility extension shall be responsible for all damage to his work or to the existing facility caused by a defect in temporary utilities or utility extensions.

1. Enforce compliance with specified codes and standards.
2. Enforce safe practices.
3. Prevent abuse of services and utilities.
4. Prevent damage to finishes.

B. Upon completion of work, or when directed by Architect/Engineer, restore existing systems to original condition.

2. PRODUCTS (Not applicable)

3. EXECUTION

3.1. ALL TEMPORARY UTILITIES AND EXTENSIONS

A. Comply with DIVISION 22, 23, and 26 of the Specifications, and Federal and

State regulations.

B. Install work in a neat and orderly manner.

C. Be made structurally, mechanically and electrically sound throughout.

D. Be maintained to give safe, continuous service, and to provide safe working conditions.

E. Be modified and extended as work progresses.

3.2. INSTALLATION

A. Electrical:

1. Protect branch circuits or extension wiring on floor or on ground from damage.
2. Wiring for temporary heating and ventilating equipment:

a. Wire all safety devices specified for operation or equipment.
b. Verify proper operation of all safety devices.

B. Lighting:

1. Control lighting at Contractor installed secondary power centers or unless otherwise specified.
2. Install exterior security lighting at vertical conveyances left in place overnight.

C. Water services:

1. Do not run unprotected piping on floor or on ground.
2. Provide drip pan under each water service connection located within buildings.
3. Provide insulation, or other means, to prevent pipes from freezing.
4. When necessary to maintain pressure, the Contractor requiring same to complete his work shall provide temporary pumps, tanks and compressors.

3.3. REMOVAL & REINSTALLATION

A. At the conclusion of the work, completely remove temporary materials and equipment.

B. Repair all damage caused by installation. Restore to original condition or better.

END 01 50 00

1. GENERAL

1.1. WORK INCLUDES

A. Completed Deficiency List

B. Final Cleaning

C. Project Record Drawings

1. Contact list of Installing Contractor and/or Subcontractors.

D. Guarantees, Warranties and Bonds

1. Contact list for warranty claims.

E. Submittal

1. All materials shall be submitted in multiple copies in an orderly and labeled fashion.
2. Generic documents not filled in, dated, and job specific are not acceptable.

1.2. EVIDENCE OF COMPLETION OF THE CONTRACT

A. Equipment and Building

1. All equipment operational as intended, under control, installed per Manufacturer's recommendations.
2. All construction completed, finished and in new condition.
3. All deficiencies addressed to the satisfaction of the A/E and Owner.

a. Return Punch List with each completed item initialed by the Contractor representative who has inspected the corrective work.

1.3. COORDINATE FINAL CODE INSPECTIONS

A. Work with governing authorities for occupancy inspection.

1. Municipality
2. Regional Superintendent of Schools (school project).
3. IDPH for plumbing and any other IDPH permitted work.
4. A/E for called inspection when applicable.
5. Fire Marshall, local / state for:

a. Elevator, if applicable
b. Sprinklers, if applicable.
c. Fire alarm, if applicable.

d. Walk-through
e. Boilers

1.4. WARRANTIES

A. Extended warranties beyond the one (1) year 100% labor and material overall warranty shall be provided showing:

1. Terms and dates
2. Contact information
3. Installing Contractor
4. Exact system / material as applicable.

B. Extended warranties

1. As listed in various Specification Sections.
2. As advertised by Manufacturers.
3. As required for:

a. Refrigeration equipment – five (5) years.
b. Roofing – one (1) year
c. Mechanical BAS controls – two (2) years.

4. Items requiring chronic repair during the warranty period shall have an extended 12-month warranty until repairs are not needed over a 12-month period.

1.5. PROJECT RECORD DOCUMENTS

A. Submit Project Record Documents to reasonably provide information on:

1. Hidden utilities
2. Products used.
3. Any hidden from view structural or mechanical or electrical variations from plans.
4. Notation of alternates where same impacted the Base Bid Drawings.

B. Provide listing:

1. Contractor / Subcontractor / Vendor list with:

a. Product or service.
b. Contact information.

1.6. FINAL PAY APPLICATION

A. Final Lien Waivers – all Subcontracts and direct Suppliers.

B. Final Affidavit showing $0.00 due to all vendors.

C. Letter from Bond holder approving closeout payment.

D. Final paperwork on allowances, adds or deductions agreed upon by Change Order.

E. Final acceptance as applicable.

END 01 78 00

1. GENERAL

1.1. BASE BID WORK INCLUDES:

A. Work primarily includes masonry infill for removed ductwork, infill masonry for removed louvers, and cutting new duct and pipe openings, and where existing openings have size changed.

1. Prime Contractor will core holes for new branch and loop piping as needed.

B. Coordination

1. Provide openings requested by various trades through walls.
2. Install sleeves or lintels.

1.2. RELATED REQUIREMENTS

A. Specified elsewhere

1. 05 55 00 – Metal Fabrication
2. 07 05 15 -- Insulation

1.3. QUALITY ASSURANCE

A. Code Compliance

1. International Building Code (IBC)
2. ACI 530-92 / ASCE 5-92
3. ACI 530.1-92 / ASCE 6-92

1.4. SUBMITTALS

A. Mortar – each type, data sheet
B. Grout – each type, data sheet
C. Brick – samples, at architect office

1. Material samples to A/E
2. After material acceptance, provide cut samples of each shape – samples at job site.
3. Clips

1.5. DELIVERY AND HANDLING

A. Store materials in a manner to prevent damage.

1. Protect from excess moisture exposure.
2. Keep clean; do not employ muddy units.

3. Protect from excess handling, chippage or unit edge damage.
4. Mortar cement and lime to be kept dry prior to use.

2. PRODUCTS

2.1. FACE BRICK

A. ASTM C216 Grade SW, type FBS, 4” X 4” X 12”, match existing where brick is visible if necessary.

B. Match existing brick

1. Submit samples to architect office

2.2. WALL REPAIR AND INFILL

A. Standard size brick

2.3. COMMON BRICK, BEARING BRICK, MASONRY BEARINGS

A. Common brick and concrete brick shall be sound and of uniform size. Brick shall be employed in all locations shown on Drawings or called for in these Specifications. Where not exposed to view, common brick or sound face brick which does not conform to chippage for dimensional requirements may be employed in locations calling for common brick, if this brick conforms to the following requirements.

1. Bricks employed shall be full units, except where cut to fit. Joints shall be of a consistent nature not exceeding 1/2" in thickness nor less than 1/4" for head and bed joints.
2. Brick may be Type FBA, Grade NW except that Grade SW shall be employed, if exposed to weather in any manner, meeting ASTM C62 or C216 requirements for performance and strength. An average of five (5) bricks shall be 3000 psi minimum. Brick shall be solid concrete brick where exposed to view in block walls.

2.4. INSULATION

A. Insulation to be used in walls where infill masonry is installed (coil door removal, louvers, etc.) shall be 2” Polyisocyanurate closed cell, cut to fit snugly.

B. See Section 07 05 15 for description.

2.5. CONCRETE BLOCK

A. All block used shall be:

1. Standard sand/gravel aggregate below grade. Above grade optional.
2. Optional lightweight Haydite aggregate may be used above grade -

interior.

2.6. MORTAR

A. All prepared mortar shall conform to ASTM C270, Portland Cement/lime mortar.

1. Face brick and stone exterior or veneers, Type N, 750 psi at twenty-eight (28) days.

a. Type N mortars or masonry cement shall contain approximately equal proportions of Portland and hydrated lime; multi-use mixes that adjust sand ratio for N and S are not acceptable.

B. Prepared masonry cement may be employed, such as "Brixment" as manufactured by Louisville Cement Company, Lone Star, Lehigh, or approved equal, in proportions of one (1) part masonry cement to not more than three (3) parts damp loose sand. Sand shall have a fineness modulus of 1.96.

1. Type ‘S’, all CMU and brick work except exterior veneers.
2. Type ‘N’ exterior veneer work.

3. EXECUTION

3.1 PREPARATION / LAYOUT

A. General Contractor shall furnish all labor and materials and complete all masonry work, of every nature, called for on the accompanying drawings or specified herein these Specifications.

B. The Contractor shall leave or cut all of the openings in masonry construction required for work by the other Contractors and/or Subcontractors.

1. Provide and install lintels of proper size over all openings needed.
2. Where said lintel sizes are not established by schedule on the Drawings or herein these Specifications, sizes shall be determined in conference with the Architect.
3. Install sleeves in the walls as provided by the various Contractors and Subcontractors at locations as directed.

C. Installation of Masonry

1. This Contractor shall make all repairs needed at masonry openings, etc., after other Contractors and Subcontractors have completed their work.
2. All masonry work shall be laid straight, plumb and true, and in a workmanlike manner, employing full head joints and continuous bed joints.

3. Wherein the Drawings show masonry fill-in at the abandoned openings, the same shall comply with these documents, with each face finished to match the existing adjacent wall finish.

D. Weather-tight

1. Where sealants or flashings are to be employed, joints shall be raked to proper dimensions. Sealants employed shall be as per sealant specifications.
2. Install flashings at all exterior openings.

    a. Flexible flash from CMU and lap over lintel and drip flash.
    b. Drip flashing to extend length of lintel (uniform each end)
    c. Weeps at all exterior flashing at 32” spacing (uniform space and not more than 16” from ends).

END 04 20 00

1. GENERAL

1.1. WORK INCLUDES

A. Base Bid

1. Contractor shall provide 22 GA. 304 stainless steel pipe chase with dimensions of 10” deep x 14” wide x 9’-5” high (verify), located at the NW corner of the building Room 129 for building loop pipe. Secure to building with stainless anchors at 4’-0” o.c.
2. Provide new stainless steel 22 GA type 304 5” high x 48” long cover with hemmed edges in place of existing louver for fresh air intake, one at each eight (8) classrooms. Secure using same spacing as existing louvers anchors. There is approximately 34 lineal ft. of this vent base which must be closed. Install 2” thick x 5” x 48” polyiso insulation in each louver opening.
3. Contractor shall provide metal trim associated with the flue caps and new exhaust fans on existing roof curbs.

B. Alternate Bid

1. Provide aluminum .040 pipe chase cover (approximately 9” x 4” three sided to cover new loop branch pipe to heat pumps. See Sheet A2. This could be 190’ of chase cover. Hem edges and provide pre-finished with beige color.
2. Screws shall be oval head or round head stainless steel.

1.2. RELATED WORK

A. Specified elsewhere

1. 01 01 00 – Summary of Work
2. 07 92 00 -- Sealant & Caulks

1.3. QUALITY ASSURANCE

A. Sheet metal flashing and trim shall conform with the following:

1. Specified requirements of the manufacturer of the metal.
2. Recommended practices contained in "Aluminum Construction", from the Aluminum Association, 750 Third Avenue, New York, NY 10017, latest edition.
3. Anodized quality ASTM B-136, ASTM-B-137 or ASTM-B-244.

B. SMACNA standards for Architectural Sheet Metal

1.4. REFERENCE STANDARDS

A. ASTM B209-79, Alloy 3003-H14: Aluminum

B. 26 GA. Galvanized steel

2. PRODUCTS

2.1. MATERIALS – See Drawings for applications

A. Aluminum: Comply with reference standards.

1. Closure panels at Bard unit to wall glazing 0.50 aluminum
2. Kynar 5000 finish for exposed sides.
3. 0.50" hemmed aluminum.

B. Steel Siding Panels

1. Match existing in shape and as close as possible in finish.
2. Galvanized 24 GA. steel
3. Install 2” fiber-faced polyiso insulation roofing glue attached.

3. EXECUTION

3.1. FABRICATION

A. Cabinet, countertop, and Heat Pump side panel material to be aluminum. Baseboard vent for F.A. to be .24GA stainless brush finish.

1. Always hem exposed edges.
2. Includes edge flashings, drips, closures, trim, and/or assemblies.

B. Verify dimensions at site prior to shop production fabrications. The closure panels could be 6” to 12” depth. Height will always be 100”, exceptions may arise.

1. Baseboard vent to be closed off with 5” stainless steel screwed to existing stainless steel base vent on rooms as shown – not all rooms.

3.2. INSTALLATION

A. Examine all surfaces to receive the metal work.

1. Verify all dimensions of existing and subsequent constructions.
2. Installation of metal flashing and trim shall constitute acceptance of existing conditions.
3. Coordinate work with work of HVAC, Plumbing and Electrical Subcontractors.

B. Erect all the members plumb, level and in line securely anchored and

properly related to other parts of the work.

C. Secure closure panel to existing metal panel where possible with screws.

1. The sheet metal panels shall completely cover the open space area left by the large duct removal in the exterior wall panel.

D. All holes in sheet metal flashing anchored by screws exposed to temperature change and which is applied in segments in excess of 4’-0” lengths shall be 1/16” diameter over size to accommodate expansion and contraction.

1. Screws to be round head or oval head stainless steel sheet metal screws.

E. Anchor holes in material segments shall commence and end on minimum of 1" from the ends of the segment.

END 05 55 00

1. GENERAL

1.1. REQUIREMENTS INCLUDE

A. The Contractor shall provide treated lumber as shown on the Drawings, specified herein, and as needed to complete the work.

1. There may be several roof curbs that need to be modified for new exhaust fans mounted on existing curbs, and for new gravity ventilators installed in roof.

1.2. RELATED WORK

A. Specified elsewhere

1. See Mechanical and Architectural Drawings

1.3. PRODUCT DELIVERY, STORAGE AND HANDLING

A. Immediately upon delivery to site, place materials in area protected from weather.

B. Store materials a minimum of 6 in. (150 mm) above ground on framework or blocking and cover with protective waterproof covering, providing adequate air circulation or ventilation.

1. Do not install wet materials

C. Seasoned materials shall not be stored in wet or damp areas.

2. PRODUCTS

2.1. MATERIALS

A. Lumber

1. Dimensions

a. Specified lumber dimensions are nominal: verify actual filed conditions and field verify dimensions and provide materials required to accomplish the intent of the details shown.

1) Rip or adjust sizes as needed to accomplish detail results.

b. Lumber dimensions conform to industry standards established by the American Lumber Standards Committee

and the rule writing agencies.

2. Moisture content: Nineteen percent (19%) maximum at time of permanent close in of building or structure, for lumber 2" or less nominal thickness.

3. Surfacing: surface four sides (S4S), unless otherwise shown, or specified.

B. Plywood: CDX exposure rated and clearly stamped on material, thicknesses and listed on Drawings.

1. 5 ply minimum.

C. Rough Hardware:

1. Any hardware used in treated lumber or plywood shall be stainless steel or finish rated for treated lumber use.
2. Any fasteners used in exposed to weather applications shall be stainless steel, or other corrosion finished appropriate for the application, zinc plated is not a weathering corrosion finish.
3. Drawings may detail framing plates, and accessories:

a. Modifications to existing Mechanical curbs and installation of new curbs may be secured to existing concrete deck and existing curbs using 12 ga. galvanized angles.

4. Bolts: FS FF-B-575C
5. Nuts: FS FF-N-836C
6. Expansion Shields: FS FF-B-561C (limited use, see Drawings)
7. Lag Screws and Bolts: FS FF-B-561C
8. Toggle Bolts: FS FF-B-588C
9. Wood Screws: FS FF-S-111C
10. Nails and Staples: FS FF-N-105B
11. RED HEAD, Fastenal, Hilti or approved equal, structural rated stud anchors

a. Wedge type, double wedge when noted
b. Epoxy
c. Drive in type

3. EXECUTION

3.1. PREPARATION

A. Examine receiving surfaces and verify that no rot or detrimental condition such as poor anchorage exists.

1. Application or installation of materials constitutes acceptance of existing application conditions.

B. Verify all dimensions of in place and subsequent construction.

1. Adjust framing or additional framing as needed to accomplish the intent of the work and as needed to complete the work properly.

