



JOLIET JUNIOR COLLEGE

1901

(Business & Auxiliary Services)
1215 Houbolt Road
Joliet, Illinois 60431-8938

INSTRUCTIONS TO BIDDERS

Sealed proposals are invited for **BUILDING H HVAC UNIT REPLACEMENT** pursuant to specifications.

PROPOSALS:

Proposals will be received and publicly read aloud by the Joliet Junior College District #525, Joliet, Will County, Illinois, at the place, date and time hereinafter designated. You are invited to be present if you so desire.

PLACE: Joliet Junior College District #525
Office of Facility Services
L-BUILDING Room #L1005
1215 Houbolt Road
Joliet, IL 60431-8938

DATE: **MARCH 19, 2024**

FAXES ARE NOT ACCEPTABLE

TIME: **9:00 AM**

Proposals received after this time will not be accepted.

Proposals must be made in accordance with the instructions contained herein. They shall be submitted on the forms provided on the College's website in a sealed envelope addressed to the Director of Business & Auxiliary Services, L-Building Room L1005, plainly marked, with the Bidder's Name and Address and the notation:

BID: **BUILDING H HVAC UNIT REPLACEMENT**

PRE-BID MEETING:

An optional pre-bid meeting will be held on **MARCH 5, 2024 at 9:00 AM**. The meeting will be at the Main Campus, L Building, Room L1005, 1215 Houbolt Road, Joliet, IL.

DELIVERY:

All prices must be quoted F.O.B., Joliet Junior College, 1215 Houbolt Road, Joliet, IL 60431 unless otherwise noted.

TAX EXEMPTION:

Joliet Junior College District #525 is exempt from Federal, State, and Municipal taxes.

SIGNATURE ON BIDS:

Joliet Junior College District #525 requires the signature on bid documents to be that of an authorized representative of said company.

Each bidder, by making his bid, represents that he has read and understands the bidding documents and that these instructions to bidders are a part of the specifications.

BIDDING PROCEDURES:

1. No bid shall be modified, withdrawn, or cancelled for sixty (60) days after the bid opening date without the consent of the College Board of Trustees.
2. Changes or corrections may be made in the bid documents after they have been issued and before bids are received. In such case, a written addendum describing the change or correction will be issued by the College to all bidders of record. Such addendum shall take precedence over that portion of the documents concerned, and shall become part of the bid documents. Except in unusual cases, addendum will be issued to reach the bidders at least five (5) days prior to date established for receipt of bids.
3. Each bidder shall carefully examine all bid documents and all addenda thereto, and shall thoroughly familiarize themselves with the detailed requirements thereof prior to submitting a proposal. Should a bidder find discrepancies or ambiguities in, or omissions from documents, or should they be in doubt as to their meaning, they shall, at once, and in any event, not later than ten (10) days prior to bid due date, notify the College who will, if necessary, send written addendum to all bidders. The college will not be responsible for any oral instructions. All inquiries shall be directed to the Director of Business & Auxiliary Services. After bids are received, no allowance will be made for oversight by bidder.

SUBSTITUTIONS:

1. Each bidder represents that his bid is based upon the materials and equipment described in the bidding documents.
2. Any dealer bidding an equal product must specify brand name, model number, and supply specifications of product. The Board shall be the sole judge of whether an article shall be deemed to be equal.
3. A bidder's failure to meet the minimum specifications as listed may result in disqualification of his bid.

REJECTION OF BIDS:

The bidder acknowledges the right of the College Board to reject any or all proposals and to waive informality or irregularity in any proposal received and to award each item to different bidders or all items to a single bidder. In addition, the bidder recognizes the right of the College Board to reject a proposal if the proposal is in any way incomplete or irregular. The College Board may also award, at its discretion, only certain items quoted on. The College Board also reserves the right to reject the proposal of a Bidder who has previously failed to perform properly or complete on time contracts of a similar nature or a bid of a Bidder when investigation shows that Bidder is not in a position to perform the contract.

BUSINESS ENTERPRISE PROGRAM (BEP):**MINORITIES, FEMALES, AND PERSONS WITH DISABILITIES PARTICIPATION AND UTILIZATION PLAN:**

Joliet Junior College will make every effort to use local business firms and contract with small, minority-owned, and/or women-owned businesses in the procurement process. This solicitation contains a 20% goal to include businesses owned and controlled by minorities, females, and persons with disabilities in the College's procurement and contracting processes in accordance with the State of Illinois' Business Enterprise for Minorities, Females, and Persons with Disabilities Act (30 ILCS 575).

Because these goals vary by business ownership status and category of procurement, we urge interested businesses to visit the Commission on Equity & Inclusion (CEI), [Business Enterprise Program \(BEP\)](#) web site to obtain complete requirements and additional details. BEP certified firms and firms utilizing subcontractors for the project shall submit a [utilization plan](#) that meets or exceeds the college's goal.

For all construction related projects, the all companies must submit a utilization plan.

If a vendor cannot meet the goal, documentation and explanation of good faith efforts to meet the specified goal is required within the utilization plan.

PROPRIETARY INFORMATION:

Vendor should be aware that the contents of all submitted bids are subject to public review and will be subject to the Illinois Freedom of Information Act. All information submitted with your bid will be considered public information unless vendor identifies all proprietary information in the proposal by clearly marking on the top of each page so considered, "Proprietary Information." The Illinois Attorney General shall make a final determination of what constitutes proprietary information or trade secrets. While JJC will endeavor to maintain all submitted information deemed proprietary within JJC, JJC will not be liable for the release of such information.

ACKNOWLEDGEMENT OF ADDENDA:

Signature of company official on original document shall be construed as acknowledgement of receipt of any and all addenda pertaining to this specific proposal. Identification by number of addenda and date issued should be noted on all proposals submitted.

FAILURE TO ACKNOWLEDGE RECEIPT OF ADDENDA ON PROPOSAL SUBMITTED MAY RESULT IN DISQUALIFICATION OF PROPOSAL.

Bidders who obtain a copy of the bid from our web site are responsible for checking back on the site for any addenda issued.

CLERICAL ERRORS:

If applicable, all errors in price extensions will be corrected by Joliet Junior College and totals for award determination corrected accordingly, unless the bidder specifies that no change be made in the total submitted. In this case, all incorrect price extensions will be noted at "lot", and award determination made on the basis of total price submitted.

SAMPLES:

Bidder may be required to furnish samples upon request and without charge to the College.

BID SECURITY:

A certified check or bank draft or bid bond, made payable to Joliet Junior College District #525, Will County, Illinois, **MUST** be submitted with the bid in the amount of **ten (10) percent of your total bid**. The bid security will be forfeited by the successful bidder in the event of the bidders failure to enter into a contract. Checks or drafts of unsuccessful bidders will be returned as soon as practicable after opening and checking the bids.

PAYMENTS:

Certified Payroll

1. With each pay application, contractors shall submit certified payroll in a format acceptable to Junior College District #525.

Partial Lien Waivers

1. The contractors' partial lien waiver, for the full amount of the payment, shall accompany the first payment application. Each subsequent payment application shall be accompanied by the contractor's partial waiver, and by partial waivers from all subcontractors and suppliers who were included in the immediately preceding payment application, to the extent of that payment.
2. Lien waivers from the Contractor and all subcontractors and suppliers shall accompany the first payment application when the amount of payment exceeds 50 percent of the total contract sum.

Final Lien Waivers: The contractor's request for final payment shall include:

1. The contractor's final lien waiver in the full amount of the contract.
2. Final lien waivers in the full amount of their contracts from all subcontractors and suppliers for which final lien waivers have not previously been submitted.

INSURANCE:

The successful bidder will be required to furnish a certificate of insurance in the following amounts:

The insurance coverage required here-in-under shall be the minimum amounts maintained by the Contractor and Subcontractors until all Work is completed and accepted by the Owner.

The Contractor will purchase and maintain "all risks" Builder's Risk property insurance, where applicable, subject only to such exclusions as have been specifically approved by the Owner in writing.

A. Workers Compensation

1. State: Statutory
2. Applicable Federal: Statutory
3. Employer's Liability:
 - a. \$1,000,000 per Accident
 - b. \$1,000,000 Occupational Disease

B. Commercial Comprehensive Liability

1. Each Occurrence: \$1,000,000

2. Products/Completed Operations Aggregate: \$2,000,000
3. Personal/Advertising Injury: \$1,000,000
4. General Aggregate: \$2,000,000
5. Policy shall include: \$2,000,000
 - a. Premises: Operations
 - b. Independent Contractors Liability
 - c. Products and Completed Operations: Maintained for minimum of one year after date of final Certificate for Payment, in full amount of the limits specified above.
 - d. Contractual Liability
 - e. Coverage for explosion (x), collapse (c), and underground (u).
6. The Commercial Comprehensive Liability policy shall include a contractual liability endorsement insuring the indemnity required by the contract. The indemnities shall be named as additional insured on the Contractor's Commercial Comprehensive Liability policy using Form CG 20 10 or its equivalent and shall name Joliet Junior College, its Board of Trustees, officers, employees and agents as additional named insured's at a minimum. The Contractor hereby agrees to effectuate the naming of such additional insured's as unrestricted additional insured's on the Contractor's policy. The additional insured endorsement shall provide the following:
 - a. That the coverage afforded the additional insurance will be primary/non-contributory insurance for the additional insurance with respect to claims arising out of operations performed by or on behalf of the Contractor.
 - b. That the policy shall contain a thirty (30) day notice of cancellation prior to the effective date thereof.
 - c. That the additional insureds have other insurance which is applicable to the loss, such other insurance will be on an excess or contingent basis.
 - d. That the amount of the company's liability under the insurance policy will not be reduced by the existence of such other insurance.
 - e. That the additional insureds will not be given less than thirty (30) days prior written notice of any cancellation thereof.
 - f. That the Contractor agrees to indemnify the College for any applicable deductibles.
 - g. That the insurance policy from an A.M. Best rated "secured" Illinois State licensed insurer.
 - h. The Contractor shall provide the College with a copy of its insurance policy or in the alternative and subject to the College's agreement, an excerpt of a page from the actual policy evidencing the additional insureds as provided for herein.
 - i. Contractor acknowledges that failure to obtain such insurance on behalf of the College constitutes a material breach of the contract and subjects Contractor to liability for damages, indemnification and all other legal remedies available to College. The Contractor is to provide the College at all times with a certificate of insurance, evidencing the above requirements have been met. The failure of the College to object to the contents of the certificate or the absence of it shall not be deemed a waiver of any and all rights held by the College.
 - j. That enclosed is a copy of the endorsement providing additional insured's status and that the Contractor will furnish a Certificate of insurance evidencing the foregoing provisions.
 - k. Please include clause below in the policy:

It is agreed that Joliet Junior College, its Board of Trustees, officers, employees, agents and (Architect/Engineer Name) are additional insureds on the policy.

C. Business Auto Liability (including owned, non-owned and hired vehicles).

1. Bodily injury
 - a. \$1,000,000 per person
 - b. \$2,000,000 per accident
2. Property damage: \$1,000,000 OR
3. Combined Single limit: \$1,000,000

D. Umbrella

1. Umbrella Excess Liability: \$4,000,000
2. If the Contractor's Workers Compensation, Commercial General Liability and Business Auto policies do not have these minimum limits, an Umbrella policy written by an insurance company acceptable to the Owner may be used to meet the minimum limits required.
3. Follow-form or Primary/Non-Contributory (PNC) status and Waiver of Subrogation (WOS) for Joliet Junior College

All such policies of insurance shall be written by companies approved by the College and Certificates of Insurance shall be furnished to the College. The College shall be listed as an additional named insured under such policies. Each policy shall require at least 30 days' notice to the College in the event of cancellation. The contractor agrees to indemnify, defend, and hold harmless the College from and against all suits or claims, which may be based upon any injury to or death of any person or persons or damage to property, which may occur or which may be alleged to have occurred in the course of the performance of this Agreement by the Contractor, whether such sum claim shall be made by an employee of the Contractor, by a third person or their representatives, or whether or not it shall be claimed that the said injury, death, or damage or cause through a negligence act or omission of the Contractor; and the all charges of attorneys and all costs and other expenses arising there from or incurred in connection therewith; and if any judgment shall be rendered against the College in any such action or actions, the Contractor, at its own expense, shall satisfy and discharge the same.

PERFORMANCE BONDS:

The successful bidder on this proposal must furnish a performance bond and a labor and material payment bond made out to Junior College District #525, prepared on an approved form, as security for the faithful performance of their contract, within ten (10) days of their notification that their bid has been accepted. The surety thereon must be such surety company or companies as are authorized and licensed to transact business in the State of Illinois and have an A-XIV best rating. Attorneys in fact who sign bid bonds must file with each bond a certified copy of their power of attorney to sign said bonds. The performance bond is an amount equal to one hundred and ten percent (110%) of the contract sum. Such bonds shall be in force from the date of signing of the contract until one year after issuing of final certificate of payment. The cost of the bonds shall be included in the bidder's proposal.

LAWS AND ORDINANCES:

In execution of the work, the Contractor shall comply with applicable state and local laws, ordinances and regulation, the rules and regulations of the Board of Fire Underwriters, and OSHA standards.

SEX OFFENDER REGISTRATION REQUIREMENT NOTIFICATION:

Illinois Compiled Statutes (730 ILCS 150/2) requires that any person who is required by law to register as a sex offender and who is either a student or an employee at an institution of higher education, must also register with the police department of the institution they are employed by or attending. For purposes of this act, a student or employee is defined as anyone working at or attending the institution for a period of five (5) days or an aggregate period of more than thirty (30) days during a calendar year. This includes persons operating as or employed by an outside contractor at the institution. Anyone meeting the above requirements is required to register at the Campus Police Department located in G1013, within five (5) days of enrolling or becoming employed. Persons failing to register are subject to criminal prosecution.

DAMAGE AND NEGLIGENCE:

The Contractor agrees to indemnify and save harmless the College and employees from and against all loss, including costs and attorney's fees, by reasons or liability imposed by law upon the College for damages because of bodily injury, including death at any time resulting therefrom, sustained by any person or persons or on account of damage to property including loss of use thereof as provided in the General Conditions and Supplementary Conditions.

College shall not be responsible for damages, delays, or failure to perform on its part resulting from acts or occurrences of force majeure. "Force majeure" means any (a) act of God, landslide, lightning, earthquake, hurricane, tornado, blizzard, floods and other adverse and inclement weather conditions; (b) fire, explosion, flood, acts of a public enemy, war, blockade, insurrection, riot or civil disturbance; (c) labor dispute, strike, work slow down, picketing, primary boycotts, secondary boycotts or boycotts of any kind and nature, or work stoppages; (d) any law, order, regulation ordinance, or requirement of any government or legal body or any representative of any such government or legal body; (e) inability to secure necessary materials, equipment, parts or other components of the project as a result of transportation difficulties, fuel or energy shortages, or acts or omission of any common carriers; or (f) any other similar cause or similar event beyond the reasonable control of College.

INVESTIGATION OF BIDDERS:

The College will make any necessary investigation to determine the ability of the bidder to fulfill the proposal requirements. Joliet Junior College reserves the right to reject any proposal if it is determined that the bidder is not properly qualified to carry out the obligation of the contract.

DISCLOSURE:

Vendor shall note any and all relationships that might be a conflict of interest and include such information with the bid.

APPRENTICESHIP AND TRAINING PROGRAMS:

The bidder and all bidder's subcontractors must participate in applicable apprenticeship and training programs approved by and registered with the United States Department of Labor Bureau of Apprenticeship and Training. The apprenticeship and training programs(s) must be in the same trade in which the firm shall be performing work on behalf of the College under the Contract. This provision shall not apply to federally funded construction projects if, in the opinion of College, such application would jeopardize the receipt or use of federal funds in support of such project.

A STATEMENT TO THE ABOVE EFFECT HAS BEEN ADDED TO THE BID FORM. BIDDERS MUST BE A MEMBER OF AN APPROVED APPRENTICESHIP PROGRAM PRIOR TO BID OPENING ON THE PROJECT. FAILURE TO LIST REQUIRED INFORMATION MAY RESULT IN DISQUALIFICATION OF BID”.

SUBCONTRACTORS:

Bidders must state on the proposal form all subcontractors he intends to use for this project. Failure to do so may be cause for rejection of bid.

PREVAILING WAGE RATE:

The successful bidder must pay not less than the prevailing hourly wage rate determined by the Illinois Department of Labor for the county where the contract is executed and the craft or type of worker needed to execute the contract. See the prevailing wage scale attached.

If, during the course of work under this contract, the Department of Labor revises the prevailing rate hourly wages to be paid under this contract for any trade or occupation, Owner, will notify Contractor and each Subcontractor of the changes in the prevailing rate of hourly wages. Contractor shall have the sole responsibility and duty to ensure that the revised prevailing rate of hourly wages is paid by contractor and all Subcontractors to each worker to whom a revised rate is applicable. Revisions to the prevailing wage as set forth above shall not result in an increase in the Contract Sum.

In compliance with the Office of the Attorney General the following is also required of all bidders:

Payment of Prevailing Wage:

- The Act requires that all laborers, workers and mechanics employed by or on behalf of a public body in the construction of public works be paid the general prevailing rate of hourly wages (including allotments for training and approved apprenticeship programs, health and welfare, insurance, vacation and pension benefits) for work of a similar character in the locality in which the work is performed. See 820 ILCS 103/3. The Act contains all relevant definitions, including those for the terms “public body”, “public works” and “general prevailing rate of hourly wages”, which will assist you in the understanding its requirements and your responsibilities. See 820 ILCS 130/2.
- The Illinois Department of Labor publishes the current prevailing wage rate. See <http://www.state.il.us/agency/idol/rates/rates.htm>. The rate is revised regularly and such revision takes effect immediately.

Specifications and Contractual Language:

- Public bodies must insert a provision or stipulation requiring the payment of the prevailing wage rate into every public works resolution or ordinance, call for bids, project specification and contract. See 820 ILCS 130/4(a).
- Contractors and subcontractors must insert a provision or stipulation regarding the payment of the prevailing wage rate into every public works project and bid specification, subcontract, and contractor’s bond. See 820 ILCS 130/4(b), (c).
- Contractors or construction managers who have been awarded public works contracts must post the relevant prevailing wage rate(s) at a location on the project site that is easily accessible by workers. See 820 ILCS 130/4(f).

Record-Keeping Responsibilities:

- All contractors and subcontractors must create and keep for at least three years, records of all laborers, mechanics, and other workers employed by them on a public works project. See 820

ILCS 130/5(a) (1).

- These records must include each worker's name, address, telephone number (if available), social security number, classification(s), hourly wages paid in each pay period, number of hours worked each day, and the starting and ending times of each work day. Each contractor and subcontractor is required to make these records available for inspection by the public body's agents or Illinois Department of Labor officials at a reasonable time and place upon seven business days notice. See 820 ILCS 130/5(a) (1), (b).