C. See Drawing Details.

3.2. INSTALLATION

A. Frame wood members to be close fit, set accurately to required lines and levels and secured rigidly in place in accordance with the Drawings.

1. In continuous runs, stagger members of such as multiple member plates or curbs.
2. Anchor all members typical to industry standards as a minimum.

a. As detailed
b. Sill plates not more than 48” anchor spacing, ½” bolts nor 12” from plate ends.
c. Roof edge curbs, not less than 60 pounds per lineal foot pull off resistance any direction.

3. Cut and fit framing, blocking etc. to accommodate the other work, other trades and MEP work.
4. Interlock plate and curbing corners.

B. Framing Roof

1. Provide dimensioned wood for all framing, blocking, furring, nailing strips built into, or adjacent to, exterior masonry walls, wood in contact with concrete and wood in conjunction with roofing.
2. In reroof applications, existing perimeter blocking may remain in the final assembly.

a. Should same, or segments of same, be discovered to have deteriorated or have loose anchorage then said segments shall be replaced of material as specified herein above and by properly secured in place by the Contractor as a part of the Base Bid.
b. Additional materials only will be reimbursed.

3. Demolition of existing assemblies may be listed in Drawings to accommodate new detailing or conditions.

END 06 10 00

1. GENERAL

1.1. BASE BID INCLUDES

A. The Contractor shall remove and repair roofs and curbs to allow installation of new exhaust fans, replacing existing fans, providing new roof openings for ERU's, or other equipment.

B. The roof over the entire building is out of warranty. Repairs must be compatible with the existing roof.

C. Repairs need to be warranted for 2 years.

2. PRODUCT

2.1. INSULATION

A. Insulation for roof curb repair shall be 2" polyisocyanurate.

B. See Section 04 20 00. Insulation for exterior wall repair shall include 2" polyisocyanurate insulation.

C. Description – base insulation:

1. One 2.5" polyisocyanurate adhered to deck. See Drawings for thickness.
2. Multiple layers where noted on the Drawings or as required to meet existing roof system.

D. Attachment of the product:

1. Urethane made by the manufacturer of the EPDM roof material may be used.
2. Screws may be used. Provide stainless steel screws only.

2.2. ROOFING MEMBRANE SYSTEM

A. Repair shall be made with 60 mil EPDM rubber

B. Flashing, steam tape, RUSS stripe adhesive and anchors all must be by same manufacturer.

1. Carlisle Syn Tec Systems, Carlisle, PA
2. Versigard, Akron, OH
3. Firestone Building Products, Co., Carmel, IN - Firestone Rubbergard

C. Resilient Flashing: 60-mil uncured formable EPDM shall be of same source by name as the membrane system.

1. Use only where required for manufacturer's warranty.

3. INSTALLATION

A. Install roofing and flashing system(s) and all accessory items in strict accordance with system Manufacturer's printed instructions current at date of bidding documents.

END 07 05 15

1. GENERAL

1.1. WORK INCLUDED

A. Contractor shall provide caulking and sealing of joints as shown on Drawings and specified herein, including backup fillers where required.

1.2. RELATED WORK

A. Specified elsewhere:

1. 05 5500 - Sheet Metal

1.3. SUBMITTALS. Submit the Manufacturer's literature, materials description and installation instructions for each compound and filler in accordance with 01340.

1.4. HANDLING & STORAGE

A. When the Contractor chooses a product for a particular use for a sealant or caulk specified, that same product shall be used throughout the project for that specific assignment.

1.5. WARRANTY

A. Sealant Manufacturer: Contractor shall certify per Section 01 78 00, as applicable.

1. Material performance - twenty (20) years against shrinkage and hardening - implied and advertised.
2. Loss of bond to substrate - five (5) years - Contractor or Manufacturer's Warranty.

2. PRODUCTS

2.1. MATERIALS

A. Exterior for metal-to-metal, metal-to-glass and for glass-to-glass installations.

1. Sealants shall be one (1) part type - silicone
2. Serviceable life expectancy shall be twenty (20) year minimum in Manufacturer's printed material for applications proposed.
3. Approved products are as follows: (Select proper product from product family).

a. General Electric Silicone Series 1200.
b. Dow Chemical 780 Silicone Rubber Sealant.
c. Products Research & Chemical Corp. (PRC) 4588 Polyisobutylene.

B. Exterior grade for masonry-to-masonry, metal-to-masonry, wood-to-masonry, and glass-to-masonry.

1. Material's serviceable life expectancy shall be twenty (20) year minimum in Manufacturer's printed material for the applications proposed – one (1) part urethane.

2. Approved products are as follows:

   a. Sonneborn NP-1
   b. Silaflex 1A
   c. Vulkem 116
   d. Tremco Mono

3. EXECUTION

3.1. PREPARATION

A. Examine all surfaces to receive the parts of the work specified herein. The application or installation of materials constitutes acceptance of the substrate.

B. Clean surfaces and remove protective coatings that may fail in adhesion or interfere with bond of compound so surfaces are free of deleterious substances which might impair the work.

C. Prime surfaces per the Sealant Manufacturer's instructions.

D. Install bond breakers in locations and of type recommended by the Sealant Manufacturer to prevent bond or sealant to surfaces where such bond might impair the performance of the sealant.

3.2. INSTALLATION

A. Install all materials in accordance with Manufacturer's printed instructions. Unless otherwise directed, conform as follows:

1. Compounds shall not be installed at temperatures below 40 deg. F unless the Manufacturer specifically permits the application of his materials at a lower temperature.
2. If job conditions require installation of compounds below the minimum installation temperatures recommended by the Manufacturer, consult the Manufacturer's Representative and establish the minimum provisions required to ensure the satisfactory work.
3. In joints which are not subject to traffic, apply sealants to a minimum depth of 50% of the normal joint width but not less than 3/8" or more than 1/2" deep.
4. Apply non-elastomeric compounds in exposed joints with the depth of compound not less than the joint width.
5. Use appropriate sealants for all exterior joints.
6. Sealants and caulks shall be a color selected to blend with adjacent material color.

B. Installations shall be neatly executed, smooth and regular in appearance, no lumps or globs or smears onto adjacent surfaces. Tool when appropriate.

3.3. SEALANT COLOR SELECTION

A. Sealant shall match surrounds for color or shall be clear.

1. Coordinate with Architect/Engineer regarding colors to insure approval.
2. Once a Manufacturer's product has been established for a use, that same product shall be used throughout the project for the particular situation and background.

3.4. SEALANT APPLICATION

A. For exterior/building envelope conditions: Select the proper sealant to provide resistance to air or water infiltration at all exterior envelope joints, connections of dissimilar materials:

1. Wall penetration
2. Abutting dissimilar materials
3. As needed to control infiltration

a. Water
b. Air
c. Vermin and insects

END 07 92 00

1. GENERAL

1.1. WORK INCLUDES

A. Base Bid

1. Area shown on plans shall have existing ceiling removed and new grid and panels installed.
2. Provide new grid and new 2’ x 4’ or 2’ x 2’ panels installed.

   a. UNIT PRICE described on Bid Form shall include demolition and removal of damaged grid and ceiling tiles not shown to be removed.
   b. In all areas repair or replace only as encountered and impacted by the work, after approval of Architect or Architect Representative.

3. Provide price for removing and reinstalling 2 X 4 existing light fixtures as shown on plans.

   a. Provide unit price for handling existing 2 x 4 light fixtures (one for one), not providing and installing new fixtures (see Bid Form).

1.2. RELATED WORK

A. Specified elsewhere

1. Division 23 Mechanical
2. Division 26 Electrical

1.3. QUALITY ASSURANCE

A. All materials of any type, single source, (single run if possible).

B. All materials certified upon request by an independent NVLAP accredited laboratory.

1. Fire rated materials: Underwriters Laboratories, Inc. Design P-202 RC13-1 Hour except spring clips are not required.
2. **HUMIDITY RESISTANCE, MOLD RESISTANCE.**
3. STC, SA and reflectance factors

1.4. SUBMITTALS

A. Required:

1. Manufacturer's Literature: Materials description and recommended installation and maintenance instructions. Specification of ceiling

material must indicate humidity and mold resistance.

2. PRODUCTS

2.1. MATERIALS

A. Acoustical Tile: Fissured surface, mineral fiber tile, fire code rated, 24" X 48" X 5/8", square edged, also meeting ASTM E-84 and ASTM E-119 of material certified to contain no asbestos.

1. USG
2. Conwed Corp.
3. Celotex Corp. – Fine Fissured
4. Armstrong

    a. 2’ x 4’ or 2’ x 2’ x 5/8” or mineral fiber.
    b. Humidity rated non-sag 100 deg. F, 90% R.H. **No exceptions.**
    c. Anti-microbial
    d. Fine fissured, match existing building for non-directional style.
    e. Sound Absorption: ASTM CA23-66, NRC .50-.60.
    f. Sound Attenuation: AIMA, Test I-II, 35-39 range.
    g. Light Reflectance: ASTM C 523-68, .70-.74. (LR-1).
    h. Flame Spread smoke developed: class A
    i. R thermal value = 1.36

5. Existing 2” x 4” panel may be installed provided the removed panels are stored in dry, flat condition.

B. Suspended Grillage

1. Hangers: Minimum 10-gauge, soft annealed, steel wire, galvanized. See paragraph F. below.
2. Provide support at 48" on center along main runners.

    a. Provide necessary sub-framing where needed to achieve 48" support spacing under ducts, openings, etc.

3. Existing wire supports may be reused.

C. Snap Grid System – match existing

1. Main Runners: 15/16” wide X 3/4" high, minimum 0.020" thick steel sheet formed runner with vertical leg at top and tee shape at bottom.
2. Cross tees: 15/16” wide X 3/4" high, minimum 0.020" thick steel sheet formed runner with vertical leg at top and tee shape at bottom.
3. Clips: Steel wire clips to hold main runner to carrying channels.
4. White face finish

    a. Chicago Metallic or equal – Match existing.

D. Metal Wall Moldings: Galvanized sheet steel, angles or channels, minimum 0.020" thick, match grid.

1. Note 1.1.A.3. above for floating ceiling, limited edge trim is anticipated.
2. Existing wall moldings may remain after demolition for use with new grid material.

E. #12 Eyelet Head Screws: Length as needed for wire hanger anchors.

F. Hanging wire #10 gauge galvanized soft annealed wire. Existing wire may be reused if in good condition.

2.2. FORMED EDGE

A. Many areas of the project will require formed white metal transitions.

1. Pre-finished white 26-guage galvanized sheet.
2. Hem edges.
3. Shape to condition.
4. Will occur in every room around ceiling cabinet ventilator, along all outside widow walls, at interior aluminum widows and framing and a few miscellaneous other conditions, and at split ductless units in computer rooms.

a. Best shape to be determined in conference with the Architect at each condition prior to installing grid

3. EXECUTION

3.1. PREPARATION

A. Examine all surfaces and spaces to receive the work specified herein.

B. Verify all dimensions of in-place and subsequent construction. Application or; installation of materials constitutes acceptance of the supporting construction.

3.2. INSTALLATION OF MECHANICAL SUSPENSION SYSTEMS

A. Install suspension system in accord with ASTM C636-76 and current AIMA recommended procedures.

1. New ceiling grid and tile will be installed at original elevation and shall blend into existing material and pattern.
2. Grid system shall be clipped or mechanically secured at intersections

a. Loose fit grid not allowed.
b. Method of securing shall avoid exposed fasteners such as screws or rivets up through grid, clip or tie together above

ceiling.

B. Unless otherwise shown or recommended closer by the system's manufacturer, install hangers to construction above a maximum four feet (4') o.c. in rows four feet (4') apart.

1. All hangers shall hang in plumb position.
2. Supporting runners typically shall run perpendicular to the structural members.

C. Extend wire hangers downward.

1. At proper elevation wrap hangers around carrying channels and secure each hanger with at least three (3) turns.
2. Hanger wires shall be vertical. Wires installed at a diagonal to reach a structural member shall be balanced with diagonal ties in the opposite direction to brace the grid against side loading.

D. Coordinate spacing of hangers, carrying channels. runners and moldings with the location of electrical fixtures and other items occurring in or on the ceiling.

1. The ceiling lighting fixture locations shall determine the ceiling grid pattern, (see Drawings).
2. Provide hanger wires to structure for cross runners around light fixtures. Each fixture shall have a minimum of four (4) tie wires within sixteen inches (16") of each fixture corner.

3.3. INSTALLATION OF TILE

A. Installation of acoustical materials shall be done under temperature and relative humidity conditions that will exist when the building is occupied. Building shall be closed in and operating on permanent equipment such that temperature and humidity will be maintained at a constant and normal level.

B. Installation of grid must follow installation of ceiling closer panels (new pipe soffits) at new exterior wall.

C. The entire installation shall be free of damage of any sort at the completion of the Contract. All system sections deflecting in excess of 1/240th of the span or length shall be replaced.

D. At a time and following installation the building shall be kept at a constant temperature and DOOR TO EXTERIOR KEPT CLOSED, ventilating system functional, filters in place.

3.4. CLEANING AND PROTECTION

A. Upon completion of the work remove all unused materials, debris, containers and equipment from the project site. Clean and repair floors, walls and other surfaces that have been stained, marred or otherwise damaged by work

under this section.

B. Protect acoustical ceilings during the construction period so that they will be without any indication or deterioration or damage at the time of acceptance by the Owner.

END 09 51 23

1. GENERAL

1.1. SUMMARY OF WORK

A. Base Bid: Plumbing contractor shall furnish and install all materials, accessories, tools, equipment, transportation, labor, services, and all operations required to complete the following:

1. Condensate piping.
2. Provide all condensate pumps and piping as noted on plans.
3. Remove trim from sprinkler heads – General Contractor will remove ceiling tile and replace

1.2. SUBMITTALS

A. Shop Drawings – Prior to purchase, submit for Engineer/Architect's review complete shop drawings for the following:

1. Condensate pumps

1.3. QUALITY ASSURANCE

1.4.

A. Standards: Any procedure, material or operation specified by reference to applicable standards or codes shall comply with the current or most recent edition. In conflicts between listed standards, the more stringent shall govern.

1. Applicable Standards:

a. Illinois Plumbing Code.
b. Local plumbing code.
c. 2012 International Fuel Gas Code.

B. Contractor shall obtain all necessary permits and arrange for all inspections required by State or Local authorities.

C. Materials must be new, in first class condition. Work must be done by trained, experienced, skilled journeyman (woman) under an approved full-time supervisor, with every possible precaution taken by contractor to assure safety of all persons of all categories.

1.5. GUARANTEE

A. Each entire overall installation, including every special item, device, and part and every specialized system shall be fully guaranteed from standpoint of satisfactory performance, safety, workmanship and material for one year after formal written acceptance by Engineer/Architect, any unsuitable, unsatisfactory, noisy, ineffective, defective, improperly sized or applied equipment or material, or unacceptable workmanship shall be quickly

replaced or modified during guarantee period or any extension thereof, as directed and as approved by Engineer/Architect in writing.

B. Individual items and systems shall be guaranteed for the same period in addition to the above regardless of any limitations of manufacturer's guarantee period.

2. PRODUCTS

2.1. PIPE, TUBE, AND FITTINGS

A. Condensate Piping:

1. Type L, hard drawn copper tube conforming to ASTM B88 with cast or wrought copper fittings conforming to ASTM B16.18 and B16.22. Joints made from lead free solder. Piping sizes shown on the drawings are nominal pipe sizes.