Certified Payroll Records:

- A contractor or subcontractor participating in a public works project must also submit a Certified Payroll the public body every month. This Certified Payroll must consist of a complete copy of the records required to be kept under Section 5(a)(1) of the Act, discussed above (with the exception of daily work starting and ending times). See 820 ILCS 130/5(a)(2).
- The monthly Certified Payroll shall also include a statement signed by the contractor or subcontractor submitting that: (1) the records are true and accurate; (2) the hourly rate paid to each worker is not less than the general prevailing wage rate required; and (3) the contractor or subcontractor is aware that filing a Certified Payroll that he or she knows to be false is a class B misdemeanor. See 820 ILCS 130/5(a)(2).
- The Act requires that a public body shall keep all Certified Payrolls submitted pursuant to the Act for at least three years. See 820 ILCS 130/5(a)(2). The retention of these monthly Certified Payroll submissions for three years by public bodies is crucial to the State of Illinois' efforts to enforce the Act and will be of particular interest to the Attorney General's office in the coming months.

Failure to comply with the Act's Requirements:

- No public works project may be instituted unless the provisions of the Act have been met. The Illinois Department of Labor is empowered to sue for injunctive relief against the awarding of any public works contract, or continuation of work under any such contract, if it is not in compliance with the Act's prerequisites. Contracts that are not in compliance with the Act's prerequisites are void as against public policy. See 820 ILCS 103/11.

Please note that this is not a complete list of all relevant requirements and prerequisites under the Act. All contractors and subcontractors rendering services under this contract must comply with all requirements of the Act, including but not limited to, all wage, notice and record keeping duties. For a full understanding of all of the Act's requirements and prerequisites, as well as the text of the Act and all related regulations, please see the Illinois Department of Labor's website at www.state.il.us/agency/idol/laws/Law130.htm.

BLACKOUT PERIOD:

After the College has advertised for bids, no pre-bid vendor shall contact any College officer(s) or employee(s) involved in the solicitation process, except for interpretation of bid specifications, clarification of bid submission requirements or any information pertaining to pre-bid conferences. Such bidders or sub-bidders making such request shall be made in writing at least seven (7) days prior to the date for receipt of bids. No vendor shall visit or contact any College officers or employees until after the bids are awarded, except in those instances when site inspection is a prerequisite for the submission of a bid. During the black-out period, any such visitation, solicitation or sales call by any representative of a prospective vendor in violation of this provision may cause the disqualification of such bidder's response.

BID QUANTITIES:

The College Board will reserve the right to increase or decrease, within reasonable limits, such quantities as need requires and at the unit price stated.

BID AWARDS:

The successful contractor, and/or any contractor shall not proceed on this bid until it receives a purchase order from the college. Failure to comply is the risk of that contractor.

TERMINATION OF FUNDING:

JJC's contractual obligations will be subject to termination and cancellation without penalty, accelerated payment, or other recoupment mechanism as provided herein in any fiscal year for which the Illinois General Assembly or other legally applicable funding source fails to make an appropriation to make payments under the terms of this Contract. In the event of termination for lack of appropriation, the Vendor shall be paid for services performed under this Contract up to the effective date of termination. JJC shall give notice of such termination for funding as soon as practicable after JJC becomes aware of the failure of funding.

CHANGES TO CONTRACT AFTER BID AWARD:

There shall be no deviations from any work without a written change order. All change orders must be approved by the Director of Business & Auxiliary Services or Vice President of Administrative Services as well as executed by the successful contractor.

If a change order or aggregate of change orders are 10% or more of the contract price, and such change orders are not approved, in writing, by either the Director of Business & Auxiliary Services or Vice President of Administrative Services, the successful contractor shall not be entitled to any type of compensation for services or materials provided.

GENERAL:

Joliet Junior College is committed to a policy of non-discrimination on the basis of sex, handicap, race, color, and national or ethnic origin in the admission, employment, educational programs, and activities it operates. Inquiries should be addressed to the Director of Human Resources.

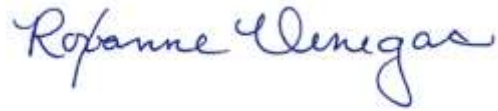
The contractor (or vendor) shall agree to save and hold harmless the Joliet Junior College District #525, the members of its College Board, its agents, servants and employees, from any and all actions or causes of action, or claim for damages, including the expense of defending suit, arising or growing out of the performance of, or failure to perform its contract.

The parties to any contract (inclusive of subcontractors) resulting from this bid hereto shall abide by the requirements of Executive Order 11246, 42 U.S.C. Section 2000d and the regulations thereto, as may be amended from time to time, the Illinois Human Rights Act, and the Rules and Regulations of the Illinois Department of Human Rights. Any vendor awarded a contract as a result of this bid must comply with the Illinois Department of Human Rights Equal Opportunity Act/Rules Sections 750.5 and 5/2-105.

Pursuant to Section 50-80 of the Illinois Procurement Code, each bidder who submits a bid or offer for a State of Illinois contract under this Code shall have a sexual harassment policy in accordance with paragraph (4) of subsection (A) of Section 2-105 of the Illinois Human Rights Act. A copy of the policy shall be provided to the college entering into the contract upon request.

B24015

The Customer reserves the right to request additional information after your proposal has been submitted.



Roxanne Venegas
Purchasing Manager

JOLIET JUNIOR COLLEGE
ILLINOIS COMMUNITY COLLEGE DISTRICT #525
(Business & Auxiliary Services)
1215 Houbolt Road
Joliet, Illinois 60431-8938
Telephone: (815) 280-6640
Fax: (815) 280-6631

INFORMATION PERTAINING TO OUR BIDS CAN BE FOUND AT THE FOLLOWING WEBSITE:
<http://www.jjc.edu/community/vendors>

QUESTIONS PERTAINING TO OUR BIDS CAN BE EMAILED TO:
purchasing@jjc.edu

**PROJECT MANUAL
FOR**

**BUILDING 'H' – HVAC UNIT REPLACEMENT
JOLIET, ILLINOIS**

OWNER

JOLIET JUNIOR COLLEGE
1215 HOUBOLT ROAD
JOLIET, ILLINOIS 60431

ARCHITECT / ENGINEER

KLUBER, INC.
41 WEST BENTON STREET
AURORA, ILLINOIS 60506



BID DOCUMENTS

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PROJECT TITLE PAGE**

PROJECT MANUAL

FOR

**JOLIET JUNIOR COLLEGE - BUILDING 'H' - HVAC UNIT REPLACEMENT
1215 HOUBOLT RD
JOLIET, IL 60431**

OWNER

**JOLIET JUNIOR COLLEGE
1215 HOUBOLT RD
JOLIET, IL 60431**

ARCHITECT / ENGINEER

**KLUBER ARCHITECTS + ENGINEERS
41 W. BENTON STREET
AURORA, ILLINOIS 60506**

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M312 ALTERNATE NO. 1: MECHANICAL ENLARGED FLOOR PLANS

M320 ROOF MECHANICAL PLAN

M410 PIPING SCHEMATIC

M411 TEMPERATURE CONTROLS

M610 MECHANICAL SCHEDULES AND DETAILS

ELECTRICAL

E050 ELECTRICAL ABBREVIATIONS, SYMBOLS LIST, SCHEDULES & DETAILS

E300 GROUND FLOOR AND ROOF ELECTRICAL PLANS

E311 ENLARGED ELECTRICAL PLANS

END OF DOCUMENT

SECTION 01 30 00 ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Submittals for review, information, and project closeout.
- B. Architect/Engineer-provided CAD files.
- C. Submittal procedures.

1.02 RELATED REQUIREMENTS

- A. Section 01 70 00 - Execution and Closeout Requirements: Additional coordination requirements.
- B. Section 01 78 00 - Closeout Submittals: Project record documents; operation and maintenance data; warranties and bonds.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 SUBMITTALS FOR REVIEW

- A. When the following are specified in individual sections, submit them for review:
 - 1. Product data.
 - 2. Shop drawings.
- B. Submit to Architect/Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.

3.02 SUBMITTALS FOR INFORMATION

- A. When the following are specified in individual sections, submit them for information:
 - 1. Design data.
 - 2. Certificates.
 - 3. Test reports.
 - 4. Inspection reports.
 - 5. Manufacturer's instructions.
 - 6. Manufacturer's field reports.
 - 7. Other types indicated.
- B. Submit for Architect/Engineer's knowledge as contract administrator or for Owner.

3.03 SUBMITTALS FOR PROJECT CLOSEOUT

- A. Submit Correction Punch List for Substantial Completion.
- B. Submit Final Correction Punch List for Substantial Completion.
- C. When the following are specified in individual sections, submit them at Project Closeout:
 - 1. Project record documents.
 - 2. Operation and maintenance data.
 - 3. Warranties.

4. Bonds.
5. Other types as indicated.

D. Submit for Owner's benefit during and after Project completion.

3.04 ARCHITECT/ENGINEER-PROVIDED CAD FILES

- A. After the execution of the Contract, Architect/Engineer will provide, free of charge, upon receipt of a properly completed and signed request utilizing "Electronic Data Transfer Consent Form" at the end of this Specification Section, CAD files depicting graphic information for the project as follows:
 1. Architectural Floor Plans: Column grid, walls, floors, stairs, doors, windows, room numbers, ceiling grid, mechanical diffusers, plumbing fixtures, sprinkler heads (if depicted in Bid Documents) and lights.
- B. Contractor acknowledges and accepts that the Architectural Floor Plans do not contain structural, mechanical, electrical, plumbing, fire protection and other building systems information depicted in the Bidding Documents. Examples of information not contained in these files include, but are not limited to, title blocks, keynotes, schedules, mechanical ductwork and equipment, electrical device symbols, circuit numbers and home runs, plumbing equipment, piping runs and riser diagrams, and architectural/engineering text or details. No other CAD files, data or information will be provided.
- C. Only a request from The Contractor will be honored. Subcontractors must obtain the files from the Contractor.
- D. In submitting a request, Contractor acknowledges that:
 1. Architect/Engineer bears no responsibility for the data or its transmission,
 2. Use of the data by the Contractor or his Subcontractors in no way relieves the Contractor of his obligations under the Contract,
 3. Contractor is solely liable for any and all claims arising from any and all products generated by the Contractor or its Subcontractors employing the data,
 4. Contractor and its Subcontractors have a limited, non-exclusive license to use the data solely in connection with the Work of the Project.
 5. Architect/Engineer retains all rights, including copyright, to the data.

3.05 NUMBER OF COPIES OF SUBMITTALS

- A. Documents for Review:
 1. Small Size Sheets: Not Larger Than 11 x 17 inches. Submit 2 paper copies, one of which will be retained by Architect/Engineer. Contractor shall make his own copies from the original returned by the Architect.
 - a. Contractor's Option: In lieu of paper copies indicated above, submit in Adobe PDF electronic file format via email. Architect will return a reviewed copy in Adobe PDF electronic file format via email. Create PDFs at native size and right-side up; illegible files will be rejected.
 2. Large Size Sheets: Larger Than 11 x17 inches; 36 x 48 inches maximum. Submit 2 paper copies, one of which will be retained by Architect/Engineer.
 - a. Contractor's Option: In lieu of paper copies indicated above, submit in Adobe PDF electronic file format via email. Architect will return a reviewed copy in Adobe PDF electronic file format via email. Create PDFs at native size and right-side up; illegible files will be rejected.

- B. Documents for Information: Submit one copy.
- C. Extra Copies at Project Closeout: See Section 01 78 00.

3.06 SUBMITTAL PROCEDURES

- A. Product Data Procedures:
 - 1. Submit only information required by individual specification sections.
 - 2. Collect required information into a single submittal.
 - 3. Do not submit (Material) Safety Data Sheets for materials or products.
- B. Shop Drawing Procedures:
 - 1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting the Contract Documents and coordinating related Work.
 - 2. Generic, non-project specific information submitted as shop drawings do not meet the requirements for shop drawings.
- C. Transmit each Submittal with a copy of approved Submittal form.
- D. Transmit each Submittal with AIA Form G810.
- E. Sequentially number the transmittal form. Revise Submittals with original number and a sequential alphabetic suffix.
- F. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.
- G. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.
- H. Deliver Submittals to Architect/Engineer at business address.
- I. Schedule Submittals to expedite the Project, and coordinate submission of related items.
- J. For each Submittal for review, allow 20 days excluding delivery time to and from the Contractor.
- K. Clearly identify variations from the Contract Documents. Regardless of the type of variation, Contractor is solely responsible for errors in the field that arise from Submittal variations from the requirements of the Contract Documents if those variations were not expressly noted to specifically identify for and describe to the reviewer the nature of the variation from the Contract Documents.
- L. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work.
- M. Correlate submitted items with specified products; clearly indicate the specified product that corresponds to each submitted item.
- N. When options or optional features available for a Product are indicated in a Submittal, and selections for those options/features are indicated in the Contract Documents, identify on the Submittal the selection indicated in the Contract Documents.
- O. Provide space for Contractor and Architect/Engineer review stamps.

- P. When revised for resubmission, using clouds, highlights or other means acceptable to the Architect, identify all changes made since previous submission. Resubmittals that do not clearly identify all changes may be delayed and/or returned to the Contractor unrevised.
- Q. The Contractor is entitled to 1 Resubmittal of any Shop Drawing, Product Data, or Closeout Submittal item rejected by the Architect or returned by the Architect for further action. Thereafter, the Contractor shall pay the cost of all further Architect's reviews of Shop Drawing, Product Data or Closeout Submittal, at a rate of \$200.00/hour. Cost of such further reviews will be deducted from the Contract Sum by Change Order.
- R. Distribute reviewed Submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.
- S. Submittals not requested will not be recognized or processed.
- T. Submittal reviews may be delayed and/or Submittals may be returned unrevised for any of the following reasons:
 - 1. Submittals submitted outside the scheduled dates of the Submittal Schedule.
 - 2. Submittals are incomplete or are missing information.
 - 3. Submittals are not submitted in accordance with procedures outlined in this Section (i.e. spec Section number not indicated, missing Contractor's review stamp, submitted items not correlated with specified products).

END OF SECTION

ELECTRONIC DATA TRANSFER CONSENT FORM

Project Name: BUILDING 'H' – HVAC UNIT REPLACEMENT
1215 HOUBOLT ROAD
JOLIET, ILLINOIS 60431

Project No.: 23-292-1509

Owner: JOLIET JUNIOR COLLEGE

Your Work: _____

KLUBER, INC. (hereinafter referred to as "Kluber") an Illinois corporation, is providing electronic data to you solely at your request and for your convenience. By accepting and opening any of the electronic data files, you agree that Kluber bears no liability for the data or its transmission to you and that you are solely liable for any and all claims referring or relating to any and all products you, or your Subcontractors, may generate with the data.

You acknowledge that you have a limited non-exclusive license to use the information solely in connection with your work on the project captioned above, and that Kluber retains all rights, including copyright, to the data.

Acknowledged by: _____ (Printed Name) _____ (Signature)

Company: _____

Date: _____ Email: _____

Architectural Floor Plans are transmitted for the contractors' use as backgrounds for shop drawings and as-built drawings, and, as such, contain graphic information for column grid, walls, floors, stairs, doors, windows, room numbers, ceiling grid, lights, diffusers and sprinkler heads where indicated on Bid Documents. Plans do not contain title blocks, keynotes, schedules, mechanical ductwork and equipment, electrical device symbols, circuit numbers and home runs, plumbing equipment, piping runs and riser diagrams, and architectural/engineering text and details. Plans depict entire floors and are not formatted, partial plans as depicted in the Bidding Documents. Files are provided in R2013 .DWG format.)

SECTION 01 41 00 REGULATORY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General.
- B. Definitions.
- C. Quality Assurance.
- D. Regulatory Requirements.

1.02 RELATED SECTIONS

- A. Section 01 42 00 - References.

1.03 GENERAL

- A. Comply with all applicable laws, rules, regulations, codes and ordinances.
- B. If the Contractor observes that the Contract Documents may be at variance with specified codes, notify the Architect/Engineer immediately. Architect/Engineer shall issue all changes in accordance with the General Conditions.
- C. It shall not be the Contractor's primary responsibility to make certain that the Contract Documents are in accordance with all applicable laws, rules and regulations, however, when the Contractor performs work knowing or having reason to know that the work in question is contrary to applicable laws, rules, and regulations, and fails to notify the Architect/Engineer, the Contractor shall pay all costs arising therefrom.

1.04 DEFINITIONS

- A. Definitions:
 - 1. Codes: Codes are statutory requirements, rules or regulations of governmental entities.
 - 2. Standards: Standards are requirements that have been established as accepted criteria, set general consent.

1.05 QUALITY ASSURANCE

- A. The Architect/Engineer has designed the project to applicable code requirements and has copies of said codes available for the Contractor's inspection.
- B. The Contractor shall:
 - 1. Ensure that copies of codes and standards referenced herein or specified in individual specifications sections are available to Contractor's personnel, agents, and Sub-Contractors.
 - 2. Ensure that Contractor's personnel, agents, and Sub-Contractors are familiar with the workmanship and requirements of applicable codes and standards.

1.06 REGULATORY REQUIREMENTS

- A. Source and Requirements: Verify amendments with local code officials.
 - 1. Illinois Community College Board code requirements:
 - a. ICC International Building Code, 2018 Edition.

- b. ICC International Mechanical Code, 2018 Edition.
- c. National Electrical Code, 2020 Edition.
- d. NFPA No. 101 - Life Safety Code, 2018 Edition.
- 2. State code requirements:
 - a. Illinois Department of Public Health (IDPH):
 - 1) Illinois Plumbing Code (Illinois Administrative Code, Title 77, Chapter I, Subchapter r, Part 890).
 - b. Illinois Environmental Protection Agency (IEPA):
 - 1) Air-Pollution Standards.
 - 2) Noise Pollution Standards.
 - 3) Water Pollution Standards.
 - 4) Public Water Supplies
 - 5) Solid Waste Standards.
 - c. Illinois State Fire Marshal (OSFM):
 - 1) Boiler & Pressure Vessel Safety Code (Illinois Administrative Code, Title 44, Chapter I, Part 120).
 - 2) Illinois Rules & Regulations for Fire Prevention & Safety (Illinois Administrative Code 100).
- 3. Information and Requirements for Utility Services: Local utility companies.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 42 00 REFERENCES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Drawing symbols, abbreviations and acronyms.
- B. Definitions of terms used throughout the Contract Documents.
- C. Explanation of specification format and content.
- D. Requirements relating to referenced standards.
- E. Applicability of referenced standards.
- F. List of industry organizations and certain of their respective documents.

1.02 DRAWING SYMBOLS AND CONVENTIONS

- A. Abbreviations and graphic symbols are defined on the General Notes, Symbols & Abbreviations sheet of the drawings.
- B. Generally, symbols used on the mechanical and electrical drawings conform to those recommended by ASHRAE, though, where appropriate, these symbols are supplemented by more specific symbols as recommended by ASME, ASPE, or the IEEE.

1.03 DEFINITIONS

- A. Where the terms "indicated", "noted", "scheduled", "shown", or "specified" are used it is to help locate the reference; no limitation on location is intended except as specifically noted.
- B. Where the terms "directed", "requested", "authorized", "approved", are used as in "directed by the Architect/Engineer", no implied meaning shall be construed to extend the Architect/Engineer's responsibilities into the Contractor's purview of construction supervision.
- C. Where the term "approved" is used in conjunction with the Architect/Engineer's action on submittals, requests or applications it is limited to the duties of the Architect/Engineer as described in the Agreement, and the General and Supplemental Conditions of the Contract. Such use of the term "approval" shall not limit or release the Contractor from his responsibility to fulfill Contract requirements.
- D. Where the term "regulations" is used it means all applicable statutes, laws, ordinances, and orders issued by authorities having jurisdiction, as well as construction industry standards, rules, or conventions that address performance of the Work.
- E. Where the term "furnish" is used it means supply, deliver, and unload to the construction site ready for assembly and incorporation into the Work.
- F. Where the term "install" is used it is meant to describe operations at the job site to include unloading, assembling, placing, anchoring, finishing, protecting, cleaning and all other similar operations required to fully incorporate an item into the Work.
- G. Where the term "provide" is used it means "furnish and install" as defined above.

- H. The "Project Site" is the space available to the Contractor for performance of construction activities. The Project Site may be for the exclusive use of the Contractor and his activities or may be used in conjunction with others with others performing other construction or related activities on the Project. The Extent of the Project Site is indicated on the Drawings.

1.04 SPECIFICATION FORMAT AND CONTENT

- A. These Specifications are based on the Construction Specification Institute's 49 Division format and numbering system.
- B. Language used in the Specifications and other Contract Documents is an abbreviated type. Implied words and meanings will be appropriately interpreted.
- C. Requirements expressed in imperative and streamlined language are to be performed by the Contractor. At certain locations in the text, subjective language may be used to describe responsibilities that must be fulfilled indirectly by the Contractor or others.
1. Whenever a colon (:) is used within a sentence or phrase, it shall be construed to mean the words "shall be".
- D. Use of certain terms such as "carpentry" is not intended to imply that certain activities must be performed by accredited or unionized individuals of a corresponding generic name. The Specifications do, however, require that certain construction activities shall be performed by specialists who are recognized experts in the operations to be performed. Specialists shall be used for said activities, however the final responsibility for fulfilling the requirements of the Contract remains the Contractor's.

1.05 QUALITY ASSURANCE

- A. For products or workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard of date of issue specified in this section, except where a specific date is established by applicable code.
- C. Obtain copies of standards when required by the Contract Documents.
- D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.
- E. Should specified reference standards conflict with Contract Documents, request clarification from the Architect/Engineer before proceeding.
- F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of the Architect/Engineer shall be altered by the Contract Documents by mention or inference otherwise in any reference document.

1.06 APPLICABILITY OF INDUSTRY STANDARDS

- A. Construction industry standards shall have the same force and effect as if bound or copied directly in the Contract Documents, except where more stringent requirements are specified. All such applicable standards are made a part of the Contract Documents by reference.

1. Where compliance with two or more standards are referenced and conflicting requirements for quality or quantities occur, comply with the more stringent requirements. Refer questions regarding apparently conflicting standards to the Architect for a decision before proceeding.
2. The standard of quality or quantity levels specified, shown, or referenced shall be the minimum to be provided or performed. Refer questions regarding standards of minimum quality or quantity to the Architect before proceeding.

1.07 CONSTRUCTION INDUSTRY ORGANIZATIONS AND DOCUMENTS

- A. AA -- ALUMINUM ASSOCIATION, INC.
- B. AABC -- ASSOCIATED AIR BALANCE COUNCIL
- C. ACI -- AMERICAN CONCRETE INSTITUTE INTERNATIONAL
- D. AISC -- AMERICAN INSTITUTE OF STEEL CONSTRUCTION, INC.
- E. ANSI -- AMERICAN NATIONAL STANDARDS INSTITUTE
- F. ARI -- AIR-CONDITIONING AND REFRIGERATION INSTITUTE
- G. ASHRAE -- AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS, INC.
- H. ASME -- THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS
- I. ASTM -- AMERICAN SOCIETY FOR TESTING AND MATERIALS
- J. AWS -- AMERICAN WELDING SOCIETY
- K. CPSC -- CONSUMER PRODUCTS SAFETY COMMISSION
- L. FM -- FACTORY MUTUAL RESEARCH CORPORATION
- M. ICC -- INTERNATIONAL CODE COUNCIL, INC.
- N. IEEE -- INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS
- O. ISO -- INTERNATIONAL STANDARDS ORGANIZATION
- P. MSS -- MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY, INC.
- Q. NAAMM -- THE NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS
- R. NAIMA -- NORTH AMERICAN INSULATION MANUFACTURERS ASSOCIATION
- S. NCMA -- NATIONAL CONCRETE MASONRY ASSOCIATION
- T. NEBB -- NATIONAL ENVIRONMENTAL BALANCING BUREAU
- U. NEMA -- NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
- V. NFPA -- NATIONAL FIRE PROTECTION ASSOCIATION
- W. NRCA -- NATIONAL ROOFING CONTRACTORS ASSOCIATION
- X. SMACNA -- SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION, INC.

- Y. SSPC -- THE SOCIETY FOR PROTECTIVE COATINGS
- Z. SWRI -- SEALANT, WATERPROOFING AND RESTORATION INSTITUTE
- AA. UL -- UNDERWRITERS LABORATORIES INC.
- BB. USG -- UNITED STATES GYPSUM
 - 1. USG (HB) - Gypsum Construction Handbook; Seventh Edition.

1.08 UNITED STATES GOVERNMENT AND RELATED AGENCIES/DOCUMENTS

- A. CFR -- CODE OF FEDERAL REGULATIONS
- B. CPSC -- CONSUMER PRODUCTS SAFETY COMMISSION
- C. EPA -- ENVIRONMENTAL PROTECTION AGENCY
- D. FS -- FEDERAL SPECIFICATIONS AND STANDARDS (General Services Administration)
- E. GSA -- U.S. GENERAL SERVICES ADMINISTRATION

1.09 STATE GOVERNMENT AND RELATED AGENCIES/DOCUMENTS

- A. CDB -- ILLINOIS CAPITAL DEVELOPMENT BOARD
- B. IDOL -- ILLINOIS DEPARTMENT OF LABOR
- C. IDPH -- ILLINOIS DEPARTMENT OF PUBLIC HEALTH
- D. IEPA -- ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
- E. OSFM -- OFFICE OF THE ILLINOIS STATE FIRE MARSHAL.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 60 00 PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General product requirements.
- B. Transportation, handling, storage and protection.
- C. Product option requirements.
- D. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 SUBMITTALS

- A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

PART 2 PRODUCTS

2.01 NEW PRODUCTS

- A. Provide new products unless specifically required or permitted by the Contract Documents.
- B. Designed, manufactured, and tested in accordance with industry standards.

2.02 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.03 MAINTENANCE MATERIALS

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
- B. Deliver to Project site and place in location directed by Owner's representative; obtain Owner's signature on receipt for delivery prior to final payment. Submit signed receipts with Closeout Submittals.

PART 3 EXECUTION

3.01 SUBSTITUTION LIMITATIONS

- A. Substitutions Prior To Bid Opening: Architect/Engineer will consider a written request for substitution provided that such request is received at least seven (7) days prior to the Bid opening date. Requests received after that time will not be considered.
 - 1. If a request is approved, the Architect/Engineer will issue an appropriate addendum prior to the Bid opening date.
- B. Substitutions After Notice of Award: Architect/Engineer will consider a request for substitution only under one or more of the following conditions:
 - 1. Substitution is required for compliance with final interpretation of code requirements or insurance regulations.
 - 2. Specified product is not available through no fault of the Contractor.
 - 3. Specified product is not compatible with other specified materials/equipment.
 - 4. Manufacturer will not certify or warranty specified product as required.
- C. Document each request utilizing Substitution Request Form following this section with complete data substantiating compliance of proposed substitution with Contract Documents. Incomplete requests will not be considered. Submit a separate Substitution Request Form and accompanying documentation for each proposed substitution.
- D. Provide the following minimum documentation with each Substitution Request Form:
 - 1. Product identification, manufacturer, product data including dimensions and weight, performance and installation instructions.
 - 2. Side-by-side itemized comparison of proposed substitution with specified product.
 - 3. Coordination information including other modifications required as a result of proposed substitution.
 - 4. Cost information including the effect of the proposed substitution on the Contract Sum.
- E. Sign and date the Substitution Request Form.
- F. A request for substitution constitutes a representation that the submitter:
 - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
 - 2. Agrees to provide the same warranty for the substitution as for the specified product.
 - 3. Agrees to coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
 - 4. Waives claims for additional costs or time extension that may subsequently become apparent.
 - 5. Agrees to reimburse Owner and Architect/Engineer for review or redesign services associated with re-approval by authorities having jurisdiction over the Project.
- G. Architect/Engineer will notify submitter in writing of decision to accept or reject request.
- H. Substitutions of products or product characteristics/components/options/accessories will not be considered when they are indicated or implied on Contractor's submittals, without separate written request, or when acceptance will require revision to the Contract Documents, whether rejection of said substitutions is expressly identified by Architect/Engineer on Contractor's submittals or not.

3.02 TRANSPORTATION AND HANDLING

- A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.
- B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.
- C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- D. Transport and handle products in accordance with manufacturer's instructions.
- E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.
- H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.03 STORAGE AND PROTECTION

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.
- D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
- E. For exterior storage of fabricated products, place on sloped supports above ground.
- F. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- G. Comply with manufacturer's warranty conditions, if any.
- H. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- I. Prevent contact with material that may cause corrosion, discoloration, or staining.
- J. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- K. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SUBSTITUTION REQUEST FORM

PROJECT: BUILDING 'H' HVAC UNIT REPLACEMENT

SPECIFIED ITEM: _____

Specification Section	Page	Paragraph	Description
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The undersigned requests consideration of the following:

PROPOSED SUBSTITUTION: _____

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

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

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

1. The proposed substitution does not affect dimensions shown on drawings.
2. The undersigned will pay for changes to the building design, including engineering design, detailing, and construction costs caused by the requested substitution.
3. The proposed substitution will have no adverse effect on other trades, the construction schedule, or specified warranty requirements.
4. Maintenance and service parts will be locally available for the proposed substitution.

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

 Printed Name

 Signature

 Date

 Firm

 Telephone

 Email

Attachments (list): _____

For Use By The Architect/Engineer:

☐ Accepted ☐ Accepted As Noted

☐ Not Accepted ☐ Received Too Late

By: _____

Date: _____

Remarks: _____

SECTION 01 70 00 EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Examination, preparation, and general installation procedures.
- B. Cutting and patching.
- C. Cleaning and protection.
- D. Starting of systems and equipment.
- E. Demonstration and instruction of Owner personnel.
- F. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.

1.02 RELATED REQUIREMENTS

- A. Section 01 78 00 - Closeout Submittals: Project record documents, operation and maintenance data, warranties .
- B. Section 01 79 00 - Demonstration and Training: Demonstration of products and systems to be commissioned and where indicated in specific specification sections.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
 - 1. Structural integrity of any element of Project.
 - 2. Integrity of weather exposed or moisture resistant element.
 - 3. Efficiency, maintenance, or safety of any operational element.
 - 4. Visual qualities of sight exposed elements.
 - 5. Work of Owner or separate Contractor.

1.04 PROJECT CONDITIONS

- A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- B. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
 - 1. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Owner.
- C. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
- D. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.
- E. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.

- F. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

1.05 COORDINATION

- A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- B. Notify affected utility companies and comply with their requirements.
- C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- F. Coordinate completion and clean-up of work of separate sections.
- G. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
- E. Verify that utility services are available, of the correct characteristics, and in the correct locations.

- F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

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

3.03 GENERAL INSTALLATION REQUIREMENTS

- A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
- B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.04 ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
 - 1. Verify that construction and utility arrangements are as indicated.
 - 2. Report discrepancies to Architect/Engineer before disturbing existing installation.
 - 3. Beginning of alterations work constitutes acceptance of existing conditions.
- B. Keep areas in which alterations are being conducted separated from other areas that are still occupied.
- C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
 - 1. Where openings in exterior enclosure exist, provide construction to make exterior enclosure weatherproof.
 - 2. Insulate existing ducts or pipes that are exposed to outdoor ambient temperatures by alterations work.
- D. Remove existing work as indicated and as required to accomplish new work.
 - 1. Remove items indicated on Drawings.
 - 2. Relocate items indicated on Drawings.
 - 3. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
 - 4. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.

- E. Services (Including but not limited to HVAC and Electrical): Remove, relocate, and extend existing systems to accommodate new construction.
 - 1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
 - 2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
 - 3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
 - a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
 - b. Provide temporary connections as required to maintain existing systems in service.
 - 4. Verify that abandoned services serve only abandoned facilities.
 - 5. Remove abandoned pipe, ducts, conduits, and equipment; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.
- F. Protect existing work to remain.
 - 1. Prevent movement of structure; provide shoring and bracing if necessary.
 - 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
 - 3. Repair adjacent construction and finishes damaged during removal work.
- G. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
- H. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.
- I. Refinish existing surfaces as indicated:
 - 1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
 - 2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.
- J. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.
- K. Do not begin new construction in alterations areas before demolition is complete.
- L. Comply with all other applicable requirements of this section.

3.05 CUTTING AND PATCHING

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. See Alterations article above for additional requirements.
- C. Perform whatever cutting and patching is necessary to:
 - 1. Complete the work.
 - 2. Fit products together to integrate with other work.

3. Provide openings for penetration of mechanical, electrical, and other services.
 4. Match work that has been cut to adjacent work.
 5. Repair areas adjacent to cuts to required condition.
 6. Repair new work damaged by subsequent work.
 7. Remove samples of installed work for testing when requested.
 8. Remove and replace defective and non-conforming work.
- D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
- E. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- G. Restore work with new products in accordance with requirements of Contract Documents.
- H. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material , to full thickness of the penetrated element.
- J. Patching:
1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
 2. Match color, texture, and appearance.
 3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.06 PROTECTION OF INSTALLED WORK

- A. Protect installed work from damage by construction operations.
- B. Provide special protection where specified in individual specification sections.
- C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- G. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.07 SYSTEM STARTUP

- A. Coordinate schedule for start-up of various equipment and systems.

- B. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.
- C. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- D. Verify that wiring and support components for equipment are complete and tested.
- E. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.
- F. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.08 DEMONSTRATION AND INSTRUCTION

- A. See Section 01 79 00 - Demonstration and Training.

3.09 ADJUSTING

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

3.10 FINAL CLEANING

- A. Execute final cleaning prior to final project assessment.
 - 1. Clean areas to be occupied by Owner prior to final completion before Owner occupancy.
- B. Use cleaning materials that are nonhazardous.
- C. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
- D. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- E. Clean debris from roofs.
- F. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.11 CLOSEOUT PROCEDURES

- A. See Section 01 77 00 for additional requirements.
- B. Make submittals that are required by governing or other authorities.
- C. Accompany Project Coordinator on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Substantial Completion.
- D. Notify Architect/Engineer when work is considered ready for Architect/Engineer's Substantial Completion inspection.
- E. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect/Engineer's Substantial Completion inspection.

- F. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect/Engineer's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect/Engineer.
- G. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.
- H. Notify Architect/Engineer when work is considered finally complete and ready for Architect/Engineer's Substantial Completion final inspection.
- I. Complete items of work determined by Architect/Engineer listed in executed Certificate of Substantial Completion.

END OF SECTION

SECTION 01 77 00 CLOSEOUT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES:

- A. Substantial Completion Procedures.
- B. Final Completion Procedures.

1.02 RELATED REQUIREMENTS:

- A. Section 01 78 00 - Closeout Submittals.

1.03 SUBSTANTIAL COMPLETION PROCEDURES

- A. Substantial Completion Procedures:
 - 1. When the Work or a portion of the Work is considered to be substantially complete, the Contractor inspects the project and prepares a comprehensive list of outstanding items to be completed or corrected, Initial Punch List.
 - 2. Contractor submits notice of Substantial Completion.
 - 3. Contractor completes items on the Initial Punch List.
 - 4. Architect/Engineer inspects the project to verify substantial completion and prepares a Final Punch List.
 - 5. Architect/Engineer prepares Certificate of Substantial Completion, acceptance is required by Owner and Contractor.

1.04 FINAL COMPLETION PROCEDURES

- A. Final Completion Procedures:
 - 1. When items on Initial and Final Punch Lists are complete, the Contractor submits notice of final completion and final application for payment.
 - 2. Contractor submits Final Closeout Submittals as specified in Section 01 78 00.
 - 3. Architect inspects project and verifies the Work is acceptable and conforms with the Contract Documents.
 - 4. Architect processes final application for payment and closeout submittals.

1.05 CORRECTION PERIOD

- A. Correction Period commences on the date of Substantial Completion and expires one year from that date.
- B. Owner: document non-conforming or defective work over course of Correction Period. Notify Contractor in writing of nonconforming or defective work. Copy Architect/Engineer.
 - 1. Life safety issues requiring immediate corrective work: Contact Contractor for action.

PART 2 PRODUCTS - NOT USED.

PART 3 EXECUTION - NOT USED.

END OF SECTION

SECTION 01 78 00 CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Project Record Documents.
- B. Operation and Maintenance Data.
- C. Warranties and bonds.

1.02 RELATED REQUIREMENTS

- A. Section 01 30 00 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- B. Section 01 70 00 - Execution and Closeout Requirements: Contract closeout procedures.
- C. Individual Product Sections: Specific requirements for operation and maintenance data.
- D. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

- 1. Submit preliminary draft or proposed formats and outlines of contents before start of Work. Architect/Engineer will review draft and return with comments.
- 2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
- 3. Submit completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect/Engineer comments. Revise content as required prior to final submission.
- 4. Submit revised final documents in final in PDF file format on USB flash drive form within 10 days after final inspection.
- B. Warranties and Bonds:
 - 1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
 - 2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
 - 3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

- 1. Specifications.
- 2. Reviewed shop drawings, product data, and samples.
- 3. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.

- D. Record information concurrent with construction progress.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
 - 1. Manufacturer's name and product model and number.
 - 2. Product substitutions or alternates utilized.
 - 3. Changes made by Addenda and modifications.
- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
 - 1. Measured depths of foundations in relation to finish first floor datum.
 - 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - 3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
- G. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

3.02 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

- A. For Each Product, Applied Material, and Finish:
 - 1. Product data, with catalog number, size, composition, and color and texture designations.
 - 2. Information for re-ordering custom manufactured products.
- B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.
- C. Moisture protection and weather-exposed products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.
- D. Additional information as specified in individual product specification sections.
- E. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

3.03 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

- A. For Each Item of Equipment and Each System:
 - 1. Description of unit or system, and component parts.
 - 2. Identify function, normal operating characteristics, and limiting conditions.
 - 3. Include performance curves, with engineering data and tests.
 - 4. Complete nomenclature and model number of replaceable parts.
- B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.
- C. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.

- D. Include color coded wiring diagrams as installed.
- E. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
- F. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- G. Provide servicing and lubrication schedule, and list of lubricants required.
- H. Include manufacturer's printed operation and maintenance instructions.
- I. Include sequence of operation by controls manufacturer.
- J. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- K. Provide control diagrams by controls manufacturer as installed.
- L. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- M. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- N. Include test and balancing reports.
- O. Additional Requirements: As specified in individual product specification sections.