B. Natural Gas (G) Piping:

1. Some gas piping may need to be plugged and removed.
2. Pipe: Schedule 40, seamless or electric resistance welded (ERW) steel pipe A53 Grade B or seamless steel pipe A106, Grade B.
3. Joints and Fittings:

   a. 2-inch and under: Joints shall be threaded. Fittings shall be wrought-steel with dimensions and tolerances conforming to ANSI B16.11. Unions shall be wrought steel. Threaded joints shall be made up with thread compound suitable for use with natural gas.
   b. 2 1/2-inch and larger: Joints shall be butt welded or flanged. Fittings shall be seamless wrought-steel butt weld type, ASTM A234, Grade WPB with dimensions, tolerances and pressure-temperature rating in accordance with ANSI/ASME B16.9. Flanges shall be steel (ASTM A105), Class 150, and manufactured in accordance with ANSI/ASME B16.5. Weld-o-let fittings may be used in lieu of tees for branch connections provided main is two sizes larger than takeoff. Couplings or half couplings are not acceptable except for non-flow connections such as thermometers or gauges.
   c. Where NG pipe is not used in new HVAC system, the piping shall be removed back to the nearest pipe remaining in use.

C. Soil and Waste Lines (N.I.C.):

1. All soil and waste pipe shall be no-hub cast iron or shall be manufactured from Type 1, Grade 1, Schedule 40 polyvinyl chloride (PVC) materials. The PVC materials shall be classified as self-extinguishing and have a flamespread rating of 0.25. Pipe shall meet the requirements of CS 272-65 of ASTM D2665 and shall be

approved by NSF.

2. The pipe shall be marked in accordance with the ASTM designation and show the symbols DWV NSF.
3. Install new soil and waste lines as indicated and connect to sanitary system as required.
4. Provide cleanout branched throughout the plumbing system where indicated or required by the nature of the work.
5. Make changes in line or grade with the proper fitting.
6. All exterior pipe shall be firmly and uniformly bedded throughout its total length on 3" minimum compacted sand or gravel.
7. Backfill shall be 6" minimum compacted sand or gravel on sides and top.
8. Exterior sewers shall have minimum 4'-0" cover, unless required otherwise.
9. All interior pipe shall be firmly and uniformly supported throughout its total length using hangers as specified.

B. Vent Piping (N.I.C.)

1. Vent piping shall be no-hub cast iron or PVC, same as specified for soil or waste lines.
2. Minimum venting shall be as shown on the drawings; otherwise, all venting shall comply with the rules of the specified codes.
3. Vent all parts of the soil and waste system of piping to prevent all liability of siphonage of traps of plumbing fixtures.
4. Sizes may be increased at contractor's option.

2.2 JOINING MATERIALS

A. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

B. Welding Filler Metals: Comply with AWS D10.12.

C. Solvent Cements for Joining Plastic Piping:

1. ABS Piping: ASTM D 2235.
2. CPVC Piping: ASTM F 493.
3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
4. PVC to ABS Piping Transition: ASTM D 3138.

2.3 PIPE COVERING

A. Flexible Elastomeric: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type 1 for tubular materials.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Aeroflex USA Inc.; Aerocel.

b. Armacell LLC; AP Armaflex.
c. RBX Corporation; Insul-Sheet 1800 and Insul-Tube 180.

B. Condensate: Insulate with flexible elastomeric or ASJ fiberglass. All joints sealed with manufacturer's recommended adhesive or equivalent, with 100% coverage. Applied by slipping uncut sections over piping wherever possible. Use is permitted where allowed by applicable codes. All joints shall be taped to afford an effective vapor barrier. Insulation shall have a flame spread rating of 25 or less and a smoke developed rating as permitted by codes.

1. Insulation Thickness:

a. Condensate: 1”

C. Vapor Barrier covering guarantee - covering on pipe, fittings, devices, unions, etc. must be unconditionally guaranteed to be free of condensation, water logging, water staining, water drip, water accumulation and mildew for one (1) full year after mechanical installation is accepted by Engineer/Architect. Any such defective work must be completely replaced and refinished when condition is reported to contractor within above guarantee period by Engineer/Architect without delay or cost to Owner, and guaranteed in same manner for another one (1) full year period.

2.4 VALVES AND COCKS

A. Valves shall be equal to Jenkins, Powell, Scott, Stockham, Lukenheimer, Nibco, or Hammond

B. Trim for all valves shall be selected for intended service as recommended in writing by valve manufacturer.

C. Natural Gas Valves: Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim: MSS SP-110. Comply with ASME B16.33.

1. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction for valves 1 inch and smaller.
2. Service Mark: Valves 1-1/4 inches to NPS 2 shall have initials "WOG" permanently marked on valve body.

2.5 PIPE HANGERS

A. Piping shall be supported independently of all connections and sleeves by pipe hangers (PH) of Modern, Grinnell, Fee & Mason, Auto-Grip, or Crane make, as follows:

Pipe Size	Distance From Sleeve In Wall End, Offset Or Corner to Hanger (Max.)	Hanger Spacing (Max.)
Up to 1¼"	2'-0”	8'-0"
1½ , 2"	3'-0"	10'-0"
2½" & Up	3'-0"	12'-0”

B. Hangers shall be arranged to permit free, unrestrained and noiseless expansion and contraction of piping, and must be adjustable.

C. Hangers, associated equipment, etc. shall be of all steel construction, with a heavy prime coat, except that portions in contact with non-ferrous pipe shall be same construction as pipe, or plated with same metal as pipe, or covered with same metal as pipe, securely fastened in place.

D. Hangers supporting piping covered with pipe insulation that has an exterior vapor barrier (Type IA) shall encircle pipe covering and shall bear on a tight fitting, exterior steel collar, completely encircling covering.

E. Overhead hangers shall be of the solid ring, or clevis type, with adjustable steel rods, securely supported from inserts or bolted to structure.

2.6 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.

D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.

E. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.

F. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.

2.7 SLEEVES

A. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

B. PVC Pipe: ASTM D 1785, Schedule 40.

2.8 FLASHING

A. Openings in roof shall be flashed as necessary to be compatible with roofing system using approved methods. Disturbed existing piping through roof shall be properly flashed and weather-tight.

2.9 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

B. One-Piece, Cast-Brass Type: With set screw.

1. Finish: Polished chrome-plated and rough brass.

3. EXECUTION

3.1 PREPARATION

A. Quantities Required and Clarifications:

1. Contractor shall determine quantities required from drawings and job conditions except that where specifications call for specific quantities, these quantities shall also govern. If there if conflict between quantities called for on drawings and in specifications, greater quantity shall govern.
2. Where an item is specified by a manufacturer's number, such number is for general information only, and shall be modified by any additional data, size, etc., which may be shown and/or specified. Where there is conflict between number and other data, it shall be contractor's responsibility to request clarification from Engineer/Architect.
3. Where clarification is required for any purpose, including discrepancies within written specifications on drawings, or between them, it shall be contractor's responsibility to request such clarification from Engineer/Architect at least 7 days before Bids are due and in all cases subsequent interpretations or clarifications made by Engineer/Architect shall be final.

B. Cleaning:

1. Piping, conduit, equipment, devices, etc. shall be thoroughly cleaned before being offered for acceptance.
2. The following shall be thoroughly cleaned, or finished out, or blown out before installation is offered for acceptance.

a. Plumbing equipment, fixtures, devices, etc.

3. Labels, stickers, temporary protection, etc. shall be removed and work shall be provided contractor without increase in contract price.

C. Permits, Fees, Enlargements, Extensions, Etc.:

1. Contractor shall secure and pay for all licenses, assessments, permits; shall pay for inspections required by county, state, and local utilities; and shall replace new or present paving etc. as approved by Engineer/Architect and all governmental bodies having jurisdiction. All without increase in contract price.

D. Verification of Points of Connection:

1. Before submitting his bid, contractor shall visit site to verify all exposed, concealed, and buried points of connection as to locations, flow, size, type, depth, pressure, elevation, operating characteristics, etc.
2. If contractor finds that any present point or points of connection to existing facilities are incorrectly shown on plans or incorrectly specified, he (she) shall notify Engineer/Architect in writing at least 7 days before bids are due to be submitted. Engineer/Architect will issue as addendum to all contractors, calling their attention to revised point or points of connection.
3. If contractor fails to notify Engineer/Architect in writing as outlined above, it will be assumed that his bid includes everything required to provide proper connections to all present points of connections as they actually exist and will pay for all relocations, replacements, additional runs and extensions, without increase in contract price.

3.2 PIPING SYSTEMS – COMMON REQUIREMENTS

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

B. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Install piping to allow application of insulation.

J. Select system components with pressure rating equal to or greater than system operating pressure.

K. Install escutcheons for penetrations of walls, ceilings, and floors.

L. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

M. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials.

N. Verify final equipment locations for roughing-in.

O. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.3 PIPING JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

D. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

E. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

F. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

G. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402, for safe-handling practice of cleaners, primers, and solvent cements.
2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 Appendixes.
3. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
4. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
5. PVC Nonpressure Piping: Join according to ASTM D 2855.
6. PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D 3138 Appendix.

3.4 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

END 22 00 00

PART 1 GENERAL

1.01 SECTION INCLUDES

A. HVAC demolition.
   1. Exhaust Fans
   2. Equipment
   3. Ductwork
   4. Piping
   5. Controls

1.02 RELATED REQUIREMENTS

A. Additional requirements for alterations work.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work: As specified in individual sections.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify field measurements and duct arrangements are as shown on Drawings.

B. Verify that abandoned ductwork and equipment serve only abandoned facilities.

C. Demolition drawings are based on casual field observation .

D. Report discrepancies to Architect before disturbing existing installation.

E. Beginning of demolition means installer accepts existing conditions.

3.02 PREPARATION

A. Disconnect HVAC systems in walls, floors, and ceilings to be removed.

3.03 DEMOLITION AND EXTENSION OF EXISTING HVAC WORK

A. Remove, relocate, and extend existing installations to accommodate new construction.

B. Remove abandoned ductwork to source of supply.

C. Remove exposed abandoned ductwork, including abandoned ductwork above accessible ceiling finishes. Cut ductwork flush with walls and floors, and patch surfaces.

D. Disconnect abandoned air outlets and inlets and remove. Remove abandoned air outlets and inlets if ductwork servicing them is abandoned and removed. Provide blank covers for abandoned air outlets and inlets that are not removed.

E. Remove exhaust fans as noted.

F. Remove piping as noted.

G. Repair adjacent construction and finishes damaged during demolition and extension work.

H. Maintain access to existing HVAC installations that remain active. Modify installation or provide access panel as appropriate.

I. Extend existing installations using materials and methods as specified.

3.04 CLEANING AND REPAIR

A. Clean and repair existing materials and equipment that remain or that are to be reused.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pressure gages and pressure gage taps.

B. Thermometers and thermometer wells.

C. Static pressure gages.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

A. ASME B40.100 - Pressure Gauges and Gauge Attachments; 2013.

B. ASTM E1 - Standard Specification for ASTM Liquid-in-Glass Thermometers; 2014.

C. UL 393 - Indicating Pressure Gauges for Fire-Protection Service; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide list that indicates use, operating range, total range and location for manufactured components.

1.05 FIELD CONDITIONS

A. Do not install instrumentation when areas are under construction, except for required rough-in, taps, supports and test plugs.

PART 2 PRODUCTS

2.01 PRESSURE GAGES

A. Pressure Gages: ASME B40.100, UL 393 drawn steel case, phosphor bronze bourdon tube, rotary brass movement, brass socket, with front recalibration adjustment, black scale on white background.

2.02 PRESSURE GAGE TAPPINGS

A. Gage Cock: Tee or lever handle, brass for maximum 150 psi.

2.03 DIAL THERMOMETERS

A. Thermometer: ASTM E1, stainless steel case, adjustable angle with front recalibration, bimetallic helix actuated with silicone fluid damping, white with black markings and black pointer hermetically sealed lens, stainless steel stem.

1. Size: 3 inch diameter dial.
2. Lens: Clear glass.

2.04 THERMOMETER SUPPORTS

A. Socket: Brass separable sockets for thermometer stems with or without extensions as required, and with cap and chain.

2.05 TEST PLUGS

A. Test Plug: 1/4 inch or 1/2 inch brass fitting and cap for receiving 1/8 inch outside diameter pressure or temperature probe with neoprene core for temperatures up to 200 degrees F.

2.06 STATIC PRESSURE GAGES

A. 3-1/2 inch diameter dial in metal case, diaphragm actuated, black figures on white background, front recalibration adjustment, 2 percent of full scale accuracy.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install gages and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.

C. Adjust gages and thermometers to final angle, clean windows and lenses, and calibrate to zero.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nameplates.

B. Tags.

C. Pipe markers.

D. Ceiling tacks.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

A. ASTM D709 - Standard Specification for Laminated Thermosetting Materials; 2013.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

A. Air Handling Units: Nameplates.

B. Control Panels: Nameplates.

C. Major Control Components: Nameplates.

D. Piping: Pipe markers.

E. Pumps: Nameplates.

F. Thermostats: Nameplates.

G. Valves: Tags and ceiling tacks where located above lay-in ceiling.

H. Water Treatment Devices: Nameplates.

2.02 NAMEPLATES

A. Manufacturers:
   1. Advanced Graphic Engraving, LLC; _____: www.advancedgraphicengraving.com.
   2. Kolbi Pipe Marker Co; _____: www.kolbipipemarkers.com.
   3. Seton Identification Products, a Tricor Direct Company; _____: www.seton.com.

B. Letter Color: White.

C. Letter Height: 1/4 inch.

D. Background Color: Black.

E. Plastic: Conform to ASTM D709.

2.03 TAGS

A. Manufacturers:
   1. Advanced Graphic Engraving; _____: www.advancedgraphicengraving.com.
   2. Brady Corporation; _____: www.bradycorp.com.
   3. Kolbi Pipe Marker Co; _____: www.kolbipipemarkers.com.
   4. Seton Identification Products, a Tricor Company; _____: www.seton.com.

B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.

2.04 PIPE MARKERS

A. Manufacturers:

1. Brady Corporation; _____: www.bradycorp.com.
2. Kolbi Pipe Marker Co; _____: www.kolbipipemarkers.com.
3. MIFAB, Inc; _____: www.mifab.com.
4. Seton Identification Products, a Tricor Company; _____: www.seton.com.

B. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

C. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

D. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

2.05 CEILING TACKS

A. Description: Steel with 3/4 inch diameter color coded head.

PART 3 EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 INSTALLATION

A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

B. Install tags with corrosion resistant chain.

C. Install plastic pipe markers in accordance with manufacturer's instructions.

D. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.

E. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.

F. Use tags on piping 3/4 inch diameter and smaller.
1. Identify service, flow direction, and pressure.
2. Install in clear view and align with axis of piping.
3. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.

END OF SECTION

ENGINEER OF RECORD MUST APPROVE FINAL REPORT PRIOR TO T&B AGENT RECIVING MORE THAN 50% PAYOUT OF TESTING AND BALANCING CONTRACT TOTAL

PART 1 GENERAL

2.01 SECTION INCLUDES

A. Testing, adjustment, and balancing of air systems.

B. Testing, adjustment, and balancing of hydronic and refrigerating systems.

C. Measurement of final operating condition of HVAC systems.

2.02 RELATED REQUIREMENTS

2.03 REFERENCE STANDARDS

A. AABC MN-1 - AABC National Standards for Total System Balance; 2002.

B. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems; 2008.