3.04 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

- A. Assemble operation and maintenance data into PDF file "manual" for Owner's personnel use, with data arranged in the same sequence as, and bookmarked by, the specification sections.
 - 1. Media: USB flash drive of capacity sufficient to store entire PDF file, fragmented.
 - 2. Attach a tag or label flash drive with Project name, date, and the title "O&M Manual".
- B. Where systems involve more than one specification section, provide separate bookmark for each system.
- C. Prepare instructions and data by personnel experienced in maintenance and operation of described products.
- D. Prepare data in the form of an instructional manual.
- E. Cover Page: Populate the first page of the PDF file with: printed title "OPERATION AND MAINTENANCE MANUAL"; identify title of Project; identify subject matter of contents.
- F. Project Directory: Beginning on the second page of the PDF file; provide Title and address of Project; names, addresses, and telephone numbers of Architect/Engineer, Consultants, Contractor and subcontractors, with names of responsible parties.
- G. Table of Contents: List every item identified by a bookmark, using the same identification as in the title of the bookmark.

- H. Bookmarks: Bookmark each separate product and system; identify the contents in the title of the bookmark; on the bookmarked page provide a description of product and major component parts of equipment.
- I. Content: Manufacturer's printed data, legibly scanned, in color where applicable, at 300 dpi resolution.
- J. Drawings: Legibly scanned, in color where applicable, at 300 dpi resolution; PDF file page size to match native sheet size of original drawing.
- K. Arrangement of Contents: Organize each volume in parts as follows:
 - 1. Project Directory.
 - 2. Table of Contents, of all volumes, and of this volume.
 - 3. Operation and Maintenance Data: Arranged by system, then by product category.
 - a. Source data.
 - b. Product data, shop drawings, and other submittals.
 - c. Operation and maintenance data.
 - d. Field quality control data.
 - e. Warranties and bonds.

3.05 WARRANTIES AND BONDS

- A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.
- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.
- E. Include color, 300 dpi resolution scans of each in Operation and Maintenance Manual PDF file, bookmarked indexed separately in Table of Contents.
- F. Manual: Bind original copies of warranties and bonds in commercial quality 8-1/2 by 11 inch three D side ring binders with durable plastic covers.
- G. Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.
- H. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.
- I. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

END OF SECTION

SECTION 01 79 00 DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.01 SUMMARY

- A. Demonstration of products and systems where indicated in specific specification sections.
- B. Training of Owner personnel in operation and maintenance is required for:
 - 1. All software-operated systems.
 - 2. HVAC systems and equipment.
 - 3. Electrical systems and equipment.

1.02 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Training Plan: Owner will designate personnel to be trained; tailor training to needs and skill-level of attendees.
 - 1. Submit to Architect/Engineer for transmittal to Owner.
 - 2. Submit not less than four weeks prior to start of training.
 - 3. Revise and resubmit until acceptable.
 - 4. Provide an overall schedule showing all training sessions.
 - 5. Include at least the following for each training session:
 - a. Identification, date, time, and duration.
 - b. Description of products and/or systems to be covered.
 - c. Name of firm and person conducting training; include qualifications.
 - d. Intended audience, such as job description.
 - e. Objectives of training and suggested methods of ensuring adequate training.
 - f. Methods to be used, such as classroom lecture, live demonstrations, hands-on, etc.
 - g. Media to be used, such as slides, hand-outs, etc.
 - h. Training equipment required, such as projector, projection screen, etc., to be provided by Contractor.
- C. Training Manuals: Provide training manual for each attendee; allow for minimum of two attendees per training session.
 - 1. Include applicable portion of O&M manuals.
 - 2. Include copies of all hand-outs, slides, overheads, video presentations, etc., that are not included in O&M manuals.
 - 3. Provide one extra copy of each training manual to be included with operation and maintenance data.
- D. Training Reports:
 - 1. Identification of each training session, date, time, and duration.
 - 2. Sign-in sheet showing names and job titles of attendees.
 - 3. List of attendee questions and written answers given, including copies of and references to supporting documentation required for clarification; include answers to questions that could not be answered in original training session.
- E. Video Recordings: Submit digital video recording of each demonstration and training session for Owner's subsequent use.

1. Format: DVD Disc.
2. Label each disc and container with session identification and date.

1.03 QUALITY ASSURANCE

- A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.
 1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.
 2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 DEMONSTRATION - GENERAL

- A. Demonstrations conducted during system start-up do not qualify as demonstrations for the purposes of this section, unless approved in advance by Owner.
- B. Demonstration may be combined with Owner personnel training if applicable.
- C. Operating Equipment and Systems: Demonstrate operation in all modes, including start-up, shut-down, seasonal changeover, emergency conditions, and troubleshooting, and maintenance procedures, including scheduled and preventive maintenance.
 1. Perform demonstrations not less than two weeks prior to Substantial Completion.
 2. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- D. Non-Operating Products: Demonstrate cleaning, scheduled and preventive maintenance, and repair procedures.
 1. Perform demonstrations not less than two weeks prior to Substantial Completion.

3.02 TRAINING - GENERAL

- A. Conduct training on-site unless otherwise indicated.
- B. Owner will provide classroom and seating at no cost to Contractor.
- C. Provide training in minimum two hour segments.
- D. Training schedule will be subject to availability of Owner's personnel to be trained; re-schedule training sessions as required by Owner; once schedule has been approved by Owner failure to conduct sessions according to schedule will be cause for Owner to charge Contractor for personnel "show-up" time.
- E. Review of Facility Policy on Operation and Maintenance Data: During training discuss:
 1. The location of the O&M manuals and procedures for use and preservation; backup copies.
 2. Typical contents and organization of all manuals, including explanatory information, system narratives, and product specific information.
 3. Typical uses of the O&M manuals.
- F. Product- and System-Specific Training:
 1. Review the applicable O&M manuals.

2. For systems, provide an overview of system operation, design parameters and constraints, and operational strategies.
 3. Review instructions for proper operation in all modes, including start-up, shut-down, seasonal changeover and emergency procedures, and for maintenance, including preventative maintenance.
 4. Provide hands-on training on all operational modes possible and preventive maintenance.
 5. Emphasize safe and proper operating requirements; discuss relevant health and safety issues and emergency procedures.
 6. Discuss common troubleshooting problems and solutions.
 7. Discuss any peculiarities of equipment installation or operation.
 8. Discuss warranties and guarantees, including procedures necessary to avoid voiding coverage.
 9. Review recommended tools and spare parts inventory suggestions of manufacturers.
 10. Review spare parts and tools required to be furnished by Contractor.
 11. Review spare parts suppliers and sources and procurement procedures.
- G. Be prepared to answer questions raised by training attendees; if unable to answer during training session, provide written response within three days.

END OF SECTION

SECTION 02 41 00 DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Selective demolition and salvage of building elements for alteration purposes.
- B. Abandonment and removal of existing utilities and utility structures.

1.02 REFERENCE STANDARDS

- A. 29 CFR 1926 - Safety and Health Regulations for Construction; Current Edition.
- B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2022, with Errata (2021).

1.03 DEFINITIONS

- A. Where the terms "remove" or "demolish" are used they shall be construed to mean remove and legally dispose of off site.
- B. Where the term "refurbish" is used it shall be construed to mean refinish, repair and otherwise restore to like-new condition.
- C. Where the term "relocate" is used it shall be construed to mean disconnect from existing utilities, move to new location and reinstall and reconnect to utilities.
- D. Where the terms "temporarily remove" or "salvage" are used they shall be construed to mean carefully remove so as to prevent damage.
 - 1. If the item is to be saved for reinstallation or relocation as part of the Work, "temporarily remove" and "salvage" shall also be construed to mean clean, adjust, lubricate and otherwise restore to best possible condition without repair or refinishing. Otherwise, these terms shall mean clean item surfaces and turn over to Owner for storage and possible future use.
- E. Where the phrase "salvage in place" is used it shall be construed to mean protect in place so as to prevent damage while adjacent elements are demolished, restore to best possible condition without repair or refinishing, and modify as necessary to properly incorporate and integrate with new Work.

1.04 SUBMITTALS

- A. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

1.05 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: Company specializing in the type of work required.
 - 1. Minimum of five years of experience.

PART 2 PRODUCTS -- NOT USED**PART 3 EXECUTION****3.01 SCOPE**

- A. Remove items indicated for demolition, salvage and relocation.

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

- A. Comply with applicable codes and regulations for demolition operations and safety of the public.
 - 1. Obtain required permits.
 - 2. Comply with applicable requirements of NFPA 241.
 - 3. Use of explosives is not permitted.
 - 4. Provide, erect, and maintain temporary barriers and security devices.
 - 5. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
 - 6. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
 - 7. Do not close or obstruct roadways or sidewalks without permit.
 - 8. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
- B. Do not begin removal until receipt of notification to proceed from Owner.
- C. Do not begin removal until built elements to be salvaged or relocated have been removed.
- D. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.
- E. If hazardous materials are discovered during removal operations, stop work and notify Architect/Engineer and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.
- F. Perform demolition in a manner that maximizes salvage and recycling of materials.
 - 1. Dismantle existing construction and separate materials.
 - 2. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

3.03 EXISTING UTILITIES

- A. Do not disrupt public utilities without permit from authority having jurisdiction.
- B. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.
- C. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.
- D. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

3.04 SELECTIVE DEMOLITION FOR ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
 - 1. Verify that construction and utility arrangements are as indicated.
 - 2. Report discrepancies to Architect/Engineer before disturbing existing installation.
 - 3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.
- B. Separate areas in which demolition is being conducted from other areas that are still occupied.
 - 1. Provide, erect, and maintain temporary dustproof partitions of wood stud and 10 Mil polyethylene sheeting construction.
- C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
- D. Remove existing work as indicated and as required to accomplish new work.
 - 1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction specified.
 - 2. Remove items indicated on drawings.
- E. Services (Including but not limited to HVAC): Remove existing systems and equipment as indicated.
 - 1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.
 - 2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
 - 3. Verify that abandoned services serve only abandoned facilities before removal.
 - 4. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification.
- F. Protect existing work to remain.
 - 1. Perform cutting to accomplish removals neatly and as specified for cutting new work.
 - 2. Repair adjacent construction and finishes damaged during removal work.
 - 3. Patch as specified for patching new work.

3.05 DEBRIS AND WASTE REMOVAL

- A. Remove debris, junk, and trash from site.
- B. Leave site in clean condition, ready for subsequent work.
- C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SECTION 05 50 00 METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Shop fabricated steel items.

1.02 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- B. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2023.
- C. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2020.
- D. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2023).

1.03 SUBMITTALS

- A. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
 - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

1.04 QUALITY ASSURANCE

- A. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and AWS D1.2/D1.2M and dated no more than 12 months before start of scheduled welding work.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

- A. Steel Tubing: ASTM A500/A500M Grade B cold-formed structural tubing.
- B. Plates: ASTM A283/A283M.
- C. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, plain.
- D. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

2.02 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Continuously seal joined members by intermittent welds and plastic filler.
- D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

2.03 FABRICATED ITEMS

2.04 FABRICATION TOLERANCES

- A. Squareness: 1/8 inch maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch.
- C. Maximum Misalignment of Adjacent Members: 1/16 inch.
- D. Maximum Bow: 1/8 inch in 48 inches.
- E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.02 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Field weld components as indicated on drawings.
- D. Perform field welding in accordance with AWS D1.1/D1.1M.
- E. Obtain approval prior to site cutting or making adjustments not scheduled.
- F. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.

3.03 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

SECTION 07 84 00 FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Firestopping systems.
- B. Firestopping of joints and penetrations in fire-resistance-rated and smoke-resistant assemblies, whether indicated on drawings or not, and other openings indicated.
- C. Smoke-stopping of all penetrations of and joints in horizontal and vertical assemblies designed to resist the passage of smoke and hot gasses, whether indicated on drawings or not, and other openings indicated.

1.02 REFERENCE STANDARDS

- A. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2022.
- B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2023a.
- C. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, with Editorial Revision (2021).
- D. ITS (DIR) - Directory of Listed Products; Current Edition.
- E. FM 4991 - Approval Standard of Firestop Contractors; 2013.
- F. FM (AG) - FM Approval Guide; Current Edition.
- G. SCAQMD 1168 - Adhesive and Sealant Applications; 1989, with Amendment (2022).
- H. UL 1479 - Standard for Fire Tests of Penetration Firestops; Current Edition, Including All Revisions.
- I. UL (DIR) - Online Certifications Directory; Current Edition.
- J. UL (FRD) - Fire Resistance Directory; Current Edition.

1.03 DEFINITIONS

- A. Assembly: Particular arrangement of materials specific to given type of construction described or detailed in referenced documents.
- B. Barriers: Time rated fire walls, smoke barrier walls, time rated ceiling/floor assemblies and structural floors.
- C. Firestopping: Methods and materials applied as a system around penetrations and in unprotected openings to limit spread of heat, fire gasses and smoke.
- D. Penetration: Opening or foreign material passing through or into barrier or structural floor such that full thickness of rated materials is not obtained.
- E. Joint: Interruption to a fire-rated assembly occurring at interface between 1) adjacent sections of wall, 2) intersecting walls, 3) top of wall and ceiling, structural floor or roof deck, 4) wall and edge of structural floor, 5) adjacent sections of structural floor.

- F. System: Specific products and applications, classified and numbered by Underwriters Laboratories, Inc. to close specific barrier penetrations and joints.
- G. Sleeve: Metal fabrication or pipe section extending through thickness of barrier and used to permanently guard penetration. Sleeves are described as part of penetrating system in other sections and may or may not be required.

1.04 SYSTEM DESCRIPTION

- A. Design Requirements:
 1. Fire-rated construction: Maintain barrier and structural floor fire resistance ratings including resistance to cold smoke at all penetrations, connections with other surfaces or types of construction, at separations required to permit building movement and sound or vibration absorption, and at other construction gaps.
 2. Smoke barrier construction: Maintain barrier and structural floor resistance to cold smoke at all penetrations, connections with other surfaces and types of construction and at all separations required to permit building movement and sound or vibration absorption, and at other construction gaps.

1.05 SUBMITTALS

- A. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.
 1. Provide manufacturer's qualified engineering judgements for non-standard applications.
- B. Product Data: Provide data on product characteristics, performance ratings, and limitations.
- C. Sustainable Design Submittal: Submit VOC content documentation for nonpreformed materials.
- D. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- F. Manufacturer's qualification statement.
- G. Installer's qualification statement.

1.06 QUALITY ASSURANCE

- A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
 1. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.
 2. Valid evaluation report published by ICC Evaluation Service, Inc. (ICC-ES) at www.icc-es.org will be considered as constituting an acceptable test report.
 3. Submission of actual test reports is required for assemblies for which none of the above substantiation exists.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Installer Qualifications: Company specializing in performing the work of this section and:
 1. Approved by Factory Mutual Research Corporation under FM 4991, or meeting any two of the following requirements:

2. Verification of minimum three years documented experience installing work of this type.
3. Verification of at least five satisfactorily completed projects of comparable size and type.
4. Licensed by local authorities having jurisdiction (AHJ).

1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver products in original, unopened packaging with legible manufacturer's identification.
- B. Coordinate delivery with scheduled installation date to minimize storage time at site.
- C. Store materials in a clean, dry, ventilated location. Protect materials from freezing if required by manufacturer.

1.08 FIELD CONDITIONS

- A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation; maintain minimum temperature before, during, and for three days after installation of materials.
- B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Firestopping Manufacturers:
 1. 3M Fire Protection Products: www.3m.com/firestop.
 2. A/D Fire Protection Systems Inc: www.adfire.com.
 3. Hilti, Inc: www.us.hilti.com.
 4. RectorSeal, a CSW Industrials Company: www.rectorseal.com/firestop-solutions.
 5. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com.

2.02 MATERIALS

- A. Firestopping Materials: Any materials meeting requirements.
- B. Volatile Organic Compound (VOC) Content: Provide products having VOC content lower than that required by SCAQMD 1168.
- C. Mold and Mildew Resistance: Provide firestopping materials with mold and mildew resistance rating of zero(0) in accordance with ASTM G21.
- D. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.

2.03 FIRESTOPPING ASSEMBLY REQUIREMENTS

- A. Through Penetration Firestopping: Use system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.
 1. Temperature Rise: Provide systems that have been tested to show T Rating as indicated.
 2. Listing by FM (AG), ITS (DIR), UL (DIR), or UL (FRD) in their certification directories will be considered evidence of successful testing.

2.04 FIRESTOPPING SYSTEMS

- A. Firestopping: Any material meeting requirements.

1. Fire Ratings: Use system that is listed by FM (AG), ITS (DIR), or UL (FRD) and tested in accordance with ASTM E814, ASTM E119, or UL 1479 with F Rating equal to fire rating of penetrated assembly and minimum T Rating Equal to F Rating and in compliance with other specified requirements.
- B. Acceptable Manufacturers: As listed in UL (FRD) for specific UL Design Number.
- C. Fill, Void or Cavity Materials: Conform to UL (FRD) - XHHW.
- D. Firestop Devices: Conform to UL (FRD) - XHJI.
- E. Forming Materials: Conform to UL (FRD) - XHKU.
- F. Mechanical Joint Assemblies: Conform to UL (FRD) - XHLP.
- G. Packing Material: As required by specific UL Design Number for joint system or through-penetration firestop system.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify openings are ready to receive the work of this section.
 1. Verify barrier joints and penetrations are properly sized and in suitable condition for application of materials.

3.02 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other materials that could adversely affect bond of firestopping material.
- B. Remove incompatible materials that could adversely affect bond.
- C. Install backing materials to prevent liquid material from leakage.

3.03 INSTALLATION

- A. Install materials in manner described in UL (FRD) or fire test report and in accordance with manufacturer's instructions, completely closing openings.
- B. Do not cover installed firestopping until inspected by authorities having jurisdiction.

3.04 CLEANING

- A. Clean adjacent surfaces of firestopping materials.

3.05 PROTECTION

- A. Protect adjacent surfaces from damage by material installation.
- B. Patch or replace firestopping damaged by work of other sections.

END OF SECTION

SECTION 09 51 00 ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Suspended metal grid ceiling system.
- B. Acoustical units.

1.02 RELATED REQUIREMENTS

- A. Section 23 37 00 - Air Outlets and Inlets: Air diffusion devices in ceiling.
- B. Section 26 51 00 - Interior Luminaires: Light fixtures in ceiling system.

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; 2023.
- B. ASTM C635/C635M - Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2022.
- C. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2023.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Sequence work to ensure acoustical ceilings are not installed until dust generating activities have terminated, and overhead work is completed, tested, and approved.
- B. Do not install acoustical units until after interior wet work is dry.

1.05 SUBMITTALS

- A. Product Data: Provide data on suspension system components and acoustical units.
- B. Samples: Submit two samples 6 x 6 inch in size illustrating material and finish of acoustical units.
- C. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.06 QUALITY ASSURANCE

- A. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten years experience.
- B. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten years experience.

1.07 FIELD CONDITIONS

- A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acoustic Tiles/Panels:
 - 1. USG: www.usg.com.
 - 2. Substitutions: Not permitted.
- B. Suspension Systems:
 - 1. Armstrong World Industries, Inc: www.armstrong.com.
 - 2. CertainTeed Corporation: www.certainteed.com.
 - 3. Rockfon, LLC; Chicago Metallic: www.rockfon.com.
 - 4. USG: www.usg.com.
 - 5. Substitutions: Not permitted.

2.02 ACOUSTICAL UNITS

- A. Acoustical Units - General: ASTM E1264, Class A.
- B. Acoustical Panels: Painted mineral fiber, with the following characteristics:
 - 1. Classification: ASTM E1264 Type III.
 - a. Form: 1 and 2.
 - b. Pattern: "G" - smooth.
 - 2. Size: 24 by 24 inches.
 - 3. Thickness: 5/8 inch.
 - 4. Light Reflectance: 86 percent, determined in accordance with ASTM E1264.
 - 5. NRC: 0.55, determined in accordance with ASTM E1264.
 - 6. Ceiling Attenuation Class (CAC): 35, determined in accordance with ASTM E1264.
 - 7. Panel Edge: Tegal - SLT.
 - 8. Color: White.
 - 9. Suspension System: Exposed grid.
 - 10. Product:
 - a. USG Corporation; Astro Acoustical Panels #8223: www.usg.com/ceilings.

2.03 SUSPENSION SYSTEM(S)

- A. Metal Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with perimeter moldings, stabilizer bars, clips, and splices as required.
 - 1. Materials:
 - a. Steel Grid: ASTM A653/A653M, G30 coating, unless otherwise indicated.
- B. Exposed Suspension System: Stainless steel grid and cap.
 - 1. Structural Classification: Intermediate-duty, when tested in accordance with ASTM C635/C635M.
 - 2. Profile: Tee; 15/16 inch face width.
 - 3. Finish: Baked enamel.
 - 4. Color: White.
 - 5. Products:

- a. USG Corporation; Donn Brand DX/DXL 15/16 inch Acoustical Suspension System:
www.usg.com/ceilings.
- b. Equivalent products from other specified manufacturers.

2.04 ACCESSORIES

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application and ceiling system flatness requirement specified.
- B. Hanger Wire: 12 gauge, 0.08 inch galvanized steel wire.
- C. Perimeter Moldings: Same metal and finish as grid.
 - 1. Angle Molding: L-shaped, for mounting at same elevation as face of grid.
- D. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that layout of hangers will not interfere with other work.

3.02 PREPARATION

- A. Install after major above-ceiling work is complete.
- B. Coordinate the location of hangers with other work.

3.03 INSTALLATION - SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C636/C636M and ASTM E580/E580M and as supplemented in this section.
- B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- C. Locate system on room axis according to reflected plan.
- D. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
 - 1. Use longest practical lengths.
- E. Suspension System, Non-Seismic: Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
- G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- H. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.

- I. Do not eccentrically load system or induce rotation of runners.

3.04 INSTALLATION - ACOUSTICAL UNITS

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Fit border trim neatly against abutting surfaces.
- D. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- E. Cutting Acoustical Units:
 - 1. Make field cut edges of same profile as factory edges.
 - 2. Double cut and field paint exposed reveal edges.

3.05 TOLERANCES

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
- B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

3.06 CLEANING

- A. Clean surfaces.
- B. Replace damaged or abraded components.

END OF SECTION

SECTION 23 05 19 METERS AND GAUGES FOR HVAC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pressure gages and pressure gage taps.
- B. Thermometers and thermometer wells.

1.02 RELATED REQUIREMENTS

- A. Section 23 09 23 - Direct-Digital Control System for HVAC.
- B. Section 23 21 13 - Hydronic Piping.

1.03 REFERENCE STANDARDS

- A. ASME B40.100 - Pressure Gauges and Gauge Attachments; 2022.
- B. ASTM E1 - Standard Specification for ASTM Liquid-in-Glass Thermometers; 2014 (Reapproved 2020).
- C. ASTM E77 - Standard Test Method for Inspection and Verification of Thermometers; 2014 (Reapproved 2021).
- D. UL 393 - Indicating Pressure Gauges for Fire-Protection Service; Current Edition, Including All Revisions.

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.
 - 1. Case: Steel with brass bourdon tube.
 - 2. Size: 4-1/2 inch diameter.
 - 3. Mid-Scale Accuracy: One percent.
 - 4. Scale: Psi.

2.02 PRESSURE GAGE TAPPINGS

- A. Gage Cock: Tee or lever handle, brass for maximum 150 psi.
- B. Pulsation Damper: Pressure snubber, brass with 1/4 inch connections.

2.03 STEM TYPE THERMOMETERS

- A. Thermometers - Adjustable Angle: Red- or blue-appearing non-toxic liquid in glass; ASTM E1; lens front tube, cast aluminum case with enamel finish, cast aluminum adjustable joint with positive locking device; adjustable 360 degrees in horizontal plane, 180 degrees in vertical plane.
 - 1. Size: 9 inch scale.
 - 2. Window: Clear Lexan.
 - 3. Stem: 3/4 inch NPT brass.

4. Accuracy: 2 percent, per ASTM E77.
5. Calibration: Degrees F.

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.
- B. Test Kit: Carrying case, internally padded and fitted containing one 2-1/2 inch diameter pressure gages, one gage adapters with 1/8 inch probes, two 1 inch dial thermometers.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide one pressure gage per pump, installing taps before strainers and on suction and discharge of pump. Pipe to gage.
- C. Install pressure gages with pulsation dampers. Provide gage cock to isolate each gauge. Extend nipples and siphons to allow clearance from insulation.
- D. Install thermometers in piping systems in sockets in short couplings. Enlarge pipes smaller than 2-1/2 inch for installation of thermometer sockets. Ensure sockets allow clearance from insulation.
- E. Coil and conceal excess capillary on remote element instruments.
- F. Provide instruments with scale ranges selected according to service with largest appropriate scale.
- G. Install gages and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.
- H. Adjust gages and thermometers to final angle, clean windows and lenses, and calibrate to zero.
- I. Locate test plugs adjacent thermometers and thermometer sockets.

END OF SECTION

SECTION 23 05 53
IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Pipe markers.

1.02 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2023.
- B. ASTM D709 - Standard Specification for Laminated Thermosetting Materials; 2017.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

- A. Air Handling Units: Nameplates.
- B. Air Terminal Units: Nameplates.
- C. Automatic Controls: Tags. Key to control schematic.
- D. Control Panels: Nameplates.
- E. Instrumentation: Tags.
- F. Major Control Components: Nameplates.
- G. Piping: Pipe markers.
- H. Pumps: Nameplates.
- I. Thermostats: Nameplates.
- J. Valves: Tags.

2.02 NAMEPLATES

- A. Manufacturers:
 - 1. Brimar Industries, Inc.
 - 2. Kolbi Pipe Marker Co.
 - 3. Seton Identification Products, a Tricor Direct Company.
- 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. Brady Corporation.
 - 2. Kolbi Pipe Marker Co.
 - 3. Seton Identification Products, a Tricor Company.
- B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.
- C. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

2.04 PIPE MARKERS

- A. Manufacturers:
 - 1. Brady Corporation.
 - 2. Kolbi Pipe Marker Co.
 - 3. Seton Identification Products, a Tricor Company.
- B. Color: Conform to ASME A13.1.
- C. 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.
- D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

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. 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

SECTION 23 05 93
TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Testing, adjustment, and balancing of air systems.
- B. Testing, adjustment, and balancing of hydronic systems.
- C. Measurement of final operating condition of HVAC systems.

1.02 REFERENCE STANDARDS

- A. AABC (NSTSB) - AABC National Standards for Total System Balance, 7th Edition; 2016.
- B. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems; 2008, with Errata (2019).
- C. NEBB (TAB) - Procedural Standard for Testing Adjusting and Balancing of Environmental Systems; 2019.
- D. SMACNA (TAB) - HVAC Systems Testing, Adjusting and Balancing; 2002.

1.03 SUBMITTALS

- A. Installer Qualifications: Submit name of adjusting and balancing agency and TAB supervisor for approval within 30 days after award of Contract.
- B. 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. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
 - 3. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
 - 4. Units of Measure: Report data in both I-P (inch-pound) and SI (metric) units.
 - 5. 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/Engineer.
 - g. Project Contractor.
 - h. Report date.
- C. Project Record Documents: Record actual locations of flow measuring stations and balancing valves and rough setting.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Perform total system balance in accordance with one of the following:
 - 1. AABC (NSTSB), 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.aabc.com/#sle; upon completion submit AABC National Performance Guaranty.
 - b. NEBB, National Environmental Balancing Bureau: www.nebb.org/#sle.
 - c. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute: www.tabbcertified.org/#sle.
- E. TAB Supervisor Qualifications: Certified by same organization as TAB agency.

3.02 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.

3.03 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.

3.04 RECORDING AND ADJUSTING

A. Ensure recorded data represents actual measured or observed conditions.

B. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.

C. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.

D. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

3.05 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. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.

C. Measure air quantities at air inlets and outlets.

D. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.

E. 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.

F. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.

G. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.

H. 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.

- I. Measure building static pressure and adjust supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches positive static pressure in areas as noted.
- J. For variable air volume system powered units set volume controller to air flow setting indicated. Confirm connections properly made and confirm proper operation for automatic variable air volume temperature control.

3.06 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. Adjust systems to provide specified pressure drops and flows through heat transfer elements prior to thermal testing. Perform balancing by measurement of temperature differential in conjunction with air balancing.
- D. Effect system balance with automatic control valves fully open to heat transfer elements.
- E. Effect adjustment of water distribution systems by means of balancing cocks, valves, and fittings. Do not use service or shut-off valves for balancing unless indexed for balance point.
- F. Where available pump capacity is less than total flow requirements or individual system parts, full flow in one part may be simulated by temporary restriction of flow to other parts.

3.07 SCOPE

- A. Test, adjust, and balance the following:
 - 1. HVAC Pumps.
 - 2. Air Coils.
 - 3. Air Handling Units.
 - 4. Fans.
 - 5. Air Filters.
 - 6. Air Terminal Units.
 - 7. Air Inlets and Outlets.

END OF SECTION

SECTION 23 07 13 DUCT INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Duct insulation.

1.02 REFERENCE STANDARDS

- A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.
- B. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013 (Reapproved 2019).
- C. ASTM C916 - Standard Specification for Adhesives for Duct Thermal Insulation; 2020.
- D. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material); 2019.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023c.
- F. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2022a, with Editorial Revision (2023).
- G. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.
- H. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

1.04 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.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section, with minimum three years of experience and approved by manufacturer.

1.05 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.

1.06 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.:
 - 2. Johns Manville.:
 - 3. Owens Corning Corporation.:
 - 4. CertainTeed Corporation.:
- B. Insulation: ASTM C553; flexible, noncombustible blanket.
 - 1. 'K' value: 0.25 at 75 degrees F, when tested in accordance with ASTM C518.
 - 2. Minimum installed R-Value: 6.0.
 - 3. Maximum Service Temperature: 450 degrees F.
 - 4. Maximum Water Vapor Absorption: 5.0 percent by weight.
- C. Vapor Barrier Jacket:
 - 1. Kraft paper with glass fiber yarn and bonded to aluminized film.
 - 2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
 - 3. Secure with pressure sensitive tape.
- D. Vapor Barrier Tape:
 - 1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.
- E. Tie Wire: Annealed steel, 16 gage, 0.0508 inch diameter.

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. Install in accordance with NAIMA National Insulation Standards.
- C. 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.
- D. Insulated ducts conveying air above ambient temperature:
1. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.
- E. 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.

3.03 SCHEDULES

- A. Exhaust Ducts withing 10ft of the exterior:
1. Flexible Glass Fiber Duct Insulation: 2 inches thick.
- B. Outside Air Intake Ducts:
1. Flexible Glass Fiber Duct Insulation: 2 inches thick.
- C. Supply Ducts:
1. Flexible Glass Fiber Duct Insulation: 2 inches thick.

END OF SECTION

SECTION 23 07 19 HVAC PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Piping insulation.
- B. Jackets and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 23 21 13 - Hydronic Piping: Placement of hangers and hanger inserts.

1.03 REFERENCE STANDARDS

- A. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2019, with Editorial Revision (2023).
- B. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2023.
- C. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2022a.
- D. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2023).
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023c.
- F. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2022a, with Editorial Revision (2023).
- G. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. 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 the Products specified in this section with not less than three years of documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum three years of experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.07 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. CertainTeed Corporation.:
2. Johns Manville Corporation.:
3. Knauf Insulation.:
4. Owens Corning Corporation.

B. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.

1. 'K' Value: ASTM C177, 0.24 at 75 degrees F.
2. Maximum Service Temperature: 850 degrees F.
3. Maximum Moisture Absorption: 0.2 percent by volume.

C. Vapor Barrier Jacket: White kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.

D. Vapor Barrier Lap Adhesive: Compatible with insulation.

2.03 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

A. Manufacturer:

1. Aeroflex USA, Inc.
2. Armacell LLC.
3. K-Flex USA LLC.

B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1; use molded tubular material wherever possible.

1. Minimum Service Temperature: Minus 40 degrees F.
2. Maximum Service Temperature: 180 degrees F.
3. Connection: Waterproof vapor barrier adhesive.

C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.

2.04 JACKETS

A. PVC Plastic.

1. Jacket: One piece molded type fitting covers and sheet material, off-white color.
 - a. Minimum Service Temperature: 0 degrees F.
 - b. Maximum Service Temperature: 150 degrees F.
 - c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
 - d. Thickness: 10 mil.
 - e. Connections: Brush on welding adhesive.

2. Covering Adhesive Mastic: Compatible with insulation.

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. Install in accordance with NAIMA National Insulation Standards.
- C. Exposed Piping: Locate insulation and cover seams in least visible locations.
- D. Insulated pipes conveying fluids below ambient temperature; insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
- E. Glass fiber insulated pipes conveying fluids below ambient temperature:
 1. Provide vapor barrier jackets, factory-applied or field-applied; secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.
- F. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.
- G. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.
- H. Glass fiber insulated pipes conveying fluids above ambient temperature.
 1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
- I. 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.
 5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.

3.03 SCHEDULE

- A. Heating Systems:
 1. Heating Water Supply and Return:
 - a. Glass Fiber Insulation:
 - 1) Pipe Size Range: Up to and including 1-1/4 inch.

- a) Thickness: 1-1/2 inch
- 2) Pipe Size Range: 1-1/2 inch and above.
- a) Thickness: 2 inch.

B. Cooling Systems:

- 1. Chilled Water:
 - a. Glass Fiber Insulation:
 - 1) Pipe Size Range: All sizes.
 - a) Thickness: 1-1/2 inch
- 2. Condensate Drains from Cooling Coils:
 - a. Flexible Elastomeric Cellular Insulation:
 - 1) Pipe Size Range: All sizes.
 - a) Thickness: 1/2 inch

END OF SECTION

SECTION 23 09 13
INSTRUMENTATION AND CONTROL DEVICES FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Control panels.
- B. Control Valves:
 - 1. Ball valves and actuators.
 - 2. Globe pattern.
 - 3. Electronic operators.
- C. Pressure independent control valves and actuators.
- D. Dampers.
- E. Damper Operators:
 - 1. Electric operators.
- F. Input/Output Sensors:
 - 1. Temperature sensors.
 - 2. Humidity sensors.
 - 3. Static pressure (air pressure) sensors.
 - 4. Equipment operation (current) sensors.
 - 5. Damper position indicators.
 - 6. Carbon dioxide sensors.
- G. Thermostats:
 - 1. Electric room thermostats.
 - 2. Room thermostat accessories.
 - 3. Outdoor reset thermostats.
 - 4. Immersion thermostats.
 - 5. Airstream thermostats.
 - 6. Electric low limit duct thermostats.
- H. Transmitters:
 - 1. Building static pressure transmitters.
 - 2. Pressure transmitters.
 - 3. Air pressure transmitters.
 - 4. Temperature transmitters.
 - 5. Humidity transmitters.
- I. Low Coil Input Relays.
- J. Air Flow Measuring Stations.
- K. Variable Frequency Drives.

1.02 RELATED REQUIREMENTS

- A. Section 23 05 19 - Meters and Gauges for HVAC Piping: Thermometer sockets, gage taps.
- B. Section 23 09 23 - Direct-Digital Control System for HVAC.

- C. Section 23 21 13 - Hydronic Piping: Installation of control valves, flow switches, temperature sensor sockets, gage taps.
- D. Section 23 21 14 - Hydronic Specialties.
- E. Section 26 05 83 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. AMCA 500-D - Laboratory Methods of Testing Dampers for Rating; 2018.
- B. ANSI/FCI 70-2 - Control Valve Seat Leakage; 2021.
- C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.
- D. NEMA DC 3 - Residential Controls - Electrical Wall-Mounted Room Thermostats; 2013.
- E. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.

1.04 SUBMITTALS

- A. Product Data: Provide description and engineering data for each control system component. Include sizing as requested. Provide data for each system component and software module.
- B. Shop Drawings: Indicate complete operating data, system drawings, wiring diagrams, and written detailed operational description of sequences. Submit schedule of valves indicating size, flow, and pressure drop for each valve. For automatic dampers indicate arrangement, velocities, and static pressure drops for each system.
- C. Operation and Maintenance Data: Include inspection period, cleaning methods, recommended cleaning materials, and calibration tolerances.
- D. Project Record Documents: Record actual locations of control components, including panels, thermostats, and sensors. Accurately record actual location of control components, including panels, thermostats, and sensors.
 - 1. Revise shop drawings to reflect actual installation and operating sequences.
- E. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum 3 years experience approved by manufacturer.

PART 2 PRODUCTS

2.01 EQUIPMENT - GENERAL

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

2.02 CONTROL PANELS

- A. Unitized cabinet type for each system under automatic control with relays and controls mounted in cabinet and temperature indicators, pressure gages, pilot lights, push buttons and switches flush on cabinet panel face.
- B. NEMA 250, general purpose utility enclosures with enameled finished face panel.
- C. Provide common keying for all panels.