C. NEBB (TAB) - Procedural Standards for Testing Adjusting and Balancing of Environmental Systems; 2015, Eighth Edition.

D. SMACNA (TAB) - HVAC Systems Testing, Adjusting and Balancing; 2002.

2.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
   1. Submit to Architect.
   2. Submit six weeks prior to starting the testing, adjusting, and balancing work.
   3. Include certification that the plan developer has reviewed the contract documents, the equipment and systems, and the control system with the Architect and other installers to sufficiently understand the design intent for each system.
   4. Include at least the following in the plan:
      a. List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
      b. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
      c. Identification and types of measurement instruments to be used and their most recent calibration date.
      d. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
      e. Final test report forms to be used.
      f. Expected problems and solutions, etc.
      g. Details of how TOTAL flow will be determined; for example:
         1) Air: Sum of terminal flows via control system calibrated readings or via hood readings of all terminals, supply (SA) and return air (RA) pitot traverse, SA or RA flow stations.
         2) Water: Pump curves, circuit setter, flow station, ultrasonic, etc.
      h. Confirmation of understanding of the outside air ventilation criteria under all conditions.
      i. Method of verifying and setting minimum outside air flow rate will be verified and set and for what level (total building, zone, etc.).
      j. Procedures for formal deficiency reports, including scope, frequency and distribution.

C. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
   1. Revise TAB plan to reflect actual procedures and submit as part of final report.
   2. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect and for inclusion in operating and maintenance manuals.
   3. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
   4. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
   5. Units of Measure: Report data in I-P (inch-pound) units only.
   6. Include the following on the title page of each report:
      a. Name of Testing, Adjusting, and Balancing Agency.
      b. Address of Testing, Adjusting, and Balancing Agency.
      c. Telephone number of Testing, Adjusting, and Balancing Agency.
      d. Project name.
      e. Project location.
      f. Project Architect.
      g. Project Engineer.
      h. Project Contractor.
      i. Report date.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

4.01 GENERAL REQUIREMENTS

A. Perform total system balance in accordance with one of the following:
   1. AABC MN-1, AABC National Standards for Total System Balance.
   2. ASHRAE Std 111, Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems.
   3. NEBB Procedural Standards for Testing Adjusting Balancing of Environmental Systems.
   4. SMACNA (TAB).

B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.

C. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with the authorities having jurisdiction.

D. TAB Agency Qualifications:
   1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
   2. Having minimum of three years documented experience.
   3. Certified by one of the following:
      a. AABC, Associated Air Balance Council: www.aabchq.com; upon completion submit AABC National Performance Guaranty.
      b. NEBB, National Environmental Balancing Bureau: www.nebb.org.
      c. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute: www.tabbcertified.org.

E. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.

4.02 EXAMINATION

A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
   1. Systems are started and operating in a safe and normal condition.
   2. Temperature control systems are installed complete and operable.
   3. Proper thermal overload protection is in place for electrical equipment.

4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
5. Duct systems are clean of debris.
6. Fans are rotating correctly.
7. Fire and volume dampers are in place and open.
8. Air coil fins are cleaned and combed.
9. Access doors are closed and duct end caps are in place.
10. Air outlets are installed and connected.
11. Duct system leakage is minimized.
12. Hydronic systems are flushed, filled, and vented.
13. Pumps are rotating correctly.
14. Proper strainer baskets are clean and in place.
15. Service and balance valves are open.

B. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.

C. Beginning of work means acceptance of existing conditions.

4.03 PREPARATION

A. Hold a pre-balancing meeting at least one week prior to starting TAB work.
1. Require attendance by all installers whose work will be tested, adjusted, or balanced.

4.04 ADJUSTMENT TOLERANCES

A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.

B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

C. Hydronic Systems: Adjust to within plus or minus 10 percent of design.

4.05 RECORDING AND ADJUSTING

A. Field Logs: Maintain written logs including:
1. Running log of events and issues.
2. Discrepancies, deficient or uncompleted work by others.
3. Contract interpretation requests.
4. Lists of completed tests.

B. Ensure recorded data represents actual measured or observed conditions.

C. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.

D. Mark on the drawings the locations where traverse and other critical measurements were taken and cross reference the location in the final report.

E. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.

F. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

4.06 AIR SYSTEM PROCEDURE

A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.

B. Measure air quantities at air inlets and outlets.

C. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.

D. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.

E. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.

F. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.

G. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.

H. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.

I. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.

4.07 WATER SYSTEM PROCEDURE

A. Adjust water systems to provide required or design quantities.

B. Use calibrated Venturi tubes, orifices, or other metered fittings and pressure gages to determine flow rates for system balance. Where flow metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.

C. Verify specified flow to Heat pumps then open circuit setters completely

4.08 SCOPE

A. Test, adjust, and balance the following:
   1. HVAC Pumps.
   2. Packaged Terminal Air Conditioning Units.
   3. Fans.
   4. Air Filters.
   5. Air Inlets and Outlets.

4.09 MINIMUM DATA TO BE REPORTED

A. Electric Motors:
   1. Manufacturer.
   2. Model/Frame.
   3. HP/BHP.
   4. Phase, voltage, amperage; nameplate, actual, no load.
   5. RPM.

B. Pumps:
   1. Identification/number.
   2. Manufacturer.
   3. Size/model.
   4. Design flow rate, pressure drop, BHP.
   5. Actual flow rate, pressure drop, BHP.
   6. Discharge pressure.
   7. Suction pressure.
   8. Total operating head pressure.

C. Air Moving Equipment:
   1. Location.
   2. Manufacturer.
   3. Model number.
   4. Serial number.
   5. Arrangement/Class/Discharge.
   6. Air flow, specified and actual.

7. Return air flow, specified and actual.
8. Outside air flow, specified and actual.
9. Total static pressure (total external), specified and actual.
10. Inlet pressure.
11. Discharge pressure.

D. Return Air/Outside Air:
1. Identification/location.
2. Design air flow.
3. Actual air flow.
4. Design return air flow.
5. Actual return air flow.
6. Design outside air flow.
7. Actual outside air flow.

E. Exhaust Fans:
1. Location.
2. Manufacturer.
3. Model number.
4. Serial number.
5. Air flow, specified and actual.

F. Duct Traverses:
1. System zone/branch.
2. Duct size.
3. Area.
4. Design velocity.
5. Design air flow.
6. Test velocity.
7. Test air flow.
8. Duct static pressure.

G. Air Distribution Tests:
1. Air terminal number.
2. Room number/location.
3. Terminal type.
4. Terminal size.
5. Design velocity.
6. Design air flow.
7. Test (final) velocity.
8. Test (final) air flow.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Duct insulation.

B. Duct Liner.

C. Insulation jackets.

1.02 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 23 0553 - Identification for HVAC Piping and Equipment.

1.03 REFERENCE STANDARDS

A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.

C. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2010.

D. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014.

E. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material); 2012.

F. ASTM C1338 - Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings; 2008.

G. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

H. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.

I. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association; 2006.

J. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section with not less than three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.

B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.07 FIELD CONDITIONS

A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.

B. Maintain temperature during and after installation for minimum period of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER, FLEXIBLE

A. Manufacturer:
   1. Knauf Insulation; _____: www.knaufinsulation.com.
   2. Johns Manville; _____: www.jm.com.
   3. Owens Corning Corporation; _____: www.ocbuildingspec.com.

B. Vapor Barrier Jacket:
   1. Kraft paper with glass fiber yarn and bonded to aluminized film.

2.03 GLASS FIBER, RIGID

A. Manufacturer:
   1. Knauf Insulation; _____: www.knaufinsulation.com.
   2. Johns Manville; _____: www.jm.com.
   3. Owens Corning Corp: www.owenscorning.com.

B. Insulation: ASTM C612; rigid, noncombustible blanket.
   1. 'K' Value: 0.24 at 75 degrees F, when tested in accordance with ASTM C518.

2.04 JACKETS

A. Aluminum Jacket: ASTM B209 (ASTM B209M).

2.05 DUCT LINER

A. Manufacturers:
   1. Knauf Insulation; _____: www.knaufinsulation.com.
   2. Johns Manville; _____: www.jm.com.
   3. Owens Corning Corp: www.owenscorning.com.

B. Insulation: Non-corrosive, incombustible glass fiber complying with ASTM C1071; flexible blanket, rigid board, and preformed round liner board; impregnated surface and edges coated with poly vinyl acetate polymer, acrylic polymer, or black composite.
   1. Fungal Resistance: No growth when tested according to ASTM G21.
   2. Minimum Noise Reduction Coefficients:
      a. 1/2 inch Thickness: 0.30.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that ducts have been tested before applying insulation materials.

B. Verify that surfaces are clean, foreign material removed, and dry.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Insulated ducts conveying air below ambient temperature:
   1. Provide insulation with vapor barrier jackets.
   2. Finish with tape and vapor barrier jacket.
   3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
   4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.

C. Insulated ducts conveying air above ambient temperature:
   1. Provide with or without standard vapor barrier jacket.

2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.

D. External Duct Insulation Application:
   1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
   2. Secure insulation without vapor barrier with staples, tape, or wires.
   3. Install without sag on underside of duct. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift duct off trapeze hangers and insert spacers.
   4. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
   5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.

E. Duct and Plenum Liner Application:
   1. Adhere insulation with adhesive for 90 percent coverage.
   2. Seal and smooth joints. Seal and coat transverse joints.
   3. Seal liner surface penetrations with adhesive.
   4. Duct dimensions indicated are net inside dimensions required for air flow. Increase duct size to allow for insulation thickness.

3.03 SCHEDULES

A. See Duct insulation Schedule on Drawings

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Equipment insulation.

B. Covering.

C. Breeching insulation.

1.02 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 09 9123 - Interior Painting: Painting insulation covering.

C. Section 23 0553 - Identification for HVAC Piping and Equipment.

D. Section 23 2113 - Hydronic Piping: Placement of hangers and hanger inserts.

E. Section 23 2114 - Hydronic Specialties.

F. Section 23 2300 - Refrigerant Piping: Placement of inserts.

1.03 REFERENCE STANDARDS

A. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2014.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

C. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for equipment scheduled.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with not less than three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.

B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.07 FIELD CONDITIONS

A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.

B. Maintain temperature during and after installation for minimum period of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

A. Manufacturer:
   1. Aeroflex USA, Inc: www.aeroflexusa.com.
   2. Armacell LLC: www.armacell.us.
   3. K-Flex USA LLC: www.kflexusa.com.

B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 3, in sheet form.
   1. Minimum Service Temperature: Minus 40 degrees F.
   2. Maximum Service Temperature: 220 degrees F.
   3. Connection: Waterproof vapor barrier adhesive.

C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that equipment has been tested before applying insulation materials.

B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Factory Insulated Equipment: Do not insulate.

C. Exposed Equipment: Locate insulation and cover seams in least visible locations.

D. Apply insulation close to equipment by grooving, scoring, and beveling insulation. Fasten insulation to equipment with studs, pins, clips, adhesive, wires, or bands.

E. Fill joints, cracks, seams, and depressions with bedding compound to form smooth surface. On cold equipment, use vapor barrier cement.

F. Insulated equipment containing fluids below ambient temperature; insulate entire system.

G. Nameplates and ASME Stamps: Bevel and seal insulation around; do not insulate over.

H. Equipment Requiring Access for Maintenance, Repair, or Cleaning: Install insulation so it can be easily removed and replaced without damage.

3.03 SCHEDULE

A. Ground Source System
   1. Pump Bodies:
   2. Air Separators:
   3. Expansion Tanks:

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Piping insulation.

B. Jackets and accessories.

1.02 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 07 8400 - Firestopping.

C. Section 09 9123 - Interior Painting: Painting insulation jacket.

D. Section 23 2113 - Hydronic Piping: Placement of hangers and hanger inserts.

1.03 REFERENCE STANDARDS

A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.

C. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2014.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

E. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.06 FIELD CONDITIONS

A. Maintain ambient conditions required by manufacturers of each product.

B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER

A. Manufacturers:
   1. Knauf Insulation; _____: www.knaufinsulation.com.
   2. Johns Manville Corporation: www.jm.com.
   3. Owens Corning Corp: www.owenscorning.com.

2.03 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

A. Manufacturer:

1. Aeroflex USA, Inc: www.aeroflexusa.com.
2. Armacell LLC: www.armacell.us.
3. K-Flex USA LLC: www.kflexusa.com.

B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 3; use molded tubular material wherever possible.
1. Minimum Service Temperature: Minus 40 degrees F.
2. Maximum Service Temperature: 220 degrees F.
3. Connection: Waterproof vapor barrier adhesive.

2.04 JACKETS

A. Aluminum Jacket: ASTM B209 (ASTM B209M) formed aluminum sheet.
1. Thickness: 0.016 inch sheet.
2. Finish: Smooth.
3. Joining: Longitudinal slip joints and 2 inch laps.
4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that piping has been tested before applying insulation materials.

B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Exposed Piping: Locate insulation and cover seams in least visible locations.

C. Insulated pipes conveying fluids below ambient temperature; insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.

D. Inserts and Shields:
1. Application: Piping 1-1/2 inches diameter or larger.
2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
3. Insert location: Between support shield and piping and under the finish jacket.
4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.

E. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 07 8400.

F. Heat Traced Piping: Insulate fittings, joints, and valves with insulation of like material, thickness, and finish as adjoining pipe. Size large enough to enclose pipe and heat tracer. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

3.03 SCHEDULE

A. Ground Source Supply & Return
1. Ground Source Water
a. 1” Fiberglass with ASJ Viton Fittings

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Hydronic system requirements.

B. Pipe hangers and supports.

C. Unions, flanges, mechanical couplings, and dielectric connections.

D. Valves:
   1. Ball valves.
   2. Butterfly valves.
   3. Check valves.

1.02 RELATED REQUIREMENTS

A. Section 07 8400 - Firestopping.

B. Section 09 9123 - Interior Painting.

C. Section 22 0719 - Plumbing Piping Insulation.

D. Section 23 0548 - Vibration and Seismic Controls for HVAC Piping and Equipment.

E. Section 23 0719 - HVAC Piping Insulation.

F. Section 23 2114 - Hydronic Specialties.

G. Section 23 2500 - HVAC Water Treatment: Pipe cleaning.

1.03 REFERENCE STANDARDS

A. ASME B31.9 - Building Services Piping; 2014.

B. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers; 1992 (Reapproved 2008).

C. ASTM F1476 - Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications; 2007 (Reapproved 2013).

D. AWWA C606 - Grooved and Shouldered Joints; 2011.

E. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2009.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data:
   1. Include data on pipe materials, pipe fittings, valves, and accessories.
   2. Indicate valve data and ratings.

1.06 QUALITY ASSURANCE

A. Provide all grooved joint couplings, fittings, valves, specialties, and grooving tools from a single manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

B. Provide temporary protective coating on cast iron and steel valves.

C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.08 FIELD CONDITIONS

A. Do not install underground piping when bedding is wet or frozen.

PART 2 PRODUCTS

2.01 HYDRONIC SYSTEM REQUIREMENTS

A. Comply with ASME B31.9 and applicable federal, state, and local regulations.

B. Piping: Provide piping, fittings, hangers and supports as required, as indicated, and as follows:
   1. Where more than one piping system material is specified, provide joining fittings that are compatible with piping materials and ensure that the integrity of the system is not jeopardized.
   2. Use non-conducting dielectric connections whenever jointing dissimilar metals.
   3. Grooved mechanical joints may be used in accessible locations only.
      a. Accessible locations include those exposed on interior of building, in pipe chases, and in mechanical rooms, aboveground outdoors, and as approved by Architect.
      b. Use rigid joints unless otherwise indicated.
   4. Provide pipe hangers and supports in accordance with ASME B31.9 or MSS SP-58 unless indicated otherwise.