2.03 CONTROL VALVES

- A. Manufacturers.
 - 1. Danfoss; Model AB-QM.
 - 2. Flow Control Industries; Model DeltaP Valve.
 - 3. Johnson Controls.
- B. Pressure Independent Control Valve.
 - 1. ASME B16.34 or ASME B16.15, valve bodies shall be two-way normally open or closed. Valve bodies 2 inches and smaller shall be bronze or brass. Valve bodies 2-1/2 inches and larger shall be brass, bronze or iron.
 - 2. Valve shall be two way globe style, pressure independent, with integrated differential pressure control regulator. Regulation control of pressure shall be by an integrated EPDM diaphragm design, stainless spring, pressure control disc and require no internal maintenance or replaceable cartridges. Pressure control seat shall be brass construction with vulcanized EPDM.
 - 3. Provide user adjustable maximum flow within valve control range; adjustment method shall indicate percentage of valve flow range and utilize spring locked method of adjustment.
 - 4. Regulation of internal control valve differential pressure shall provide 100% control valve authority and maintain a linear flow characteristic.
 - 5. Flow shall be accurately controlled from 0-100% full rated flow with an operating pressure differential range of 4 to 60 psig.
 - 6. Valve shall provide back seated globe design to allow service of packing under pressure without leakage for valves up to 1-1/4 inches.
 - 7. Valve shall include PT test ports.
 - 8. Actuator shall operate the valve through its' full range and have a minimum close off pressure of 90 psig; have the ability to supply on/off, floating, proportional, safety spring and or feedback options; visible position indication; thermostatic, thermal or electronic version as indicated. Actuator shall be from the same manufacturer as the valve manufacturer.
- C. Ball Valves and Actuators:
 - 1. Service: Use for brine (30 percent glycol), chilled water, or hot water.
 - 2. Flow Characteristic: Include 3-way diverting operation configured to fail normally closed (NC).
 - 3. Rangeability: 500 to 1.
 - 4. ANSI Rating: Class 150.
 - 5. Leakage: Class IV (0.1 percent of rated capacity) per ANSI/FCI 70-2.
 - 6. Body Size:
 - a. Under 2-1/2 inches:
 - 1) Connection: NPT.
 - 2) Materials:

- a) Body: Brass.
 - b) Flanges: Ductile iron.
 - c) Ball: Chrome-plated brass.
 - d) Stem: Nickel-plated brass.
 - e) Seat: Graphite-reinforced PTFE with EPDM O-Ring backing.
 - f) Stem Seal: EPDM O-Rings.
 - g) Flow Control Disk: Thermoplastic synthetic-resin.
- b. 2-1/2 inches and Above:
 - 1) Connection Type: Flanged.
 - 2) Materials:
 - a) Body: Brass.
 - b) Flanges: Ductile iron.
 - c) Ball: 300 series stainless steel.
 - d) Stem: 300 series stainless steel.
 - e) Seat: Graphite-reinforced PTFE with EPDM O-Ring backing.
 - f) Stem Seal: EPDM O-Rings.
 - g) Flow Control Disk: Thermoplastic synthetic-resin.
- c. Service Temperature:
 - 1) Fluid Side: 0 to 284 degrees F liquid or 25 psig steam.
 - 2) Ambient Side: From minus 4 to 122 degrees F.
- 7. Actuator Requirements:
 - a. Assembly: Factory-mounted.
 - b. Input: 0 to 10 VDC configured for proportional control.
 - c. Accessories: Provide with valve position indicator and manual override.
- D. Globe Pattern:
 - 1. Up to 2 inches: Bronze body, bronze trim, rising stem, renewable composition disc, screwed ends with backseating capacity repackable under pressure.
 - 2. Over 2 inches: Iron body, bronze trim, rising stem, plug-type disc, flanged ends, renewable seat and disc.
 - 3. Hydronic Systems:
 - a. Rate for service pressure of 125 psig at 250 degrees F.
 - b. Replaceable plugs and seats of stainless steel.
 - c. Size for 3 psig maximum pressure drop at design flow rate.
- E. Butterfly Pattern:
 - 1. Iron body, bronze disc, resilient replaceable seat for service to 180 degrees F wafer or lug ends, extended neck.
 - 2. Pressure Control: Zinc or aluminum castings, rated for service with elastomeric diaphragm, adjustable electric contacts.
 - 3. Hydronic Systems:
 - a. Rate for service pressure of 125 psig at 250 degrees F.
 - b. Size for 1 psig maximum pressure drop at design flow rate.

2.04 INPUT/OUTPUT SENSORS

- A. Temperature Sensors:
 - 1. Use thermistor or RTD type temperature sensing elements with characteristics resistant to moisture, vibration, and other conditions consistent with the application without affecting

accuracy and life expectancy.

2. Construct RTD of nickel or platinum with base resistance of 1000 ohms at 70 degrees F.
3. 100 ohm platinum RTD is acceptable if used with project DDC controllers.
4. Temperature Sensing Device: Compatible with project DDC controllers.
5. Performance Characteristics:
 - a. RTD:
 - 1) Duct Averaging Accuracy: Plus/minus 0.50 degrees F minimum.
 - 2) Chilled Water Accuracy: Plus/minus 0.50 degrees F minimum.
 - 3) All Other Accuracy: Plus/minus 0.75 degrees F minimum.
 - 4) Range: Minus 40 degrees F through 220 degrees F minimum.
 - b. Thermistor:
 - 1) Accuracy (All): Plus/minus 0.36 degrees F minimum.
 - 2) Range: Minus 25 degrees F through 122 degrees F minimum.
 - 3) Heat Dissipation Constant: 2.7 mW per degree C.
 - c. Temperature Transmitter:
 - 1) Accuracy: 0.10 degree F minimum or plus/minus 0.20 percent of span.
 - 2) Output: 4 to 20 mA.
 - d. Sensing Range:
 - 1) Provide limited range sensors if required to sense the range expected for a respective point.
 - 2) Use RTD type sensors for extended ranges beyond minus 30 degrees F to 230 degrees F.
 - 3) Use temperature transmitters in conjunction with RTD's when RTD's are incompatible with DDC controller direct temperature input.
 - e. Wire Resistance:
 - 1) Use appropriate wire size to limit temperature offset due to wire resistance to 1.0 degree F or use temperature transmitter when offset is greater than 1.0 degree F due to wire resistance.
 - 2) Compensate for wire resistance in software input definition when feature is available in the DDC controller.
 - f. Outside Air Sensors: Watertight inlet fitting shielded from direct rays of the sun.
 - g. Immersion Temperature Sensors: A sensor encased in a corrosion-resistant probe with an indoor junction box service entry body.
 - h. Temperature Averaging Elements:
 - 1) Use on duct sensors for ductwork 10 sq ft or larger.
 - 2) Use averaging elements where prone to stratification with sensor length 8 ft or 16 ft.
 - 3) Provide for all mixed air and heating coil discharge sensors regardless of duct size.
 - i. Insertion Elements:
 - 1) Use in ducts not affected by temperature stratification or smaller than 11 sq inches.
 - 2) Provide dry type, insertion elements for liquids, installed in immersion wells, with minimum insertion length of 2.5 inches.

B. Humidity Sensors:

1. Duct Mounted Sensor: Voltage type encased in a die-cast metal, weather-proof housing.
 - a. Input Power, Voltage Type: Class 2; 12-30 VDC/24 VAC, 15mA max.
 - b. Input Power, mA Type: Class 2; Loop powered 12-30 VDC only, 30 mA max.
 - c. Output Voltage Type: 3-wire observed polarity.
 - d. Output mA Type: 2-wire, not polarity sensitive (clipped and capped).

- e. Humidity:
 - 1) HS Element: Digitally profiled thin-film capacitive.
 - 2) Accuracy 1 percent at 10 to 80 percent relative humidity at 77 degrees F, multi-point calibration, NIST traceable.
 - a) Plus/minus 1 percent at 20 to 40 percent RH in mA output mode; (multi-point calibration, NIST traceable).
 - 3) Scaling: 0 to 100 percent RH.
- f. Temperature Effect:
 - 1) Duct Mounted: Plus/minus 0.18 percent per degree F.
 - 2) Outdoor Mounted: 4 to 20mA version: $(0.0013 \times \%RH \times (T_{\text{degreeC}} - 25))$.
- g. Hysteresis: 1.5 percent typical.
- h. Linearity: Included in accuracy specification.
- i. Reset Rate: 24 hours.
- j. Stability: Plus/minus 1 percent at 68 degrees F (20 degrees C) annually, for two years.
- k. Operating Environment:
 - 1) Operating Humidity Range: 0 to 100 percent RH noncondensing.
 - 2) Operating Temperature Range: Minus 40 degrees F to 122 degrees F.
- C. Static Pressure (Air Pressure) Sensors:
 - 1. Unidirectional with ranges not exceeding 150 percent of maximum expected input.
 - 2. Temperature compensate with typical thermal error or 0.06 percent of full scale in temperature range of 40 to 100 degrees F.
 - 3. Accuracy: One percent of full scale with repeatability 0.3 percent.
 - 4. Output: 0 to 5 vdc with power at 12 to 28 vdc.
- D. Equipment Operation (Current) Sensors:
 - 1. Status Inputs for Fans: Differential pressure switch with adjustable range of 0 to 5 inches wg.
 - 2. Status Inputs for Pumps: Differential pressure switch piped across pump with adjustable pressure differential range of 8 to 60 psi.
 - 3. Status Inputs for Electric Motors: Current sensing relay with current transformers, adjustable and set to 175 percent of rated motor current.
- E. Damper Position Indicators: Potentiometer mounted in enclosure with adjustable crank arm assembly connected to damper to transmit 0 to 100 percent damper travel.

2.05 THERMOSTATS

- A. Electric Room Thermostats: Matching Campus standard
 - 1. Provide sensor type matching existing campus standard.
 - a. Provide metal wall plate for common corridors, provide with LCD display in offices.
 - 2. Type: NEMA DC 3, 24 volts, with setback/setup temperature control.
 - 3. Service: Cooling and heating.
 - 4. Room thermostats shall be equipped with setpoint adjustment.
 - 5. Thermostats shall match owner standard.
- B. Room Thermostat Accessories:
 - 1. Insulating Bases: For thermostats located on exterior walls.
- C. Outdoor Reset Thermostats:

1. Remote bulb or bimetal rod and tube type, proportioning action with adjustable throttling range, adjustable setpoint.
- D. Immersion Thermostats:
 1. Remote bulb or bimetallic rod and tube type, proportional action with adjustable setpoint and adjustable throttling range.
- E. Airstream Thermostats:
 1. Remote bulb or bimetallic rod and tube type, proportional action with adjustable setpoint in middle of range and adjustable throttling range.
- F. Electric Low Limit Duct Thermostats:
 1. Snap acting, single pole, single throw, manual reset switch that trips if temperature sensed across any 12 inches of bulb length is equal to or below setpoint,
 2. Bulb length: Minimum 20 feet.
 3. Provide one thermostat for every 20 sq ft of coil surface.

2.06 TRANSMITTERS

- A. Building Static Pressure Transmitters:
 1. One pipe, direct acting, double bell, scale range 0.01 to 6.0 inch wg positive or negative, and sensitivity of 0.0005 inch wg. Transmit electronic signal to receiver with matching scale range.
- B. Pressure Transmitters:
 1. One pipe direct acting indicating type for gas, liquid, or steam service, range suitable for system, proportional electronic output.
- C. Air Pressure Transmitters:
 1. General: Provide dry media differential pressure transducers to monitor duct and room pressure.
 - a. Media Compatibility: Dry air.
 - b. Input Power: Class 2; 12 to 30 VDC; 2-wire: 20 mA max.
 - c. Output: Field selectable, 2-wire, loop-powered 4 to 20 mA (DC only, clipped and capped).
 - d. Pressure Ranges: 4 and 7, field selectable.
 - e. Response Time:
 - 1) Standard: T95 in 20 seconds.
 - 2) Fast: T95 in 2 seconds.
 - 3) Switch selectable.
 - f. Mode: Switch selectable, unidirectional.
- D. Temperature Transmitters:
 1. One pipe, directly proportional output signal to measured variable, linearity within plus or minus 1/2 percent of range for 200 degrees F span and plus or minus 1 percent for 50 degrees F span, with 50 degrees F. temperature range, compensated bulb, averaging capillary, or rod and tube operation on 20 psig input pressure and 3 to 15 psig output.
- E. Humidity Transmitters:
 1. One pipe, directly proportioned output signal to measured variable, linearity within plus or minus 1 percent for 70 percent relative humidity span, capable of withstanding 95 percent relative humidity without loss of calibration.

2.07 LOW COIL INPUT RELAYS

A. Manufacturers

1. Functional Devices, Inc.; RIB
 - a. Encoded relay Hi/Low separation 20 amp DPDT +Override.
 - b. UL Listed, UL916, UL864, C-UL and UL Accepted for use in Plenum, NEMA 1.
 - c. Power input: 120 Vac, 50-60 Hz or 208-277 Vac, 50-60 Hz as applicable.
 - d. Control Input: 5-25 Vac/dc. 50-60 Hz.
 - e. Relay status: LED on = activated.

2.08 AIR FLOW MEASURING STATION

A. Manufacturers:

1. Ebtron, Inc.; Model Advantage II Gold Series.
2. Air Monitor Corp.

B. Thermal dispersion airflow measurement device. Measuring device shall consist of one or more multi-point measuring probes and a single microprocessor-based transmitter. Transmitter shall have an LCD display capable of displaying airflow and temperature. Airflow shall be field configurable to be displayed as a velocity or volumetric rate.

C. Transmitter shall operate on 24 VAC.

D. Transmitter shall be capable of communicating with building automation system using one of the following interface options:

1. Linear analog output signal: Field selectable, fuse protected and isolated, 0-10 VDC and 4-20 mA (4-wire).
2. RS-485: Field selectable ModBus.
3. 10 Base-T Ethernet: Field selectable ModBus TCP and TCP/IP.
4. LonWorks Free Topology.

E. Sensors shall be fabricated of anodized aluminum alloy tube with 303/304 stainless steel mounting brackets.

F. Airflow/temperature measuring devices shall be UL listed.

2.09 VARIABLE FREQUENCY DRIVES

A. Manufacturer: Danfoss VLT.

B. Rated input voltage: See schedules.

C. Variable torque horsepower: See schedules.

D. Enclosure: Power electronics and control electronics housed in NEMA 1 enclosure.

E. Electro-mechanical construction:

1. Input voltage +/- 10 percent.
2. Output current overload rating of 125 percent of motor FLA for 1 minute.
3. Voltage source design using PWM inverter technology.
4. Microprocessor based control circuit generating sine coded PWM output current waveform.

F. Non-volatile memory (NV RAM); all programming is maintained when disconnected from power.

- G. Corrects displacement power factor to 98 percent throughout the motor speed range and eliminates power line notching, through the use of diode bridge input section or power factor correction capacitors and isolation transformer.
- H. Input phase insensitive, sequencing of the 3 phase input lines is not required.
- I. Fused DC bus with capacitive filtering.
- J. Insulated Gate Bipolar Transistors (IGBT) output, allowing motor noise, at 60 Hz, less than 2 dB (@ 1 meter) above that resulting from across the line operation.
- K. Three current transformers detect the output current to provide: Electronic thermal overload protection, Three phase current limit, Ground fault protection, Short circuit protection and Speed search capability.
- L. Digital operator keypad and display.
- M. Power electronics provide efficiency of 97 percent (minimum).
- N. Materials of construction UL 94-VO rated.
- O. Non-fused disconnect provided for motor service.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that systems are ready to receive work.
- C. Beginning of installation means installer accepts existing conditions.
- D. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Check and verify location of thermostats with plans and room details before installation. Locate 60 inches above floor. Align with lighting switches.
- C. Mount outdoor reset thermostats and outdoor sensors indoors, with sensing elements outdoors with sun shield.
- D. Provide separable sockets for liquids and flanges for air bulb elements.
- E. Provide valves with position indicators and with pilot positioners where sequenced with other controls.
- F. Provide mixing dampers of opposed blade construction arranged to mix streams. Provide pilot positioners on mixed air damper motors.
- G. Provide isolation (two position) dampers of parallel blade construction.

- H. Install damper motors on outside of duct in warm areas. Do not install motors in locations at outdoor temperatures.
- I. Mount control panels adjacent to associated equipment on vibration free walls or free standing angle iron supports. One cabinet may accommodate more than one system in same equipment room. Provide engraved plastic nameplates for instruments and controls inside cabinet and engraved plastic nameplates on cabinet face.
- J. Install "hand/off/auto" selector switches to override automatic interlock controls when switch is in "hand" position.
- K. Provide conduit and electrical wiring in accordance with Section 26 05 83. Electrical material and installation shall be in accordance with appropriate requirements of Division 26.

END OF SECTION

SECTION 23 09 23
DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. System description.
- B. Operator interface.
- C. Controllers.
- D. Power supplies and line filtering.
- E. System software.
- F. Controller software.
- G. HVAC control programs.

1.02 RELATED REQUIREMENTS

- A. Section 23 09 13 - Instrumentation and Control Devices for HVAC.

1.03 REFERENCE STANDARDS

- A. MIL-STD-810 - Environmental Engineering Considerations and Laboratory Tests; 2019h.
- B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Expand building Johnson Controls, Inc. building control system to interface with new equipment and perform the sequence of operation specified. Modify automation system graphics to delete removed equipment and add new equipment.
- B. Provide a color graphical representation of all systems. The graphical display shall include all points indicated in the pints list and any others required to achieve the sequences of operation. The graphical user interface shall consist of the following as a minimum;
 - 1. Menu bar navigation via windows-like bars.
 - 2. Navigation will also be available via an image of the building profile from which the user clicks on floors to bring up individual floor plans.
 - 3. The individual floor plan zones shall change color based upon the difference between the actual zone temperature and zone set point so that the operator can tell at a glance if zones are in, above or below acceptable ranges. A minimum of five (5) colors are required: Color 1 = within acceptable range of set point, Color 2 = warning - zone is above acceptable range of set point and approaching high temperature alarm; Color 3 = zone is in high temperature alarm; Color 4 = warning - zone is below acceptable range of set point and approaching low temperature alarm; Color 5 = zone is in low temperature alarm.
 - 4. Clicking on a floor plan zone shall bring up a dynamic color graphic of the mechanical equipment that serves that zone.
 - 5. Each major piece of mechanical equipment (terminal unit, AHU, boiler, chillers, cooling towers, etc.) shall have a pictorial dynamic color graphic. The central plant equipment may be

combined as appropriate on one or more graphic page.

6. Text-based (non-pictorial) summary screens will also be provided so that the operator may view critical information on multiple units at once. Summary screens will be provided for terminal units and air handling units. Summary screens for VAV/FPVAV boxes will contain as a minimum room temperature, room temperature set point, occ/unocc status and CFM for each box. Summary screens for AHUs will contain as a minimum space temperature (CV units) or discharge temperature (VAV units) and the corresponding set point, static pressure (VAV units), OA damper position, mixed air temperature, fan status and occ/unocc status.
7. Clicking on a unit on any summary screen shall bring up the complete graphic for that unit.
8. Outside air temperature shall be displayed on each graphic screen.

1.05 OPEN, INTEROPERABLE, INTEGRATED ARCHITECTURES

- A. The intent of this specification is to provide a peer-to-peer networked, stand-alone, distributed control system with the capability to integrate both the ANSI/ASHRAE Standard 135-1995 BACnet and LonWorks technology communication protocols in one open, interoperable system.
- B. The supplied computer software shall employ object-oriented technology (OOT) for representation of all data and control devices within the system. In addition, adherence to industry standards including ANSI/ASHRAE Standard 135-1995, BACnet and LonMark to assure interoperability between all system components is required. For each LonWorks device that does not have LonMark certification, the device supplier must provide a XIF file for the device. For each BACnet device, the device supplier must provide a PICS document showing the installed device = s-compliance level. Minimum compliance is Level 3; with the ability to support data read and write functionality. Physical connection of BACnet devices shall be via Ethernet.
- C. All components and controllers supplied under this contract shall be true peer-to-peer communicating devices. Components or controllers requiring polling by a host to pass data shall not be acceptable.
- D. The supplied system must incorporate the ability to access all data using Java enabled browsers without requiring proprietary operator interface and configuration programs. An Open Database Connectivity (ODBC) or Structured Query Language (SQL) compliant server database is required for all system database parameter storage. This data shall reside on a supplier-installed server for all database access. Systems requiring proprietary database and user interface programs shall not be acceptable.
- E. The installed system shall provide secure password access to all features, functions and data contained in the overall Building Management Control System (BMCS). Secure Socket Layer (SSL) encryption shall be an available option for remote access.
- F. The installed system must be totally scalable to allow for future expansion with the addition of controllers and/or input/output devices. It shall not be necessary to remove equipment supplied under this contract to expand the system.
- G. The failure of any single component or network shall not interrupt the control functions of non-affected devices. A single network failure shall only affect shared communications or shared data; individual application controllers and network controllers shall continue normal operation minus only the data from a remote device from the affected network. Automatic default values for all network transported data shall be provided to allow continued operation until the network is restored.