C. Pipe-to-Valve and Pipe-to-Equipment Connections: Use flanges, unions, or grooved couplings to allow disconnection of components for servicing; do not use direct welded, soldered, or threaded connections.

D. Valves: Provide valves where indicated:
   1. For throttling, bypass, or manual flow control services, use globe, ball, or butterfly valves.
   2. In heating water, chilled water, or condenser water systems, butterfly valves may be used interchangeably with gate and globe valves.

2.02 PIPE HANGERS AND SUPPORTS

A. Provide hangers and supports that comply with MSS SP-58.
   1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.

B. In grooved installations, use rigid couplings with offsetting angle-pattern bolt pads or with wedge shaped grooves in header piping to permit support and hanging in accordance with ASME B31.9.

2.03 UNIONS, FLANGES, MECHANICAL COUPLINGS, AND DIELECTRIC CONNECTIONS

A. Unions for Pipe 2 Inches and Less:

B. Flanges for Pipe 2 Inches and Greater:

C. Mechanical Couplings for Grooved and Shouldered Joints: Two or more curved housing segments with continuous key to engage pipe groove, circular C-profile gasket, and bolts to secure and compress gasket.
   1. Dimensions and Testing: In accordance with AWWA C606.
   2. Mechanical Couplings: Comply with ASTM F1476.
   3. Bolts and Nuts: Hot dipped galvanized or zinc-electroplated steel.
   4. When pipe is field grooved, provide coupling manufacturer's grooving tools.

2.04 BALL VALVES

A. Up To and Including 2 Inches:
   1. Bronze one piece body, chrome plated brass ball, teflon seats and stuffing box ring, lever handle with balancing stops, solder ends with union.

2.05 BUTTERFLY VALVES

A. Body: Cast or ductile iron with resilient replaceable EPDM seat, wafer, lug, or grooved ends, extended neck.

B. Disc: Construct of aluminum bronze, chrome plated ductile iron, stainless steel, ductile iron with EPDM encapsulation, or Buna-N encapsulation.

C. Operator: 10 position lever handle.

PART 3 EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Prepare pipe for grooved mechanical joints as required by coupling manufacturer.

C. Remove scale and dirt on inside and outside before assembly.

D. Prepare piping connections to equipment using jointing system specified.

E. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

F. After completion, fill, clean, and treat systems. Refer to Section 23 2500 for additional requirements.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Route piping in orderly manner, parallel to building structure, and maintain gradient.

C. Install piping to conserve building space and to avoid interfere with use of space.

D. Group piping whenever practical at common elevations.

E. Slope piping and arrange to drain at low points.

F. Pipe Hangers and Supports:
   1. Install in accordance with ASME B31.9, ASTM F708, or MSS SP-58.
   2. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
   3. Place hangers within 12 inches of each horizontal elbow.
   4. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
   5. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
   6. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
   7. Provide copper plated hangers and supports for copper piping.
   8. Prime coat exposed steel hangers and supports. Refer to Section 09 9123. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 22 0719.

3.03 SCHEDULES

A. See piping material schedule on drawings

B. Hanger Spacing for Copper Tubing.
   1. 1/2 inch and 3/4 inch: Maximum span, 5 feet; minimum rod size, 1/4 inch.
   2. 1 inch: Maximum span, 6 feet; minimum rod size, 1/4 inch.
   3. 1-1/2 inch and 2 inch: Maximum span, 8 feet; minimum rod size, 3/8 inch.

C. Hanger Spacing for Steel Piping.

1. 1/2 inch, 3/4 inch, and 1 inch: Maximum span, 7 feet; minimum rod size, 1/4 inch.
2. 1-1/4 inches: Maximum span, 8 feet; minimum rod size, 3/8 inch.
3. 1-1/2 inches: Maximum span, 9 feet; minimum rod size, 3/8 inch.
4. 2 inches: Maximum span, 10 feet; minimum rod size, 3/8 inch.
5. 2-1/2 inches: Maximum span, 11 feet; minimum rod size, 3/8 inch.
6. 3 inches: Maximum span, 12 feet; minimum rod size, 3/8 inch.
7. 4 inches: Maximum span, 14 feet; minimum rod size, 1/2 inch.

D. Hanger Spacing for Plastic Piping.
1. 1/2 inch: Maximum span, 42 inches; minimum rod size, 1/4 inch.
2. 3/4 inch: Maximum span, 45 inches; minimum rod size, 1/4 inch.
3. 1 inch: Maximum span, 51 inches; minimum rod size, 1/4 inch.
4. 1-1/4 inches: Maximum span, 57 inches; minimum rod size, 3/8 inch.
5. 1-1/2 inches: Maximum span, 63 inches; minimum rod size, 3/8 inch.
6. 2 inches: Maximum span, 69 inches; minimum rod size, 3/8 inch.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Expansion tanks.

B. Air vents.

C. Air separators.

D. Strainers.

E. Suction diffusers.

F. Pressure-temperature test plugs.

G. Relief valves.

H. Pressure reducing valves.

I. Glycol system.

1.02 RELATED REQUIREMENTS

A. Section 23 2113 - Hydronic Piping.

1.03 REFERENCE STANDARDS

A. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1 - Rules for Construction of Pressure Vessels; 2015.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide product data for manufactured products and assemblies required for this project. Include component sizes, rough-in requirements, service sizes, and finishes. Include product description, model and dimensions.

C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Glycol Solution: One container, 10 gallon size.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

C. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.01 EXPANSION TANKS

A. Construction: Welded steel, tested and stamped in accordance with ASME BPVC-VIII-1; supplied with National Board Form U-1, rated for working pressure of 125 psi, with flexible EPDM diaphragm or bladder sealed into tank, and steel support stand.

B. Accessories: Pressure gage and air-charging fitting, tank drain; precharge to 12 psi.

C. Automatic Cold Water Fill Assembly: Pressure reducing valve, reduced pressure double check back flow preventer, test cocks, strainer, vacuum breaker, and valved by-pass.

2.02 AIR VENTS

A. Manual Type: Short vertical sections of 2 inch diameter pipe to form air chamber, with 1/8 inch brass needle valve at top of chamber.

B. Float Type:
   1. Cast iron body and cover, float, bronze pilot valve mechanism suitable for system operating temperature and pressure; with isolating valve.

2.03 AIR SEPARATORS

A. Centrifugal Air Separators/Strainers:
   1. Steel, tested and stamped in accordance with ASME BPVC-VIII-1; for 125 psi operating pressure, with integral bronze strainer, tangential inlet and outlet connections, and internal stainless steel air collector tube.

2.04 STRAINERS

A. See flow diagram on drawings.

2.05 SUCTION DIFFUSERS

A. See flow diagram on drawings.

B. Fitting: Angle pattern, cast-iron body, threaded for 2 inch and smaller, flanged for 2-1/2 inch and larger, rated for 175 psi working pressure, with inlet vanes, cylinder strainer with 3/16 inch diameter openings, disposable 5/32 inch mesh strainer to fit over cylinder strainer, 20 mesh start up screen, and permanent magnet located in flow stream and removable for cleaning.

2.06 PRESSURE-TEMPERATURE TEST PLUGS

A. Construction: Brass body designed to receive temperature or pressure probe with removable protective cap, and Neoprene rated for minimum 200 degrees F.

B. Application: Use extended length plugs to clear insulated piping.

2.07 RELIEF VALVES

A. Bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labelled.

2.08 PRESSURE REDUCING VALVES

A. Operation: Automatically feeds make-up water to the hydronic system whenever pressure in the system drops below the pressure setting of the valve. Refer to Section 23 2113.

B. Materials of Construction:
   1. Valve Body: Constructed of bronze, cast iron, brass, or iron.
   2. Internal Components: Construct of stainless steel or brass and engineered plastics or composition material.

C. Connections:
   1. NPT threaded: 0.50 inch, or 0.75 inch.
   2. Soldered: 0.50 inch.

D. Provide integral check valve and strainer.

E. Maximum Inlet Pressure: 100 psi.

F. Maximum Fluid Temperature: 180 degrees F.

G. Operating Pressure Range: Between 10 psi and 25 psi.

2.09 GLYCOL SYSTEM

A. See flow diagram on drawings.

2.10 SEE DRAWINGS

A. Glycol Solution:

1. Inhibited propylene glycol and water solution mixed [20] percent glycol - [80] percent water. Add other chemical inhibators to protect system piping and componates as needed.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install specialties in accordance with manufacturer's instructions.

B. Where large air quantities can accumulate, provide enlarged air collection standpipes.

C. Provide manual air vents at system high points and as indicated.

D. For automatic air vents in ceiling spaces or other concealed locations, provide vent tubing to nearest drain.

E. Provide air separator on suction side of system circulation pump and connect to expansion tank.

F. Provide valved drain and hose connection on strainer blow down connection.

G. Clean and flush glycol system before adding glycol solution. Refer to Section 23 2500.

H. Feed glycol solution to system through make-up line with pressure regulator, venting system high points. Set to fill at 12 psi and fill system to 30 psi

I. Perform tests determining strength of glycol and water solution and submit written test results. Add chemical inhibators to protect system piping and componates as needed.

3.02 MAINTENANCE

A. See Section 01 7000 - Execution Requirements, for additional requirements relating to maintenance service.

B. Provide service and maintenance of glycol system for one year from date of Substantial Completion at no extra charge to Owner.

C. Perform monthly visits to make glycol fluid concentration analysis on site with refractive index measurement instrument. Report findings in detail in writing, including analysis and amounts of glycol or water added.

D. Explain corrective actions to Owner's maintenance personnel in person.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. System lubricated circulators.

1.02 RELATED REQUIREMENTS

A. Section 23 0716 - HVAC Equipment Insulation.

B. Section 23 0719 - HVAC Piping Insulation.

C. Section 23 2113 - Hydronic Piping.

D. Section 23 2114 - Hydronic Specialties.

E. Section 26 2717 - Equipment Wiring: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

A. UL 778 - Standard for Motor-Operated Water Pumps; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide certified pump curves showing performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable. Include electrical characteristics and connection requirements.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacture, assembly, and field performance of pumps, with minimum three years of documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. GRUNDFOS.

B. TACO.

C. WILO

D. BELL & GOSSETT

E. ARMSTRONG

2.02 HVAC PUMPS - GENERAL

A. Provide pumps that operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.

B. Products Requiring Electrical Connection: Listed and classified by UL or testing agency acceptable to Authority Having Jurisdiction as suitable for the purpose specified and indicated.

2.03 SYSTEM LUBRICATED CIRCULATORS

A. Type: Horizontal shaft, single stage, direct connected with multiple speed wet rotor motor for in-line mounting, for 140 psi maximum working pressure, 230 degrees F maximum water temperature.

B. Type: Close coupled base mount pumps.

PART 3 EXECUTION

3.01 PREPARATION

A. Verify that electric power is available and of the correct characteristics.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide access space around pumps for service. Provide no less than minimum space recommended by manufacturer.

3.03 SCHEDULES

A. Pumps
   1. See drawings

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal ductwork.

1.02 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 07 8400 - Firestopping.

C. Section 09 9113 - Exterior Painting: Weld priming, weather resistant, paint or coating.

D. Section 23 0593 - Testing, Adjusting, and Balancing for HVAC.

E. Section 23 0713 - Duct Insulation: External insulation and duct liner.

F. Section 23 3300 - Air Duct Accessories.

G. Section 23 3600 - Air Terminal Units.

H. Section 23 3700 - Air Outlets and Inlets.

1.03 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

B. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.

C. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience, and approved by manufacturer.

1.06 FIELD CONDITIONS

A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.

B. Maintain temperatures within acceptable range during and after installation of duct sealants.

PART 2 PRODUCTS

2.01 DUCT ASSEMBLIES

A. Regulatory Requirements: Construct ductwork to NFPA 90A standards.

B. Ducts: Galvanized steel, unless otherwise indicated.

C. Low Pressure Supply (Heating Systems): 1/2 inch w.g. pressure class, galvanized steel.

D. Low Pressure Supply (System with Cooling Coils): 1/2 inch w.g. pressure class, galvanized steel.

E. Return and Relief: 1/2 inch w.g. pressure class, galvanized steel.

F. General Exhaust: 1/2 inch w.g. pressure class, galvanized steel.

G. Outside Air Intake: 1/2 inch w.g. pressure class, galvanized steel.

H. Transfer Air and Sound Boots: 1/2 inch w.g. pressure class, fibrous glass.

2.02 MATERIALS

A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.

2.03 DUCTWORK FABRICATION

A. Fabricate and support in accordance with SMACNA (DCS) and as indicated.

B. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

C. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.

D. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA (DCS).

2.04 MANUFACTURED DUCTWORK AND FITTINGS

A. Flexible Ducts: Black polymer film supported by helically wound spring steel wire.
   1. UL labeled.
   2. Insulation: Fiberglass insulation with polyethylene vapor barrier film.
   3. Pressure Rating: 4 inches WG positive and 0.5 inches WG negative.
   4. Maximum Velocity: 4000 fpm.
   5. Temperature Range: Minus 20 degrees F to 175 degrees F.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install, support, and seal ducts in accordance with SMACNA (DCS).

B. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

C. Flexible Ducts: Connect to metal ducts with adhesive.

D. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.

E. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

F. Connect diffusers or light troffer boots to low pressure ducts directly or with 5 feet maximum length of flexible duct held in place with strap or clamp.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Air turning devices/extractors.
B. Backdraft dampers - metal.
C. Backdraft dampers - fabric.
D. Combination fire and smoke dampers.
E. Duct access doors.
F. Duct test holes.
G. Fire dampers.
H. Flexible duct connections.
I. Smoke dampers.
J. Volume control dampers.

1.02 RELATED REQUIREMENTS

A. Section 23 3100 - HVAC Ducts and Casings.
B. Section 23 3600 - Air Terminal Units: Pressure regulating damper assemblies.

1.03 REFERENCE STANDARDS

A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.
B. NFPA 92 - Standard for Smoke Control Systems; 2015.
C. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005.
D. UL 33 - Safety Heat Responsive Links for Fire-Protection Service; Current Edition, Including All Revisions.
E. UL 555 - Standard for Fire Dampers; Current Edition, Including All Revisions.
F. UL 555S - Standard for Smoke Dampers; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide for shop fabricated assemblies including volume control dampers. Include electrical characteristics and connection requirements.
C. Project Record Drawings: Record actual locations of access doors and test holes.
D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
    1. See Section 01 6000 - Product Requirements, for additional provisions.
    2. Extra Fusible Links: One of each type and size.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect dampers from damage to operating linkages and blades.

PART 2 PRODUCTS

2.01 AIR TURNING DEVICES/EXTRACTORS

A. Multi-blade device with blades aligned in short dimension; steel construction; with individually adjustable blades, mounting straps.

2.02 BACKDRAFT DAMPERS - METAL

A. Gravity Backdraft Dampers, Size 18 by 18 inches or Smaller, Furnished with Air Moving Equipment: Air moving equipment manufacturer's standard construction.

2.03 BACKDRAFT DAMPERS - FABRIC

A. Fabric Backdraft Dampers: Factory-fabricated.
   1. Blades: Neoprene coated fabric material.
   2. Birdscreen: 1/2 inch nominal mesh of galvanized steel or aluminum.
   3. Maximum Velocity: 1000 fpm (5 m/sec) face velocity.