- H. The BMCS shall provide support for ODBC or SQL. An embedded database must be an ODBC-compliant database or must provide an ODBC data access mechanism to read and write data stored within it. A minimum offering would be the documentation of database schemes to allow users to read/write data into other applications using appropriate ODBC syntax.
- I. A hierarchical topology is required to assure reasonable system response times and to manage the flow and sharing of data.
 - 1. Maximum acceptable response time from any alarm occurrence (at the point of origin) to the point of annunciation shall not exceed 5 seconds for network connected user interfaces.
 - 2. Maximum acceptable response time from any alarm occurrence (at the point of origin) to the point of annunciation shall not exceed 60 seconds for remote or dial-up connected user interfaces.

1.06 WEB BROWSER CLIENTS

- A. The system shall be capable of supporting an unlimited number of clients using a standard Web browser such as Internet Explorer. Systems requiring additional software (to enable a standard Web browser) to be resident on the client machine, or manufacturer-specific browsers shall not be acceptable.
- B. The Web browser software shall run on any operating system and system configuration that is supported by the Web browser. Systems that require specific machine requirements in terms of processor speed, memory, etc., in order to allow the Web browser to function with the BMCS shall not be acceptable.
- C. The Web browser shall provide the same view of the system, in terms of graphics, schedules, calendars, logs, etc., and provide the same interface methodology as is provided by the Graphical User Interface (GUI). Systems that require different views or that require different means of interacting with objects such as schedules, or logs, shall not be permitted.
- D. The Web browser client shall support at a minimum, the following functions;
 - 1. User log-in identification and password shall be required. If an unauthorized user attempts access, a blank web page shall be displayed. Security using Java authentication and encryption techniques to prevent unauthorized access shall be implemented.
 - 2. Graphical screens developed for the GUI shall be the same screens used for the Web browser client. Any animated graphical objects supported by the GUI shall be supported by the Web browser interface.
 - 3. HTML programming shall not be required to display system graphics or data on a Web page. HTML editing of the Web page shall be allowed if the user desires a specific look or format.
 - 4. Storage of the graphical screens shall be in the Network Area Controller (NAC) without requiring any graphics to be stored on the client machine. Systems that require graphics storage on each client are not acceptable.

1.07 SUBMITTALS

- A. Product Data: Provide data for each system component and software module.
- B. Shop Drawings:
 - 1. Indicate trunk cable schematic showing programmable control unit locations, and trunk data conductors.

2. Indicate system graphics indicating monitored systems, data (connected and calculated) point addresses, and operator notations. Provide demonstration diskette containing graphics.
 3. Show system configuration with peripheral devices, batteries, power supplies, diagrams, modems, and interconnections.
 4. Indicate description and sequence of operation of operating, user, and application software.
- C. Project Record Documents: Record actual locations of control components, including control units, thermostats, and sensors.
1. Revise shop drawings to reflect actual installation and operating sequences.
- D. Operation and Maintenance Data:
1. Include interconnection wiring diagrams complete field installed systems with identified and numbered, system components and devices.
 2. Include keyboard illustrations and step-by-step procedures indexed for each operator function.
 3. Include inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.
- E. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Johnson Controls, Inc; Metasys. Jim Pierson - 708-418-2268.

2.02 SYSTEM DESCRIPTION

- A. Automatic temperature control field monitoring and control system using field programmable micro-processor based units.
- B. Base system on distributed system of fully intelligent, stand-alone controllers, operating in a multi-tasking, multi-user environment on token passing network, with central and remote hardware, software, and interconnecting wire and conduit.
- C. Include computer software and hardware, operator input/output devices, control units, local area networks (LAN), sensors, control devices, actuators.
- D. Controls for variable air volume terminals, radiation, reheat coils, unit heaters, fan coils, and the like when directly connected to the control units. Individual terminal unit control is specified in Section 23 09 13.
- E. Provide control systems consisting of thermostats, control valves, dampers and operators, indicating devices, interface equipment and other apparatus and accessories required to operate mechanical systems, and to perform functions specified.
- F. Include installation and calibration, supervision, adjustments, and fine tuning necessary for complete and fully operational system.

2.03 OPERATOR INTERFACE

- A. Interface new controller into existing Campus building automation system.
- B. Local Controller Display: JCI Model DIS1710.

1. Field equipment controller that is stand-alone display that provides a local user interface into applications running in the field controller. Display shall allow setpoints monitoring, setpoints adjustment, issue commands, change occupancy and other miscellaneous tasks.

2.04 CONTROLLERS

A. BUILDING CONTROLLERS

1. General:
 - a. Manage global strategies by one or more, independent, standalone, microprocessor based controllers.
 - b. Provide sufficient memory to support controller's operating system, database, and programming requirements.
 - c. Share data between networked controllers.
 - d. Controller operating system manages input and output communication signals allowing distributed controllers to share real and virtual object information and allowing for central monitoring and alarms.
 - e. Utilize real-time clock for scheduling.
 - f. Continuously check processor status and memory circuits for abnormal operation.
 - g. Controller to assume predetermined failure mode and generate alarm notification upon detection of abnormal operation.
 - h. Communication with other network devices to be based on assigned protocol.
2. Communication:
 - a. Controller to reside on a BACnet network using ISO 8802-3 (ETHERNET) Data Link/Physical layer protocol.
 - b. Perform routing when connected to a network of custom application and application specific controllers.
 - c. Provide service communication port for connection to a portable operator's terminal or handheld device with compatible protocol.
3. Anticipated Environmental Ambient Conditions:
 - a. Conditioned Space:
 - 1) Mount within dustproof enclosures.
 - 2) Rated for operation at 32 to 120 degrees F.
4. Provisions for Serviceability:
 - a. Diagnostic LEDs for power, communication, and processor.
 - b. Make all wiring connections to field removable, modular terminal strips, or to a termination card connected by a ribbon cable.
5. Memory: In the event of a power loss, maintain all BIOS and programming information for a minimum of 72 hours.
6. Power and Noise Immunity:
 - a. Maintain operation at 90 to 110 percent of nominal voltage rating.
 - b. Perform orderly shutdown below 80 percent of nominal voltage.
 - c. Operation protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W. at 3 feet.

B. CUSTOM APPLICATION CONTROLLERS

1. General:
 - a. Provide sufficient memory to support controller's operating system, database, and programming requirements.
 - b. Share data between networked, microprocessor based controllers.

- c. Controller operating system manages input and output communication signals allowing distributed controllers to share real and virtual object information and allowing for central monitoring and alarms.
- d. Utilize real-time clock for scheduling.
- e. Continuously check processor status and memory circuits for abnormal operation.
- f. Controller to assume predetermined failure mode and generate alarm notification upon detection of abnormal operation.
- g. Communication with other network devices to be based on assigned protocol.
- 2. Communication:
 - a. Controller to reside on a BACnet network using MS/TP Data Link/Physical layer protocol.
 - b. Provide service communication port for connection to a portable operator's terminal or handheld device with compatible protocol.
- 3. Anticipated Environmental Ambient Conditions:
 - a. Outdoors and/or in Wet Ambient Conditions:
 - 1) Mount within waterproof enclosures.
 - 2) Rated for operation at 40 to 150 degrees F.
 - b. Conditioned Space:
 - 1) Mount within dustproof enclosures.
 - 2) Rated for operation at 32 to 120 degrees F.
- 4. Provisions for Serviceability:
 - a. Diagnostic LED's for power, communication, and processor.
 - b. Make all wiring connections to field removable, modular terminal strips, or to a termination card connected by a ribbon cable.
- 5. Memory: In the event of a power loss, maintain all BIOS and programming information for a minimum of 72 hours.
- 6. Power and Noise Immunity:
 - a. Maintain operation at 90 to 110 percent of nominal voltage rating.
 - b. Perform orderly shutdown below 80 percent of nominal voltage.
 - c. Operation protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W. at 3 feet.

C. INPUT/OUTPUT INTERFACE

- 1. Hardwired inputs and outputs tie into the DDC system through building, custom application, or application specific controllers.
- 2. All Input/Output Points:
 - a. Protect controller from damage resulting from any point short-circuiting or grounding and from voltage up to 24 volts of any duration.
 - b. Provide universal type for building and custom application controllers where input or output is software designated as either binary or analog type with appropriate properties.
- 3. Binary Inputs:
 - a. Allow monitoring of On/Off signals from remote devices.
 - b. Provide wetting current of 12 mA minimum, compatible with commonly available control devices and protected against the effects of contact bounce and noise.
 - c. Sense dry contact closure with power provided only by the controller.
- 4. Pulse Accumulation Input Objects: Conform to all requirements of binary input objects and accept up to 10 pulses per second.
- 5. Analog Inputs:

- a. Allow for monitoring of low voltage 0 to 10 VDC, 4 to 20 mA current, or resistance signals (thermistor, RTD).
 - b. Compatible with and field configurable to commonly available sensing devices.
- 6. Binary Outputs:
 - a. Used for On/Off operation or a pulsed low-voltage signal for pulse width modulation control.
 - b. Outputs provided with three position (On/Off/Auto) override switches.
 - c. Status lights for building and custom application controllers to be selectable for normally open or normally closed operation.
- 7. Analog Outputs:
 - a. Monitoring signal provides a 0 to 10 VDC or a 4 to 20 mA output signal for end device control.
 - b. Provide status lights and two position (AUTO/MANUAL) switch for building and custom application controllers with manually adjustable potentiometer for manual override on building and custom application controllers.
 - c. Drift to not exceed 0.4 percent of range per year.
- 8. Tri State Outputs:
 - a. Coordinate two binary outputs to control three point, floating type, electronic actuators without feedback.
 - b. Limit the use of three point, floating devices to the following zone and terminal unit control applications:
 - c. Control algorithms run the zone actuator to one end of its stroke once every 24 hours for verification of operator tracking.
- 9. System Object Capacity:
 - a. System size to be expandable to twice the number of input output objects required by providing additional controllers, including associated devices and wiring.
 - b. Hardware additions or software revisions for the installed operator interfaces are not to be required for future, system expansions.

2.05 POWER SUPPLIES AND LINE FILTERING

- A. Power Supplies:
 - 1. Provide UL listed control transformers with Class 2 current limiting type or over-current protection in both primary and secondary circuits for Class 2 service as required by the NEC.
 - 2. Limit connected loads to 80 percent of rated capacity.
 - 3. Match DC power supply to current output and voltage requirements.
 - 4. Unit to be full wave rectifier type with output ripple of 5.0 mV maximum peak to peak.
 - 5. Regulation to be 1 percent combined line and load with 100 microsecond response time for 50 percent load changes.
 - 6. Provide over-voltage and over-current protection to withstand a 150 percent current overload for 3 seconds minimum without trip-out or failure.
 - 7. Operational Ambient Conditions: 32 to 120 degrees F.
 - 8. EM/RF meets FCC Class B and VDE 0871 for Class B and MIL-STD 810 for shock and vibration.
 - 9. Line voltage units UL recognized and CSA approved.
- B. Power Line Filtering:
 - 1. Provide external or internal transient voltage and surge suppression component for all workstations and controllers.
 - 2. Minimum surge protection attributes:

- a. Dielectric strength of 1000 volts minimum.
- b. Response time of 10 nanoseconds or less.
- c. Transverse mode noise attenuation of 65 dB or greater.
- d. Common mode noise attenuation of 150 dB or greater at 40 to 100 Hz.

2.06 FIELD DEVICES

A. Networked Thermostat (NT)

1. The NT shall communicate over the Field Controller Bus using BACnet Standard MS/TP Bus Protocol ASHRAE SSPC-135, Clause 9.
 - a. The NT shall be BACnet Testing Labs (BTL) certified and carry the BTL Label.
 - b. The NT shall be tested and certified as a BACnet Application Specific Controller (B-ASC).
 - c. A BACnet Protocol Implementation Conformance Statement shall be provided for the NT.
 - d. The Conformance Statement shall be submitted 10 days prior to bidding.
2. The Networked Thermostat shall support remote read/write and parameter adjustment from the web based User Interface through a Network Automation Engine.
3. The Networked Thermostat shall include an intuitive User Interface providing plain text messages.
 - a. Two line, 8 character backlit display
 - b. LED indicators for Fan, Heat, and Cool status
 - c. Five (5) User Interface Keys
 - 1) Mode
 - 2) Fan
 - 3) Override
 - 4) Degrees C/F
 - 5) Up/Down
 - d. The display shall continuously scroll through the following parameters:
 - 1) Room Temperature
 - 2) System Mode
 - 3) Schedule Status - Occupied/Unoccupied/Override
 - 4) Applicable Alarms
4. The Networked Thermostat shall provide the flexibility to support any one of the following inputs:
 - a. Integral Indoor Air Temperature Sensor
 - b. Duct Mount Air Temperature Sensor
 - c. Remote Indoor Air Temperature Sensor with Occupancy Override and LED Indicator
 - d. Two configurable binary inputs
5. The Networked Thermostat shall provide the flexibility to support any one of the following outputs:
 - a. Three Speed Fan Control
 - b. Two On/Off
 - c. Two Floating
 - d. Two Proportional (0 to 10V)
6. The Networked Thermostat shall provide a minimum of six (6) levels of keypad lockout.
7. The Networked Thermostat shall provide the flexibility to adjust the following parameters:
 - a. Adjustable Temporary Occupancy from 0 to 24 hours
 - b. Adjustable heating/cooling deadband from 2° F to 5° F
 - c. Adjustable heating/cooling cycles per hour from 4 to 8

8. Where required by application and indicated on plans or room schedules provide the Networked Thermostat with an integral Passive Infra-Red (PIR) occupancy sensor.
9. The Networked Thermostat shall employ nonvolatile electrically erasable programmable read-only memory (EEPROM) for all adjustable parameters.

2.07 LOCAL AREA NETWORK (LAN)

- A. Provide communication between control units over local area network (LAN).
- B. Break in Communication Path: Alarm and automatically initiate LAN reconfiguration.
- C. LAN Data Speed: Minimum 19.2 Kb.
- D. Communication Techniques: Allow interface into network by multiple operation stations and by auto-answer/auto-dial modems. Support communication over telephone lines utilizing modems.
- E. Transmission Median: Fiber optic or single pair of solid 24 gage twisted, shielded copper cable.
- F. Network Support: Time for global point to be received by any station, shall be less than 3 seconds. Provide automatic reconfiguration if any station is added or lost. If transmission cable is cut, reconfigure two sections with no disruption to system's operation, without operator intervention.

2.08 CONTROLLER SOFTWARE

- A. All applications reside and operate in the system controllers and editing of all applications occurs at the operator workstation.
- B. System Security:
 1. User access secured via user passwords and usernames.
 2. Passwords restrict user to the objects, applications, and system functions as assigned by the system manager.
 3. User Log On/Log Off attempts are recorded.
 4. Automatic Log Off occurs following the last keystroke after a user defined delay time.
- C. Object or Object Group Scheduling:
 1. Weekly Schedules Based on Separate, Daily Schedules:
 - a. Include start, stop, optimal stop, and night economizer.
 - b. 10 events maximum per schedule.
 - c. Start/stop times adjustable for each group object.
- D. Provide standard application for equipment coordination and grouping based on function and location to be used for scheduling and other applications.
- E. Alarms:
 1. Binary object is set to alarm based on the operator specified state.
 2. Analog object to have high/low alarm limits.
 3. All alarming is capable of being automatically and manually disabled.
 4. Alarm Reporting:
 - a. Operator determines action to be taken for alarm event.
 - b. Alarms to be routed to appropriate workstation.
 - c. Reporting Options:
- F. Maintenance Management: System monitors equipment status and generates maintenance messages based upon user-designated run-time limits.

- G. Sequencing: Application software based upon specified sequences of operation shown on the Drawings.
- H. PID Control Characteristics:
 - 1. Direct or reverse action.
 - 2. Anti-windup.
 - 3. Calculated, time-varying, analog value, positions an output or stages a series of outputs.
 - 4. User selectable controlled variable, set-point, and PED gains.
- I. Staggered Start Application:
 - 1. Prevents all controlled equipment from simultaneously restarting after power outage.
 - 2. Order of equipment startup is user selectable.
- J. On-Off Control with Differential:
 - 1. Algorithm allows binary output to be cycled based on a controlled variable and set-point.
 - 2. Algorithm to be direct-acting or reverse-acting incorporating an adjustable differential.
- K. Run-Time Totalization:
 - 1. Totalize run-times for all binary input objects.
 - 2. Provides operator with capability to assign high run-time alarm.

2.09 HVAC CONTROL PROGRAMS

- A. General:
 - 1. Support Inch-pounds and SI (metric) units of measurement.
 - 2. Identify each HVAC Control system.
- B. Optimal Run Time:
 - 1. Control start-up and shutdown times of HVAC equipment for both heating and cooling.
 - 2. Based on occupancy schedules, outside air temperature, seasonal requirements, and interior room mass temperature.
 - 3. Start-up systems by using outside air temperature, room mass temperatures, and adaptive model prediction for how long building takes to warm up or cool down under different conditions.
 - 4. Use outside air temperature to determine early shut down with ventilation override.
- C. Supply Air Reset:
 - 1. Monitor heating and cooling loads in building spaces, terminal reheat systems, and single zone unit discharge temperatures.
- D. Enthalpy Switchover:
 - 1. Calculate outside and return air enthalpy using measured temperature and relative humidity; determine energy expended and control outside and return air dampers.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that conditioned power supply is available to the control units and to the operator workstation. Verify that field end devices, wiring, and pneumatic tubing is installed prior to installation proceeding.

3.02 INSTALLATION

- A. Install control units and other hardware in position on permanent walls where not subject to excessive vibration.
- B. Install software in control units and in operator workstation. Implement all features of programs to specified requirements and appropriate to sequence of operation.
- C. Provide conduit and electrical wiring in accordance with Section 26 05 00. Electrical material and installation shall be in accordance with appropriate requirements of Division 26.
 - 1. Provide conduit for all control wiring exposed to view. This includes but is not limited to all storage rooms, mechanical rooms, and similar spaces.
 - 2. Provide conduit for all control wiring concealed in inaccessible spaces. This includes but is not limited to wiring above/behind drywall and plaster ("hard") ceilings or soffits, and wiring within vertical chase spaces, regardless of whether access doors are provided or not.
 - 3. Control wiring that is concealed above readily accessible ceilings such as acoustical lay-in ceilings, need not be run in conduit.
- D. All exposed conduit wiring that is not located above an accessible ceiling shall be installed in conduit. This includes all storage room, mechanical rooms, etc.

3.03 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate complete and operating system to Owner.

END OF SECTION

SECTION 23 21 13 HYDRONIC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Hydronic system requirements.
- B. Heating water piping, above grade.
- C. Chilled water piping, above grade.
- D. Pipe hangers and supports.
- E. Unions, flanges, mechanical couplings, and dielectric connections.
- F. Valves:
 - 1. Ball valves.
 - 2. Butterfly valves.
 - 3. Check valves.

1.02 RELATED REQUIREMENTS

- A. Section 23 07 19 - HVAC Piping Insulation.
- B. Section 23 21 14 - Hydronic Specialties.

1.03 REFERENCE STANDARDS

- A. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2021.
- B. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2021.
- C. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2021.
- D. ASME B31.9 - Building Services Piping; 2020.
- E. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.
- F. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2023a.
- G. ASTM B32 - Standard Specification for Solder Metal; 2020.
- H. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2022.
- I. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2020.
- J. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers; 1992 (Reapproved 2022).
- K. ASTM F1476 - Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications; 2007 (Reapproved 2019).
- L. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2019.
- M. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2023).

N. AWWA C606 - Grooved and Shouldered Joints; 2022.

O. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018, with Amendment (2019).

1.04 SUBMITTALS

A. Manufacturer's Installation Instructions: Indicate hanging and support methods, joining procedures.

B. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified in this section, with minimum three years of experience.

1.06 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.

1.07 WARRANTY

A. Provide 50 year limited warranty on press fittings from date of installation.

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. 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.

1. Where grooved joints are used in piping, provide grooved valve/equipment connections if available; if not available, provide flanged ends and grooved flange adapters.

D. Valves: Provide valves where indicated:

1. Provide drain valves where indicated, and if not indicated provide at least at main shut-off, low points of piping, bases of vertical risers, and at equipment. Use 3/4 inch gate valves with cap; pipe to nearest floor drain.
2. Isolate equipment using butterfly valves with lug end flanges or grooved mechanical couplings.
3. For throttling, bypass, or manual flow control services, use ball or butterfly valves.

4. For throttling and isolation service in chilled and condenser water systems, use only butterfly valves.
5. In heating water or chilled water systems, butterfly valves may be used interchangeably with gate and globe valves.
6. For shut-off and to isolate parts of systems or vertical risers, use ball or butterfly valves.

E. Welding Materials and Procedures: Conform to ASME BPVC-IX.

2.02 HEATING WATER PIPING, ABOVE GRADE

- A. Steel Pipe: ASTM A53/A53M, Schedule 40, black, using one of the following joint types:
 1. Welded Joints: ASTM A234/A234M, wrought steel welding type fittings; AWS D1.1/D1.1M welded.
 2. Threaded Joints: ASME B16.3, malleable iron fittings.
- B. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), drawn, using one of the following joint types:
 1. Fittings: ASME B16.18, cast brass/bronze or ASME B16.22, wrought copper and bronze.
 2. Solder Joints:
 - a. Solder: ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.
 - b. Braze: AWS A5.8M/A5.8 BCuP copper/silver alloy.
 3. Tee Connections: Mechanically extracted collars with notched and dimpled branch tube.
 4. Mechanical Press Sealed Fittings: Double pressed type complying with ASME B16.22, utilizing EPDM, non toxic synthetic rubber sealing elements. Sealing elements shall be factory installed by fitting manufacturer. Press ends shall have means to indicate non-pressed fitting during pressure test.
 - a. Manufacturers:
 - 1) Viega LLC.
 - 2) Nibco.

2.03 CHILLED WATER PIPING, ABOVE GRADE

- A. Steel Pipe: ASTM A53/A53M, Schedule 40, black; using one of the following joint types:
 1. Welded Joints: ASTM A234/A234M, wrought steel welding type fittings; AWS D1.1/D1.1M welded.
 2. Threaded Joints: ASME B16.3, malleable iron fittings.
- B. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), hard drawn; using one of the following joint types:
 1. Fittings: ASME B16.18, cast brass/bronze or ASME B16.22, wrought copper and bronze.
 2. Solder Joints:
 - a. Solder: ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.
 - b. Braze: AWS A5.8M/A5.8 BCuP copper/silver alloy.
 3. Tee Connections: Mechanically extracted collars with notched and dimpled branch tube.
 4. Mechanical Press Sealed Fittings: Double pressed type complying with ASME B16.22, utilizing EPDM, non toxic synthetic rubber sealing elements. Sealing elements shall be factory installed by fitting manufacturer. Press ends shall have means to indicate non-pressed fitting during pressure testing.
 - a. Manufacturers:
 - 1) Viega LLC.
 - 2) Nibco.

2.04 EQUIPMENT DRAINS AND OVERFLOWS

- A. Steel Pipe: ASTM A53/A53M, Schedule 40 galvanized; using one of the following joint types:
 - 1. Threaded Joints: Galvanized cast iron, or ASME B16.3 malleable iron fittings.
 - 2. Grooved Joints: AWWA C606 grooved pipe, fittings of same material, and mechanical couplings.
- B. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), drawn; using one of the following joint types:
 - 1. Solder Joints: ASME B16.18 cast brass/bronze or ASME B16.22 solder wrought copper fittings; ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.
 - 2. Grooved Joints: AWWA C606 grooved pipe, fittings of same material, and mechanical couplings.

2.05 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. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Carbon steel, adjustable swivel, split ring.
- C. Hangers for Cold Pipe Sizes 2 Inches and Greater: Carbon steel, adjustable, clevis.
- D. Hangers for Hot Pipe Sizes 2 to 4 Inches: Carbon steel, adjustable, clevis.
- E. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
- F. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
- G. Vertical Support: Steel riser clamp.
- H. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
- I. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
- J. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- K. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.
- L. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.
- M. 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.

2.06 UNIONS, FLANGES, MECHANICAL COUPLINGS, AND DIELECTRIC CONNECTIONS

- A. Unions for Pipe 2 Inches and Less:
 - 1. Ferrous Piping: 150 psig malleable iron, threaded.
 - 2. Copper Pipe: Bronze, soldered joints.
- B. Flanges for Pipe 2 Inches and Greater:
 - 1. Ferrous Piping: 150 psig forged steel, slip-on.

2. Copper Piping: Bronze.
 3. Gaskets: 1/16 inch thick preformed neoprene.
- 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. Housing Material: Ductile iron, galvanized complying with ASTM A536.
 4. Gasket Material: EPDM suitable for operating temperature range from minus 30 degrees F to 230 degrees F.
 5. Bolts and Nuts: Hot dipped galvanized or zinc-electroplated steel.
 6. When pipe is field grooved, provide coupling manufacturer's grooving tools.
- D. Dielectric Connections:
1. Waterways:
 - a. Water impervious insulation barrier capable of limiting galvanic current to 1 percent of short circuit current in a corresponding bimetallic joint.
 - b. Dry insulation barrier able to withstand 600 volt breakdown test.
 - c. Construct of galvanized steel with threaded end connections to match connecting piping.
 - d. Suitable for the required operating pressures and temperatures.
 2. Flanges:
 - a. Dielectric flanges with same pressure ratings as standard flanges.
 - b. Water impervious insulation barrier capable of limiting galvanic current to 1 percent of short circuit current in a corresponding bimetallic joint.
 - c. Dry insulation barrier able to withstand 600 volt breakdown test.
 - d. Construct of galvanized steel with threaded end connections to match connecting piping.
 - e. Suitable for the required operating pressures and temperatures.

2.07 BALL VALVES

- A. Manufacturers:
1. Nibco, Inc; Model S-585-70-66.
 2. Watts.
 3. Apollo.
- B. 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.
- C. Over 2 Inches:
1. Ductile iron body, chrome plated stainless steel ball, teflon or Virgin TFE seat and stuffing box seals, lever handle, flanged ends, rated to 800 psi.

2.08 BUTTERFLY VALVES

- A. Manufacturers:
1. Nibco; Model LD 2000.
 2. Crane Valve.
 3. Milwaukee Valve Company.

- B. Body: Ductile iron with resilient molded-in EPDM seat, lug ends, extended neck.
- C. Disc: Construct of aluminum bronze, geometric drive (one piece stem, no pin through disc).
- D. Stem: Stainless steel with stem offset from the centerline to provide full 360 degree circumferential setting.
- E. Operator: 10 position lever handle.

2.09 SWING CHECK VALVES

- A. Manufacturers:
 - 1. Nibco, Inc.
 - 2. Stockham.
 - 3. Grinnell.
 - 4. Jomar.
- B. Up To and Including 2 Inches:
 - 1. Bronze body, bronze trim, bronze rotating swing disc, with composition disc, solder ends.
 - 2. Nibco Model S-433-Y.
- C. Over 2 Inches:
 - 1. Iron body, bronze trim, bronze faced rotating swing disc, renewable disc and seat, flanged ends.
 - 2. Nibco Model F-918-B.

2.10 SPRING LOADED CHECK VALVES

- A. Manufacturers:
 - 1. Nibco, Inc.
 - 2. Hammond Valve.
 - 3. Milwaukee Valve Company.
- B. Iron body, bronze trim, split plate, hinged with stainless steel spring, resilient seal bonded to body, wafer or threaded lug ends.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections to equipment using jointing system specified.
- D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.
- E. After completion, fill, clean, and treat systems.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Press connections: Copper and copper alloy press connections shall be made in accordance with the manufacturer's installation instructions. The tubing shall be fully inserted into the fitting and the

tubing marked at the shoulder of the fitting. The fitting alignment shall be checked against the mark on the tubing to assure the tubing is fully inserted in the fitting. The joints shall be pressed using the tool(s) approved by the manufacturer.

- C. Route piping in orderly manner, parallel to building structure, and maintain gradient.
- D. Install piping to conserve building space and to avoid interference with use of space.
- E. Group piping whenever practical at common elevations.
- F. Sleeve pipe passing through partitions, walls and floors.
- G. Provide sleeve and watertight mechanical seal on all underground floor and wall penetrations.
- H. Slope piping and arrange to drain at low points.
- I. Pipe Hangers and Supports:
 - 1. Install in accordance with ASME B31.9, ASTM F708, or MSS SP-58.
 - 2. Support horizontal piping as scheduled.
 - 3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 - 4. Place hangers within 12 inches of each horizontal elbow.
 - 5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 - 6. Support vertical piping at every floor. Support riser piping independently of connected horizontal piping.
 - 7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
 - 8. Provide copper plated hangers and supports for copper piping.
- J. Use eccentric reducers to maintain top of pipe level.
- K. Install valves with stems upright or horizontal, not inverted.

3.03 SCHEDULES

- A. 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.
 - 4. 2-1/2 inch: Maximum span, 9 feet; minimum rod size, 3/8 inch.
 - 5. 3 inch: Maximum span, 10 feet; minimum rod size, 3/8 inch.
 - 6. 4 inch: Maximum span, 12 feet; minimum rod size, 1/2 inch.
- B. 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.

END OF SECTION

SECTION 23 21 14 HYDRONIC SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Air vents.
- B. Strainers.
- C. Automatic flow control valves.
- D. Combination pump discharge valves.
- E. Pressure-temperature test plugs.

1.02 RELATED REQUIREMENTS

- A. Section 23 21 13 - Hydronic Piping.

1.03 SUBMITTALS

- A. 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 and model.
- B. Project Record Documents: Record actual locations of flow controls.
- C. Maintenance Data: Include installation instructions, assembly views, lubrication instructions, and replacement parts list.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.05 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 AIR VENTS

- A. Manufacturers:
 - 1. ITT Bell & Gossett.
 - 2. Taco, Inc.
 - 3. Armstrong Fluid Technology.
- B. 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.

C. Float Type:

1. Brass or semi-steel body, copper, polypropylene, or solid non-metallic float, stainless steel valve and valve seat; suitable for system operating temperature and pressure; with isolating valve.
2. Cast iron body and cover, float, bronze pilot valve mechanism suitable for system operating temperature and pressure; with isolating valve.

2.02 STRAINERS

A. Manufacturers:

1. Wilkins.
2. Watts Regulator.

B. Size 2 inch and Under:

1. Screwed brass or iron body for 175 psi working pressure, Y pattern with 1/32 inch stainless steel perforated screen.

C. Size 2-1/2 inch to 4 inch:

1. Provide flanged or grooved iron body for 175 psi working pressure, Y pattern with 3/64 inch stainless steel perforated screen.

2.03 PUMP CONNECTORS

A. Flexible Connectors: Flanged, braided type with wetted components of stainless steel, sized to match piping.

1. Maximum Operating Service: 150 psi at 240 degrees F.
2. End Connections: Same as specified for pipe jointing.
3. Provide necessary accessories including, but not limited to, swivel joints.

2.04 COMBINATION PUMP DISCHARGE VALVES

A. Manufacturers:

1. ITT Bell & Gossett.
2. Armstrong Fluid Technology.
3. Taco, Inc.

B. Valves: Straight or angle pattern, flanged cast-iron valve body with bolt-on bonnet for 175 psi operating pressure, non-slam check valve with spring-loaded bronze disc and seat, stainless steel stem, and calibrated adjustment permitting flow regulation.

2.05 PRESSURE-TEMPERATURE TEST PLUGS

A. Manufacturers:

1. Ferguson Enterprises Inc.
2. Peterson Equipment Company Inc.
3. Sisco Manufacturing Company Inc.

B. Construction: Brass body designed to receive temperature or pressure probe with removable protective cap, and Neoprene rated for minimum 200 degrees F.

C. Application: Use extended length plugs to clear insulated piping.

2.06 AUTOMATIC FLOW CONTROL VALVES

- A. Manufacturers:
 - 1. Nexus.
 - 2. Flow Design.
 - 3. Griswold controls.
 - 4. Hays Fluid Controls.
- B. Construction: Brass or bronze body with union on inlet, temperature and pressure test plug on inlet and outlet with blowdown/backflush drain.
- C. Calibration: Control flow within 5 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, maximum minimum pressure 3.5 psi.
- D. Control Mechanism:
 - 1. Stainless steel or nickel plated brass piston or regulator cup, operating against stainless steel helical or wave formed spring. Internal flow cartridge shall be permanently marked with GPM and spring range. Cartridge shall be removable for changeout.
 - 2. Precision sculptured brass or polyphenylsulfone orifice with high temperature elastomeric diaphragm. Internal flow parts shall be permanently marked with flow performance. Components shall be removable for changeout.
- E. Accessories: In-line strainer on inlet and ball valve on outlet.

2.07 MULTI-PORT PRESSURE MANIFOLD

- A. Manufacturers:
 - 1. Flow Conditioning Corp: Trumpet Valve.
 - 2. Hydronic Monitor Co., Inc.
- B. One piece manifold of brass construction with ports for connection to hydronic system. Spring return pushbuttons, gauge connection port and test port connection for gauge calibration.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install specialties in accordance with manufacturer's instructions.
- B. Provide manual air vents at system high points and as indicated.
- C. For automatic air vents in ceiling spaces or other concealed locations, provide vent tubing to nearest drain.
- D. Provide valved drain and hose connection on strainer blow down connection.

END OF SECTION

SECTION 23 21 23 HYDRONIC PUMPS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. In-line circulators.

1.02 RELATED REQUIREMENTS

- A. Section 23 07 19 - HVAC Piping Insulation.
- B. Section 23 21 13 - Hydronic Piping.
- C. Section 23 21 14 - Hydronic Specialties.
- D. Section 26 05 83 - Wiring Connections: 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. 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.
- B. Operation and Maintenance Data: Include installation instructions, assembly views, lubrication instructions, and replacement parts list.
- C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

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. Armstrong Fluid Technology.
- B. ITT Bell & Gossett.
- C. Taco, Inc.

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 IN-LINE CIRCULATORS

- A. Type: Three-piece booster pump, horizontal shaft, single stage, direct connected, with resiliently mounted motor for in-line mounting, oil lubricated, for 125 psi maximum working pressure.
- B. Casing: Cast iron, with flanged pump connections.
- C. Impeller: Non-ferrous keyed to shaft.
- D. Bearings: Oil-lubricated bronze sleeve.
- E. Shaft: Heat treated carbon steel with bronze sleeve, integral thrust collar.
- F. Seal: Mechanical seal, 225 degrees F maximum continuous operating temperature.
- G. Drive: Flexible coupling.

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.
- C. Provide line sized shut-off valve and strainer on pump suction, and line sized combination pump discharge valve on pump discharge.
- D. Lubricate pumps before start-up.

END OF SECTION

SECTION 23 31 00 HVAC DUCTS AND CASINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal ductwork.
- B. Flexible ducts.
- C. Duct cleaning.

1.02 RELATED REQUIREMENTS

- A. Section 07 84 00 - Firestopping.
- B. Section 23 07 13 - Duct Insulation: External insulation.
- C. Section 23 33 00 - Air Duct Accessories.
- D. Section 23 36 00 - Air Terminal Units.
- E. Section 23 37 00 - Air Outlets and Inlets.

1.03 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023c.
- D. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.
- E. SMACNA (LEAK) - HVAC Air Duct Leakage Test Manual; Sheet Metal and Air Conditioning Contractors' National Association; 2012, 2nd Edition.
- F. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.
- G. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. Shop Drawings: Indicate duct fittings, particulars such as gages, sizes, welds, and configuration prior to start of work for air systems.
- B. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum 3 years of documented experience.

1.06 REGULATORY REQUIREMENTS

- A. Construct ductwork to NFPA 90A standards.

1.07 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 MATERIALS

- A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G90/Z275 coating.
- B. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
 - 1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
 - 2. VOC Content: Not more than 250 g/L, excluding water.
 - 3. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.
 - 4. For Use With Flexible Ducts: UL labeled.
- C. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

D. Hanger Cable & Fastener:

1. Cable: Galvanized high tensile steel cable to EN12385. Standard lengths from 5 ft - 30 ft.

	No. 1	No. 2	No. 3 (Standard)	No. 3 (Trapeze)	No. 4	No. 5
Cable Dia. (in.)	1/16	5/64	1/8	1/8	3/16	1/4
Strand configuration	7x7	7x7	7x7	1x19	7x19	7x19
Min. breaking load (lbs)	125	500	1,000	600	2,475	3,575
Max. safe working load (lbs)	25	100	200	200	495	715
Tensile strength (lbs/sq. in.)	256,700	256,700	256,700	256,700	256,700	256,700

2. Fastener:

- a. Housing: Type ZA2 Zinc.
- b. Wedge: Sintered steel hardened to minimum 56 Rockwell C.
- c. Spring: Stainless steel, Type 302.
- d. End Cap: No. 1-4 = UV stabilized homopolymer polypropylene; No. 5 = Type ZA2 zinc.
- e. Screws: No. 5 only = Stainless steel, Type 304

3. Load Rating: All products 5:1 safety factor.

4. Size Maximum Safe Working Load

No. 1	25 lbs
No. 2	100 lbs
No. 3	200 lbs
No. 4	495 lbs
No. 5	715 lbs

5. Manufacturers:

- a. Gripple Inc.: Air Flow Company, Inc., Tom Class - 630-400-3344.

E. Ducts: Galvanized steel, unless otherwise indicated.

F. Low Pressure Supply (System with Cooling Coils): 2 inch w.g. pressure class, galvanized steel.

G. Medium and High Pressure Supply: 4 inch w.g. pressure class, galvanized steel.

H. Return and Relief: 1 inch w.g. pressure class, galvanized steel.

I. General Exhaust: 1 inch w.g. pressure class, galvanized steel.

J. Ductmate or WDCI duct connection systems are acceptable. Ductwork constructed using these systems shall refer to manufacturer's recommendations for sheet metal gage intermediate and joint reinforcement.

K. Interior gaskets for flanged connections shall be Ductmate 