2.04 COMBINATION FIRE AND SMOKE DAMPERS

A. Fabricate in accordance with NFPA 90A, UL 555, UL 555S, and as indicated.

B. Provide factory sleeve and collar for each damper.

C. Operators: UL listed and labelled spring return pneumatic type suitable for operation on 0-20 psig instrument air. Provide end switches to indicate damper position. Locate damper operator on interior of duct and link to damper operating shaft.

D. Normally Open Smoke Responsive Fire Dampers: Curtain type, closing upon actuation of electro thermal link, flexible stainless steel blade edge seals to provide constant sealing pressure, stainless steel springs with locking devices to ensure positive closure for units mounted horizontally.

E. Electro Thermal Link: Fusible link melting at 165 degrees F; 120 volts, single phase, 60 Hz; UL listed and labeled.

2.05 DUCT ACCESS DOORS

A. Fabricate in accordance with SMACNA (DCS) and as indicated.

2.06 DUCT TEST HOLES

2.07 FIRE DAMPERS

A. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.

B. Horizontal Dampers: Galvanized steel, 22 gage, 0.0299 inch frame, stainless steel closure spring, and lightweight, heat retardant non-asbestos fabric blanket.

C. Curtain Type Dampers: Galvanized steel with interlocking blades. Provide stainless steel closure springs and latches for horizontal installations. Configure with blades out of air stream except for 1.0 inch pressure class ducts up to 12 inches in height.

D. Multiple Blade Dampers: 16 gage, 0.0598 inch galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, 1/8 by 1/2 inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock.

E. Fusible Links: UL 33, separate at 160 degrees F with adjustable link straps for combination fire/balancing dampers.

2.08 FLEXIBLE DUCT CONNECTIONS

A. Fabricate in accordance with SMACNA (DCS) and as indicated.

B. Flexible Duct Connections: Fabric crimped into metal edging strip.
   1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz per sq yd.

C. Maximum Installed Length: 14 inch.

2.09 SMOKE DAMPERS

A. Fabricate in accordance with NFPA 90A and UL 555S, and as indicated.

B. Dampers: UL Class 1 airfoil blade type smoke damper, normally open automatically operated by pneumatic actuator.

C. Electro Thermal Link: Fusible link melting at 165 degrees F; 120 volts, single phase, 60 Hz; UL listed and labeled.

2.10 VOLUME CONTROL DAMPERS

A. Fabricate in accordance with SMACNA (DCS) and as indicated.

B. Single Blade Dampers: Fabricate for duct sizes up to 6 by 30 inch.
   1. Blade: 24 gage, 0.0239 inch, minimum.

C. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 by 72 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
   1. Blade: 18 gage, 0.0478 inch, minimum.

D. Quadrants:
   1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.
   2. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.
   3. Where rod lengths exceed 30 inches provide regulator at both ends.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). Refer to Section 23 3100 for duct construction and pressure class.

B. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.

C. Provide duct test holes where indicated and required for testing and balancing purposes.

D. Provide fire dampers, combination fire and smoke dampers, and smoke dampers at locations indicated, where ducts and outlets pass through fire rated components, and where required by Authorities Having Jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.

E. Install smoke dampers and combination smoke and fire dampers in accordance with NFPA 92.

F. Demonstrate re-setting of fire dampers to Owner's representative.

G. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.

H. At equipment supported by vibration isolators, provide flexible duct connections immediately adjacent to the equipment.

I. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.

J. Provide balancing dampers on high velocity systems where indicated. Refer to Section 23 3600 - Air Terminal Units.

K. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Energy recovery units.

B. Casing.

C. Fans.

D. Total energy wheel.

E. Filters.

F. Dampers.

G. Vibration isolation.

H. Power and controls.

I. Accessories.

1.02 REFERENCE STANDARDS

A. AMCA 500-D - Laboratory Methods of Testing Dampers for Rating; 2012.

B. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating; 2012.

C. AHRI 1060 I-P - Performance Rating of Air-to-Air Exchangers for Energy Recovery Ventilation Equipment; 2014.

D. ASHRAE Std 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size; 2012, with 2015 amendments.

E. ASHRAE Std 84 - Method of Testing Air to Air Heat/Energy Exchangers; 2013.

F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; 2006

I. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's installation instruction, product data, and engineering calculations.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications:
   1. Firm regularly engaged in manufacturing energy recovery units..
   2. Products in satisfactory use in similar service for not less than five years.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store in manufacturer's unopened packaging.

B. Store products to be installed indoors in dry, heated area.

1.06 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Warranty energy recovery wheel to be free from defects in material and workmanship for 3 years under circumstances of normal use.

C. Warranty dessicant core to be free from defects in material and workmanship for 5 years under circumstances of normal use.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Energy Recovery Ventilators:
   1. Semco Inc.; www.semcohvac.com.

2.02 ENERGY RECOVERY DESIGN CRITERIA

A. See Drawings

2.03 ENERGY RECOVERY UNITS

A. Energy Recovery Units: Dessicant wheel type; prefabricated packaged system designed by manufacturer.
   1. Access: Hinged and/or screwed access panels on front.
   2. Framing: Sheet metal insulated framing and panels.

2.04 CASING

A. Wall, Floor, and Roof Panels:
   1. Construction: 1 inch thick, double wall box construction, with formed edges of exterior wall overlapping formed edges of interior wall.
   2. Exterior Wall: Galvanized steel sheet.
   3. Insulation:
      a. 1 inch insulated fiberglass.
      b. Panel Cores: Fiberglass
      c. Flame Spread Index (FSI): 25 or less, when tested in accordance with ASTM E84 or UL 723.
      d. Smoke Developed Index (SDI): 50, maximum, when tested in accordance with ASTM E84 or UL 723.
   4. Roof Panel: Weatherproof.
   5. Coating: Polyurethane enamel.

B. Access Panels: Provide access to components through a large, tightly sealed and easily removable panel.

C. Doors:
   1. Construct doors of same construction and thickness as wall panels.
   2. As required.

D. Weather Hood: Provide on fresh air inlet and exhaust air outlet; removable for access.
   1. Fresh Air Weather Hood: Maintain a face velocity less than 340 feet/min.

2.05 FANS

A. Provide separate fans for exhaust and supply blowers.

B. Fans:
   1. Forward curved direct drive with inverter speed control

C. Housings: 12 gage, 0.1046 inch aluminized steel with plenums integral to general housing and constructed to Class 1 fan standards.

D. Motors:
   1. Motors: Open drip proof.
   2. Efficiency: High.
   3. Speed: Single.
   4. Control: Variable Frequency Drive.
   5. Fan Motor: UL listed and labeled.

E. Drives:

1. Fans: Belt driven.
2. As scheduled

2.06 TOTAL ENERGY WHEEL

A. Wheel: Transfer heat and humidity from one air stream to the other with minimum carryover of the exhaust air into the supply air stream.

B. Sensible Recovery Efficiency: 70%.

C. Latent Recovery Efficiency: 70%.

D. Wheel Effectiveness: Rated in accordance with ASHRAE Std 84 and AHRI 1060.

E. Flame Spread Index (FSI): 25 or less, when tested in accordance with ASTM E84 or UL 723.

F. Smoke Developed Index (SDI): 50 or less, when tested in accordance with ASTM E84 or UL 723.

G. Energy Recovery Wheel Media Face:
   1. Desiccant coated aluminum

H. Rotor:
   1. Type: Non-segmented hygroscopic aluminum wheel.
   2. Rotor Matrix: Corrosion resistant aluminum alloy composed of alternating corrugated and flat, continuously wound layers of uniform widths.

I. Desiccant:
   1. Type: 3A.

J. Drive:
   1. Drive: Tensioned drive with full perimeter link style belt.

2.07 FILTERS

A. Exhaust and Fresh Air Streams: MERV 7 filters constructed to meet ASHRAE Std 52.2.

B. Mount 1/2 inches thick permanent aluminum washable type filter in the outside air hood and in the return plenum air.

2.08 DAMPERS

A. Exhaust Back-Draft Damper: Factory installed, galvanized steel.
   1. High performance, backdraft dampers suitable for application in HVAC systems with velocities to 3000 feet per minute.
   2. Louvers, Dampers, and Shutters: AMCA 500-D and AMCA 500-L.
   3. Damper Capacity: Demonstrate damper capacity to withstand HVAC system operating conditions.
   4. Fabrication:
      a. Frame: 20 gage, 0.0359 inch, 3 inch roll formed galvanized steel channel with rear flange, prepunched mounting holes, and welded corner clips for maximum rigidity.
      b. Blades:
         1) Style: Single-piece, overlap frame.
         2) Material: Roll formed 28 gage, 0.0149 inch galvanized steel.
         3) Width: Maximum 6 inches.

B. Return Air Damper:
   1. Factory installed, adjustable volume control, opposed blade damper for regulating airflow, based on external static pressure.
   2. Return Air Damper: Structural hat channels, reinforced at corners.
   3. Roll-formed Frames: Structurally superior to 13 gage, 0.0897 inch U-channel frames.
   4. Blades: Single skin, 16 gage, 0.0598 inch.

C. Motorized Dampers: Provide motorized dampers at outside air inlet, exhaust air outlet, and supply air outlet.
   1. Type: Motorized two position parallel blade damper with blade seals.
   2. Motorized Damper: Roll-formed structural hat channels, reinforced at the corners,

3. Blades: Single skin, 16 gage, 0.0598 inch.

D. Motorized Louvers:
   1. Type: Motorized two position parallel blade louver with drainable blades, blade seals, and jamb seals
   2. Adjustable louver:
      a. Fabrication: Mullion style.
         1) Frame:
            (a) Material: Extruded aluminum, Alloy 6063-T5.
         2) Blades:
            (a) Style: Horizontal, adjustable, drainable.
            (b) Material: Formed aluminum, Alloy 6063-T5.

2.09 VIBRATION ISOLATION

A. Vibration Isolation: Provide whole unit vibration isolation with the energy recovery unit assembly.

B. Construct with appropriately-sized, seismic-rated, corrosion-resistant captive-spring isolators.

2.10 POWER AND CONTROLS

A. Motor Control Panels: UL listed.

B. Include necessary motor starters, fuses, transformers and overload protection according to NFPA 70.

C. Install wiring in accordance with NFPA 70.

2.11 ACCESSORIES

A. Variable speed drives

B. Carbon Dioxide sensors shipped loose for field installation.

C. Time clocks.

D. Roof curbs on outdoor units.

E. Indoor filter assemblies on indoor units.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that structure is ready for installation of unit, that openings in deck for ductwork, if required, are correctly sized and located, and that mechanical and electrical utilities supplying unit are of correct capacities and are accessible.

3.02 INSTALLATION

A. Provide openings for suitable ductwork connection.

3.03 SYSTEM STARTUP

A. Provide services of manufacturer's authorized representative to provide start up of unit.

3.04 CLEANING

A. Clean filters, air plenums, interior and exposed-to-view surfaces prior to Substantial Completion.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Diffusers.

B. Registers/grilles.

C. Louvers.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

A. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating; 2012.

B. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Inlets; 2006 (R2011).

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

1.05 QUALITY ASSURANCE

A. Test and rate air outlet and inlet performance in accordance with ASHRAE Std 70.

B. Test and rate louver performance in accordance with AMCA 500-L.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Price Industries; www.price-hvac.com.

B. Titus; www.titus-hvac.com.

2.02 LOUVERS

A. Type: 4 inch deep with blades on 45 degree slope with center baffle and return bend, heavy channel frame, 1/2 inch square mesh screen over exhaust and 1/2 inch square mesh screen over intake.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.

3.02 SCHEDULES

A. See drawings.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Water-source heat pumps.

B. Controls.

1.02 RELATED REQUIREMENTS

A. Section 23 2113.33 - Ground-Loop Heat-Pump Piping: Ground-source water loop.

B. Section 23 3100 - HVAC Ducts and Casings.

1.03 REFERENCE STANDARDS

A. AHRI 210/240 - Standard for Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment; 2008.

B. ASHRAE Std 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings; 2013, Including All Addenda.

C. NEMA MG 1 - Motors and Generators; 2014.

D. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.

E. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2015.

F. UL 207 - Standard for Refrigerant-Containing Components and Accessories, Nonelectrical; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. Product Data: Provide rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.

B. Warranty: Submit manufacturer’s warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. Extra Filters: One for each unit.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

B. Installer Qualifications: Company specializing in performing the work of this section with minimum five years of experience and approved by manufacturer.

1.06 WARRANTY

A. Provide five year manufacturer’s warranty for compressors, parts only.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Water Furnace:

B. Climatemaster.

C. FHP.

D. Daikin.

2.02 INDOOR UNITS FOR DUCTED SYSTEMS

A. Indoor Units: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, heating and cooling element(s), controls, and accessories; wired for single power connection with control transformer.
   1. Cabinet: Steel with baked enamel finish, easily removed and secured access doors with safety interlock switches, glass fiber insulation with reflective liner.
   2. Heating and Cooling Units: Self-contained, packaged, matched factory-engineered and assembled, pre-wired indoor units; UL listed.

B. Supply Fan: Centrifugal type rubber mounted with direct or belt drive with adjustable variable pitch motor pulley.
   1. Motor: NEMA MG 1; 1750 rpm single speed, permanently lubricated, hinge mounted.
   2. Motor Electrical Characteristics:

C. Air Filters: See Drawings

D. Evaporator Coils: Copper tube aluminum fin assembly, galvanized or polymer drain pan sloped in all directions to drain, drain connection, refrigerant piping connections, restricted distributor or thermostatic expansion valve.
   1. Construction and Ratings: In accordance with AHRI 210/240 and UL 207.
   2. Manufacturers: System manufacturer.

E. Performance Requirements: See Drawings for additional requirements.

2.03 ACCESSORY EQUIPMENT

A. Room Thermostat: Brightstat Model 8403-081 wall-mounted, electric solid state microcomputer based Bacnet compatible room thermostat to maintain temperature setting and integral humidistat for humidity control. Low-voltage; with following features:
   1. Automatic switching from heating to cooling.
   2. Preferential rate control to minimize overshoot and deviation from setpoint.
   3. Short cycle protection.
   4. Thermostat Display:
      a. Actual room temperature.
      b. Programmed temperature.
      c. System Mode Indication: Heating, Cooling, Fan Auto, Fan Off, Fan On, Humidity Control On, Occupied, Unoccupied

B. Integral circulation pump: See heatpump schedule on drawings for performance requirements. Interlock with heatpump to turn pump on when the heatpump compressor is commanded on.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrates are ready for installation of units and openings are as indicated on shop drawings.

B. Verify that proper power supply is available and in correct location.

C. Verify that proper fuel supply is available for connection.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions and requirements of local authorities having jurisdiction.

B. Install in accordance with NFPA 90A and NFPA 90B.

3.03 SCHEDULE

A. See drawings

END OF SECTION

SECTION 26 0501
MINOR ELECTRICAL DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical demolition.

1.02 RELATED REQUIREMENTS

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work: As specified in individual sections.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify field measurements and circuiting arrangements are as shown on Drawings.

B. Verify that abandoned wiring and equipment serve only abandoned facilities.

C. Demolition drawings are based on casual field observation and existing record documents.

D. Report discrepancies to Architect before disturbing existing installation.

E. Beginning of demolition means installer accepts existing conditions.

3.02 PREPARATION

A. Disconnect electrical systems in walls, floors, and ceilings to be removed.

B. Coordinate utility service outages with utility company.

C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.

D. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Minimize outage duration.
   1. Obtain permission from Owner at least 24 hours before partially or completely disabling system.

E. Existing Fire Alarm System: Maintain existing system in service until new system is accepted. Disable system only to make switchovers and connections. Minimize outage duration.
   1. Notify Owner before partially or completely disabling system.
   2. Notify local fire service.
   3. Make notifications at least 24 hours in advance.
   4. Make temporary connections to maintain service in areas adjacent to work area.

F. Existing Telephone System: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Minimize outage duration.
   1. Notify Owner at least 24 hours before partially or completely disabling system.
   2. Notify telephone utility company at least 24 hours before partially or completely disabling system.
   3. Make temporary connections to maintain service in areas adjacent to work area.

3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

A. Perform work for removal and disposal of equipment and materials containing toxic substances regulated under the Federal Toxic Substances Control Act (TSCA) in accordance with applicable federal, state, and local regulations. Applicable equipment and materials include, but are not limited to:
   1. PCB-containing electrical equipment, including transformers, capacitors, and switches.

2. PCB- and DEHP-containing lighting ballasts.
3. Mercury-containing lamps and tubes, including fluorescent lamps, high intensity discharge (HID), arc lamps, ultra-violet, high pressure sodium, mercury vapor, ignitron tubes, neon, and incandescent.

B. Remove, relocate, and extend existing installations to accommodate new construction.

C. Remove abandoned wiring to source of supply.

D. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.

E. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets that are not removed.

F. Repair adjacent construction and finishes damaged during demolition and extension work.

G. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.

3.04 CLEANING AND REPAIR

A. See Section 01 7419 - Construction Waste Management and Disposal for additional requirements.

B. Clean and repair existing materials and equipment that remain or that are to be reused.

C. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.

END OF SECTION

SECTION 26 0519
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Single conductor building wire.

B. Wiring connectors.

C. Electrical tape.

D. Wire pulling lubricant.

E. Cable ties.

1.02 RELATED REQUIREMENTS

A. Section 07 8400 - Firestopping.

B. Section 26 0526 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.

1.03 REFERENCE STANDARDS

A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013.

B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011.

C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010 (Reapproved 2014).

D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2014).

E. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape; 2010.

F. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

G. NEMA WC 70 - Nonshielded Power Cable 2000 V or Less for the Distribution of Electrical Energy; 2009.

H. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.

I. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

J. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.

K. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.

L. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.

M. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.

N. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
3. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

1.08 FIELD CONDITIONS

A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F, unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Architect and obtain direction before proceeding with work.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.

B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

A. Provide products that comply with requirements of NFPA 70.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.

D. Comply with NEMA WC 70.

E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.

F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.

G. Conductor Material:
   1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
   2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B 787M unless otherwise indicated.
   3. Tinned Copper Conductors: Comply with ASTM B33.

H. Minimum Conductor Size:
   1. Branch Circuits: 12 AWG.
      a. Exceptions:
         1) 20 A, 120 V circuits longer than 75 feet: 10 AWG, for voltage drop.
         2) 20 A, 120 V circuits longer than 150 feet: 8 AWG, for voltage drop.

I. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

J. Conductor Color Coding:
   1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
   2. Color Coding Method: Integrally colored insulation.
   3. Color Code:
      a. Equipment Ground, All Systems: Green.

2.03 SINGLE CONDUCTOR BUILDING WIRE

A. Description: Single conductor insulated wire.

B. Conductor Stranding:

1. Feeders and Branch Circuits:
    a. Size 10 AWG and Smaller: Solid.
    b. Size 8 AWG and Larger: Stranded.

C. Insulation Voltage Rating: 600 V.

D. Insulation:
1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.

2.04 WIRING CONNECTORS

A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.

B. Connectors for Grounding and Bonding: Comply with Section 26 0526.

C. Wiring Connectors for Terminations:
1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
2. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.

D. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.

2.05 WIRING ACCESSORIES

A. Electrical Tape:
1. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.

B. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.

C. Cable Ties: Material and tensile strength rating suitable for application.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that interior of building has been protected from weather.

B. Verify that work likely to damage wire and cable has been completed.

C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.

D. Verify that field measurements are as shown on the drawings.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.03 INSTALLATION

A. Circuiting Requirements:
1. Unless dimensioned, circuit routing indicated is diagrammatic.
2. When circuit destination is indicated and routing is not shown, determine exact routing required.
3. Arrange circuiting to minimize splices.
4. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
5. Maintain separation of wiring for emergency systems in accordance with NFPA 70.

B. Install products in accordance with manufacturer's instructions.

C. Install conductors and cable in a neat and workmanlike manner in accordance with NECA 1.

D. Installation in Raceway:
   1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
   2. Pull all conductors and cables together into raceway at same time.
   3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
   4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.

E. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.

F. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
   1. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conductors and cables to lay on ceiling tiles.

G. Install conductors with a minimum of 12 inches of slack at each outlet.

H. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.

I. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.

J. Make wiring connections using specified wiring connectors.
   1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
   2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
   3. Do not remove conductor strands to facilitate insertion into connector.
   4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.

K. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.

L. Insulate ends of spare conductors using vinyl insulating electrical tape.

M. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.

N. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

3.04 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Perform inspection, testing, and adjusting in accordance with Section 01 4000.

C. Inspect and test in accordance with NETA ATS, except Section 4.

D. Perform inspections and tests listed in NETA ATS, Section 7.3.2. The insulation resistance test is required for all conductors. The resistance test for parallel conductors listed as optional is not required.

E. Correct deficiencies and replace damaged or defective conductors and cables.

END OF SECTION

SECTION 26 0526
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Grounding and bonding requirements.

B. Conductors for grounding and bonding.

C. Connectors for grounding and bonding.

D. Ground rod electrodes.

1.02 RELATED REQUIREMENTS

A. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.

B. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

A. IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System; 2012.

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

C. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings; 2007.

D. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.

E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

F. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Verify exact locations of underground metal water service pipe entrances to building.
   2. Coordinate the work with other trades to provide steel reinforcement complying with specified requirements for concrete-encased electrode.
   3. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not install ground rod electrodes until final backfill and compaction is complete.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittals procedures.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

A. Existing Work: Where existing grounding and bonding system components are indicated to be reused, they may be reused only where they are free from corrosion, integrity and continuity are verified, and where acceptable to the authority having jurisdiction.

B. Do not use products for applications other than as permitted by NFPA 70 and product listing.

C. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.

D. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

E. Grounding System Resistance:
   1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Architect. Precipitation within the previous 48 hours does not constitute normally dry conditions.
   2. Grounding Electrode System: Not greater than 5 ohms to ground, when tested according to IEEE 81 using "fall-of-potential" method.
   3. Between Grounding Electrode System and Major Electrical Equipment Frames, System Neutral, and Derived Neutral Points: Not greater than 0.5 ohms, when tested using "point-to-point" methods.

F. Grounding Electrode System:
   1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
      a. Provide continuous grounding electrode conductors without splice or joint.
      b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
   2. Metal Underground Water Pipe(s):
      a. Provide connection to underground metal domestic and fire protection (where present) water service pipe(s) that are in direct contact with earth for at least 10 feet at an accessible location not more than 5 feet from the point of entrance to the building.
      b. Provide bonding jumper(s) around insulating joints/pipes as required to make pipe electrically continuous.
      c. Provide bonding jumper around water meter of sufficient length to permit removal of meter without disconnecting jumper.
   3. Metal Building or Structure Frame:
      a. Provide connection to metal building or structure frame effectively grounded in accordance with NFPA 70 at nearest accessible location.
   4. Concrete-Encased Electrode:
      a. Provide connection to concrete-encased electrode consisting of not less than 20 feet of either steel reinforcing bars or bare copper conductor not smaller than 4 AWG embedded within concrete foundation or footing that is in direct contact with earth in accordance with NFPA 70.
   5. Ground Rod Electrode(s):
      a. Provide three electrodes in an equilateral triangle configuration unless otherwise indicated or required.
      b. Space electrodes not less than 10 feet from each other and any other ground electrode.
      c. Where location is not indicated, locate electrode(s) at least 5 feet outside building perimeter foundation as near as possible to electrical service entrance; where possible, locate in softscape (uncovered) area.
   6. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.

G. Bonding and Equipment Grounding:
   1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
   2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.

3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.
7. Provide bonding for interior metal piping systems in accordance with NFPA 70. This includes, but is not limited to:
    a. Metal water piping where not already effectively bonded to metal underground water pipe used as grounding electrode.
    b. Metal gas piping.

H. Communications Systems Grounding and Bonding:
1. Provide intersystem bonding termination at service equipment or metering equipment enclosure and at disconnecting means for any additional buildings or structures in accordance with NFPA 70.

2.02 GROUNDING AND BONDING COMPONENTS

A. General Requirements:
1. Provide products listed, classified, and labeled as suitable for the purpose intended.
2. Provide products listed and labeled as complying with UL 467 where applicable.

B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 0526:
1. Use insulated copper conductors unless otherwise indicated.
    a. Exceptions:
        1) Use bare copper conductors where installed underground in direct contact with earth.
        2) Use bare copper conductors where directly encased in concrete (not in raceway).

C. Connectors for Grounding and Bonding:
1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.

D. Ground Rod Electrodes:
1. Comply with NEMA GR 1.
2. Material: Copper-bonded (copper-clad) steel.
3. Size: 3/4 inch diameter by 10 feet length, unless otherwise indicated.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that work likely to damage grounding and bonding system components has been completed.

B. Verify that field measurements are as shown on the drawings.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install grounding and bonding system components in a neat and workmanlike manner in accordance with NECA 1.

C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or provide ground plates.

D. Make grounding and bonding connections using specified connectors.
   1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
   2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
   3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
   4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
   5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

E. Identify grounding and bonding system components in accordance with Section 26 0553.

3.03 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Perform inspection, testing, and adjusting in accordance with Section 01 4000.

C. Inspect and test in accordance with NETA ATS except Section 4.

D. Perform inspections and tests listed in NETA ATS, Section 7.13.

E. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.

F. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

END OF SECTION

SECTION 26 0529
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Support and attachment components for equipment, conduit, cable, boxes, and other electrical work.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Concrete equipment pads.

B. Section 26 0534 - Conduit: Additional support and attachment requirements for conduits.

C. Section 26 0536 - Cable Trays for Electrical Systems: Additional support and attachment requirements for cable tray.

D. Section 26 5100 - Interior Lighting: Additional support and attachment requirements for interior luminaires.

1.03 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2013.

D. MFMA-4 - Metal Framing Standards Publication; 2004.

E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
   2. Coordinate the work with other trades to provide additional framing and materials required for installation.
   3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
   4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
   5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 03 3000.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

1.06 QUALITY ASSURANCE

A. Comply with NFPA 70.

B. Comply with applicable building code.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:
   1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
   2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
   3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported with a minimum safety factor of _____. Include consideration for vibration, equipment operation, and shock loads where applicable.
   4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
   5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
      a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
      b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
   1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
   2. Conduit Clamps: Bolted type unless otherwise indicated.

C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.

D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
   1. Comply with MFMA-4.

E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.

F. Anchors and Fasteners:
   1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that mounting surfaces are ready to receive support and attachment components.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install support and attachment components in a neat and workmanlike manner in accordance with NECA 1.

C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

D. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.

E. Unless specifically indicated or approved by Architect, do not provide support from roof deck.

F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

G. Equipment Support and Attachment:

1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

H. Conduit Support and Attachment: Also comply with Section 26 0534.

I. Cable Tray Support and Attachment: Also comply with Section 26 0536.

J. Interior Luminaire Support and Attachment: Also comply with Section 26 5100.

K. Secure fasteners according to manufacturer's recommended torque settings.

L. Remove temporary supports.

3.03 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Inspect support and attachment components for damage and defects.

C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

D. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical metallic tubing (EMT).

B. Conduit fittings.

C. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 07 8400 - Firestopping.

B. Section 26 0526 - Grounding and Bonding for Electrical Systems.
   1. Includes additional requirements for fittings for grounding and bonding.

C. Section 26 0529 - Hangers and Supports for Electrical Systems.

1.03 REFERENCE STANDARDS

A. ANSI C80.3 - American National Standard for Steel Electrical Metallic Tubing (EMT); 2005.

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

C. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2012.

D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.

F. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.

G. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate minimum sizes of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
   2. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
   3. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.
   4. Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.
   5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittals procedures.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.

B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the

most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.

C. Concealed Within Hollow Stud Walls: Use galvanized steel rigid metal conduit.

D. Concealed Above Accessible Ceilings: Use galvanized steel rigid metal conduit or electrical metallic tubing (EMT).

E. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit.

F. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit.
   1. Locations subject to physical damage include, but are not limited to:
      a. Where exposed below 8 feet, except within electrical and communication rooms or closets.
      b. Where exposed below 20 feet in gym.

G. Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit.

H. Connections to Vibrating Equipment:
   1. Dry Locations: Use flexible metal conduit.
   2. Maximum Length: 6 feet unless otherwise indicated.

2.02 CONDUIT REQUIREMENTS

A. Existing Work: Where existing conduits are indicated to be reused, they may be reused only where they comply with specified requirements, are free from corrosion, and integrity is verified by pulling a mandrel through them.

B. Fittings for Grounding and Bonding: Also comply with Section 26 0526.

C. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.

D. Provide products listed, classified, and labeled as suitable for the purpose intended.

E. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 FLEXIBLE METAL CONDUIT (FMC)

A. Description: NFPA 70, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.

B. Fittings:
   1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel or malleable iron.

2.04 ELECTRICAL METALLIC TUBING (EMT)

A. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.

B. Fittings:
   1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel or malleable iron.
   3. Connectors and Couplings: Use compression (gland) or set-screw type.
      a. Do not use indenter type connectors and couplings.

2.05 ACCESSORIES

A. Pull Strings: Use nylon cord with average breaking strength of not less than 200 pound-force.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on drawings.

B. Verify that mounting surfaces are ready to receive conduits.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install conduit in a neat and workmanlike manner in accordance with NECA 1.

C. Conduit Routing:
   1. Conceal all conduits unless specifically indicated to be exposed.

D. Conduit Support:
   1. Secure and support conduits in accordance with NFPA 70 and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.
   2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
   3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.

E. Connections and Terminations:
   1. Use suitable adapters where required to transition from one type of conduit to another.
   2. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
   3. Secure joints and connections to provide maximum mechanical strength and electrical continuity.

F. Penetrations:
   1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
   2. Make penetrations perpendicular to surfaces unless otherwise indicated.
   3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
   4. Conceal bends for conduit risers emerging above ground.
   5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.
   6. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
   7. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty. Include proposed locations of penetrations and methods for sealing with submittals.
   8. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.

G. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
   1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
   2. Where conduits are subject to earth movement by settlement or frost.

H. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:
   1. Where conduits pass from outdoors into conditioned interior spaces.
   2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.

I. Provide grounding and bonding in accordance with Section 26 0526.

3.03 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Correct deficiencies and replace damaged or defective conduits.

3.04 CLEANING

A. Clean interior of conduits to remove moisture and foreign matter.

3.05 PROTECTION

A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

END OF SECTION

SECTION 26 0553
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical identification requirements.

B. Identification nameplates and labels.

C. Wire and cable markers.

D. Voltage markers.

E. Warning signs and labels.

1.02 RELATED REQUIREMENTS

A. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.

1.03 REFERENCE STANDARDS

A. ANSI Z535.2 - American National Standard for Environmental and Facility Safety Signs; 2011.

B. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels; 2011.

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. UL 969 - Marking and Labeling Systems; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.

B. Sequencing:
   1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.
   2. Do not install identification products until final surface finishes and painting are complete.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittals procedures.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

1.07 FIELD CONDITIONS

A. Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

A. Existing Work: Unless specifically excluded, identify existing elements to remain that are not already identified in accordance with specified requirements.

B. Identification for Equipment:
   1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
      a. Panelboards:
         1) Identify power source and circuit number. Include location when not within sight of equipment.
         2) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.
         3) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.
   2. Service Equipment:

a. Use identification nameplate to identify each service disconnecting means.
b. Use identification nameplate at each piece of service equipment to identify the available fault current and the date calculations were performed.

3. Emergency System Equipment:
a. Use identification nameplate or voltage marker to identify emergency system equipment in accordance with NFPA 70.
b. Use identification nameplate at each piece of service equipment to identify type and location of on-site emergency power sources.

4. Use identification label to identify overcurrent protective devices for branch circuits serving fire alarm circuits. Identify with text "FIRE ALARM CIRCUIT".

C. Identification for Conductors and Cables:
1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 0519.
2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

A. Identification Nameplates:
1. Materials:
2. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.

B. Identification Labels:
1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

C. Format for Equipment Identification:
1. Minimum Size: 1 inch by 2.5 inches.
2. Legend:
a. Equipment designation or other approved description.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height:
a. Equipment Designation: 1/2 inch.
5. Color:
a. Normal Power System: White text on black background.

D. Format for Receptacle Identification:
1. Minimum Size: 3/8 inch by 1.5 inches.
2. Legend: Power source and circuit number or other designation indicated.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 3/16 inch.
5. Color: Black text on clear background.

E. Format for Fire Alarm Device Identification:
1. Minimum Size: 3/8 inch by 1.5 inches.
2. Legend: Designation indicated and device zone or address.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 3/16 inch.
5. Color: Red text on white background.

2.03 WIRE AND CABLE MARKERS

A. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.

B. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.

C. Legend: Power source and circuit number or other designation indicated.

D. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.

E. Minimum Text Height: 1/8 inch.

F. Color: Black text on white background unless otherwise indicated.

2.04 VOLTAGE MARKERS

A. Markers for Conduits: Use factory pre-printed self-adhesive vinyl, self-adhesive vinyl cloth, or vinyl snap-around type markers.

B. Minimum Size:

C. Legend:

D. Color: Black text on orange background unless otherwise indicated.

2.05 WARNING SIGNS AND LABELS

A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.

B. Warning Signs:
   1. Materials:
   2. Minimum Size: 7 by 10 inches unless otherwise indicated.

C. Warning Labels:
   1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
   2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
   3. Minimum Size: 2 by 4 inches unless otherwise indicated.

PART 3 EXECUTION

3.01 PREPARATION

A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
   1. Surface-Mounted Equipment: Enclosure front.
   2. Flush-Mounted Equipment: Inside of equipment door.
   3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
   4. Elevated Equipment: Legible from the floor or working platform.
   5. Branch Devices: Adjacent to device.
   6. Interior Components: Legible from the point of access.
   7. Conductors and Cables: Legible from the point of access.

C. Install identification products centered, level, and parallel with lines of item being identified.

D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.

E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.

F. Mark all handwritten text, where permitted, to be neat and legible.

3.03 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

END OF SECTION

SECTION 26 2416
PANELBOARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Power distribution panelboards.

B. Lighting and appliance panelboards.

C. Overcurrent protective devices for panelboards.

1.02 RELATED REQUIREMENTS

A. Section 26 0526 - Grounding and Bonding for Electrical Systems.

B. Section 26 0529 - Hangers and Supports for Electrical Systems.

C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

D. Section 26 0573 - Power System Studies: Additional criteria for the selection and adjustment of equipment and associated protective devices specified in this section.

1.03 REFERENCE STANDARDS

A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service; Federal Specification; Revision E, 2013.

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

C. NECA 407 - Standard for Installing and Maintaining Panelboards; 2009.

D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.

E. NEMA PB 1 - Panelboards; 2011.

F. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less; 2013.

G. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.

H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

I. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

J. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

K. UL 67 - Panelboards; Current Edition, Including All Revisions.

L. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
3. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted panelboards where indicated.
4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.
   1. Include characteristic trip curves for each type and rating of overcurrent protective device.

B. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
   1. Include dimensioned plan and elevation views of panelboards and adjacent equipment with all required clearances indicated.
   2. Include wiring diagrams showing all factory and field connections.
   3. Clearly indicate whether proposed short circuit current ratings are fully rated or, where acceptable, series rated systems.
   4. Include documentation of listed series ratings.

C. Field Quality Control Test Reports.

D. Project Record Documents: Record actual installed locations of panelboards and actual installed circuiting arrangements.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store panelboards in accordance with manufacturer's instructions and NECA 407.

B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

C. Handle carefully in accordance with manufacturer's written instructions to avoid damage to panelboard internal components, enclosure, and finish.

1.08 FIELD CONDITIONS

A. Maintain ambient temperature within the following limits during and after installation of panelboards:
   1. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Schneider Electric; Square D Products; _____: www.schneider-electric.us.

B. Source Limitations: Furnish panelboards and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 PANELBOARDS - GENERAL REQUIREMENTS

A. Provide products listed, classified, and labeled as suitable for the purpose intended.

B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
   1. Altitude: Less than 6,600 feet.
   2. Ambient Temperature:
      a. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.

C. Short Circuit Current Rating:

1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as determined by short circuit study performed in accordance with Section 26 0573.

D. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.

E. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.

F. Bussing: Sized in accordance with UL 67 temperature rise requirements.
   1. Provide fully rated neutral bus unless otherwise indicated, with a suitable lug for each feeder or branch circuit requiring a neutral connection.
   2. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.

G. Conductor Terminations: Suitable for use with the conductors to be installed.

H. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
   1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
      a. Indoor Clean, Dry Locations: Type 1.
      b. Outdoor Locations: Type 3R.
   2. Boxes: Galvanized steel unless otherwise indicated.
      a. Provide wiring gutters sized to accommodate the conductors to be installed.
      b. Increase gutter space as required where sub-feed lugs, feed-through lugs, gutter taps, or oversized lugs are provided.
   3. Fronts:
      a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
      b. Fronts for Flush-Mounted Enclosures: Overlap boxes on all sides to conceal rough opening.
   4. Lockable Doors: All locks keyed alike unless otherwise indicated.

I. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.

J. Multi-Section Panelboards: Provide enclosures of the same height, with feed-through lugs or sub-feed lugs and feeders as indicated or as required to interconnect sections.

2.03 POWER DISTRIBUTION PANELBOARDS

A. Description: Panelboards complying with NEMA PB 1, power and feeder distribution type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.

B. Conductor Terminations:
   1. Main and Neutral Lug Material: Copper, suitable for terminating copper conductors only.
   2. Main and Neutral Lug Type: Mechanical.

C. Bussing:
   1. Phase and Neutral Bus Material: Copper.
   2. Ground Bus Material: Copper.

D. Circuit Breakers:
   1. Provide bolt-on or plug-in type.
   2. Provide thermal magnetic circuit breakers.
   3. Provide electronic trip circuit breakers.

E. Enclosures:
   1. Provide surface-mounted or flush-mounted enclosures.
   2. Fronts: Provide door-in-door trim with hinged cover for access to load terminals and wiring gutters, and separate lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
   3. Provide clear plastic circuit directory holder mounted on inside of door.

2.04 LIGHTING AND APPLIANCE PANELBOARDS

A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.

B. Conductor Terminations:
   1. Main and Neutral Lug Material: Copper, suitable for terminating copper conductors only.
   2. Main and Neutral Lug Type: Mechanical.

C. Bussing:
   1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
   2. Phase and Neutral Bus Material: Copper.
   3. Ground Bus Material: Copper.

D. Circuit Breakers: Thermal magnetic bolt-on or plug-in type.

E. Enclosures:
   1. Provide surface-mounted or flush-mounted enclosures.
   2. Fronts: Provide door-in-door trim with hinged cover for access to load terminals and wiring gutters, and separate lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
   3. Provide clear plastic circuit directory holder mounted on inside of door.

2.05 OVERCURRENT PROTECTIVE DEVICES

A. Molded Case Circuit Breakers:
   1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
   2. Interrupting Capacity:
      a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating as required by the Overcurrent Protection Device Coordinatioin Study
      b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
   3. Conductor Terminations:
      a. Lug Material: Copper, suitable for terminating copper conductors only.
   4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
   5. Electronic Trip Circuit Breakers: Furnish solid state, microprocessor-based, true rms sensing trip units.
      a. Provide the following field-adjustable trip response settings:
   6. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.
   7. Provide the following features and accessories where indicated or where required to complete installation:
      a. Handle Pad-Lock Provision: For locking circuit breaker handle in OFF position.

2.06 SOURCE QUALITY CONTROL

A. Factory test panelboards according to NEMA PB 1.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that the ratings and configurations of the panelboards and associated components are consistent with the indicated requirements.

C. Verify that mounting surfaces are ready to receive panelboards.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install panelboards securely, in a neat and workmanlike manner in accordance with NECA 1 (general workmanship), NECA 407 (panelboards), and NEMA PB 1.1.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Provide required supports in accordance with Section 26 0529.

E. Install panelboards plumb.

F. Install flush-mounted panelboards so that trims fit completely flush to wall with no gaps and rough opening completely covered.

G. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches above the floor or working platform.

H. Provide minimum of six spare 1 inch trade size conduits out of each flush-mounted panelboard stubbed into accessible space above ceiling and below floor.

I. Provide grounding and bonding in accordance with Section 26 0526.

J. Install all field-installed branch devices, components, and accessories.

K. Set field-adjustable circuit breaker tripping function settings as determined by overcurrent protective device coordination study performed according to Section 26 0573.

L. Provide filler plates to cover unused spaces in panelboards.

M. Identify panelboards in accordance with Section 26 0553.

3.03 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Perform inspection, testing, and adjusting in accordance with Section 01 4000.

C. Inspect and test in accordance with NETA ATS, except Section 4.

D. Molded Case Circuit Breakers: Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for all main circuit breakers and circuit breakers larger than _____ amperes. Tests listed as optional are not required.

E. Procure services of a qualified manufacturer's representative to observe installation and assist in inspection, testing, and adjusting. Include manufacturer's reports with field quality control submittals.

F. Correct deficiencies and replace damaged or defective panelboards or associated components.

3.04 ADJUSTING

A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

B. Adjust alignment of panelboard fronts.

C. Load Balancing: For each panelboard, rearrange circuits such that the difference between each measured steady state phase load does not exceed 20 percent and adjust circuit directories accordingly. Maintain proper phasing for multi-wire branch circuits.

3.05 CLEANING

A. Clean dirt and debris from panelboard enclosures and components according to manufacturer's instructions.

B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall switches.

B. Receptacles.

C. Wall plates.

D. Floor box service fittings.

1.02 RELATED REQUIREMENTS

A. Section 26 0537 - Boxes.

B. Section 26 0537 - Boxes.

1.03 REFERENCE STANDARDS

A. FS W-C-596 - Connector, Electrical, Power, General Specification for; Federal Specification; Revision G, 2001.

B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush-mounted (General Specification); Federal Specification; Revision F, 1999.

C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

D. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.

E. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (R 2010).

F. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2012.

G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.

I. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.

J. UL 514D - Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.

K. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.
   2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.
   3. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
   4. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

B. Sequencing:
   1. Do not install wiring devices until final surface finishes and painting are complete.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Listed, classified, and labeled as suitable for the purpose intended.

1.06 DELIVERY, STORAGE, AND PROTECTION

A. Store in a clean, dry space in original manufacturer's packaging until ready for installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Hubbell Incorporated: www.hubbell-wiring.com.

B. Leviton Manufacturing Company, Inc: www.leviton.com.

C. Lutron Electronics Company, Inc; _____: www.lutron.com.

D. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us

E. Source Limitations: Where possible, provide products for each type of wiring device produced by a single manufacturer and obtained from a single supplier.

2.02 WIRING DEVICE APPLICATIONS

A. Provide wiring devices suitable for intended use and with ratings adequate for load served.

B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.

C. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.

D. Provide GFCI protection for receptacles installed within 6 feet of sinks.

E. For flush floor service fittings, use tile rings for installations in tile floors.

F. For flush floor service fittings, use carpet flanges for installations in carpeted floors.

2.03 WIRING DEVICE FINISHES

A. Provide wiring device finishes as described below unless otherwise indicated.

B. Wiring Devices, Unless Otherwise Indicated: Ivory with ivory nylon wall plate.

C. Wiring Devices Installed in Wet or Damp Locations: _____ with specified weatherproof cover.

D. Wiring Devices Connected to Emergency Power: Red with red nylon wall plate.

E. Flush Floor Box Service Fittings: Ivory wiring devices with brass cover and ring/flange.

2.04 WALL SWITCHES

A. Manufacturers:
   1. Hubbell Incorporated: www.hubbell-wiring.com.
   2. Leviton Manufacturing Company, Inc: www.leviton.com.
   3. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us

B. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.
   1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.

2.05 RECEPTACLES

A. Manufacturers:
   1. Hubbell Incorporated: www.hubbell-wiring.com.
   2. Leviton Manufacturing Company, Inc: www.leviton.com.
   3. Lutron Electronics Company, Inc; Designer Style: www.lutron.com.
   4. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us

B. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
   1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
   2. NEMA configurations specified are according to NEMA WD 6.

C. Convenience Receptacles:

D. GFCI Receptacles:
   1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
      a. Provide test and reset buttons of same color as device.
   2. Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.

2.06 WALL PLATES

A. Manufacturers:
   1. Hubbell Incorporated: www.hubbell-wiring.com.
   2. Leviton Manufacturing Company, Inc: www.leviton.com.
   3. Lutron Electronics Company, Inc; _____: www.lutron.com.
   4. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us

B. Wall Plates: Comply with UL 514D.
   1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
   2. Screws: Metal with slotted heads finished to match wall plate finish.

C. Nylon Wall Plates: Smooth finish, high-impact thermoplastic.

D. Weatherproof Covers for Damp Locations: Gasketed, cast aluminum, with self-closing hinged cover and corrosion-resistant screws; listed as suitable for use in wet locations with cover closed.

2.07 FLOOR BOX SERVICE FITTINGS

A. Manufacturers:
   1. Hubbell Incorporated: www.hubbell-wiring.com.
   2. Thomas & Betts Corporation: www.tnb.com.
   3. Wiremold, a brand of Legrand North America, Inc: www.legrand.us

B. Description: Service fittings compatible with floor boxes provided under Section 26 0537 with components, adapters, and trims required for complete installation.

C. Flush Floor Service Fittings:
   1. Dual Service Flush Combination Outlets:
      a. Cover: Rectangular.
      b. Configuration:
         1) Power: One standard convenience duplex receptacle(s) with duplex flap opening(s).
         2) Communications: as per Owners requirments.
   2. Accessories:
      a. Tile Rings: Finish to match covers; configuration as required to accommodate specified covers.
      b. Carpet Flanges: Finish to match covers; configuration as required to accommodate specified covers.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.

C. Verify that wall openings are neatly cut and will be completely covered by wall plates.

D. Verify that final surface finishes are complete, including painting.

E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

F. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

A. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.

B. Coordinate locations of outlet boxes provided under Section 26 0537 as required for installation of wiring devices provided under this section.

C. Install wiring devices in accordance with manufacturer's instructions.

D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

E. Where required, connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.

F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.

G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

H. Install wiring devices plumb and level with mounting yoke held rigidly in place.

I. Install wall switches with OFF position down.

J. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.

K. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.

L. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

3.04 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Perform field inspection, testing, and adjusting in accordance with Section 01 4000.

C. Inspect each wiring device for damage and defects.

D. Operate each wall switch, wall dimmer, and fan speed controller with circuit energized to verify proper operation.

E. Test each receptacle to verify operation and proper polarity.

F. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.

G. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.05 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

3.06 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION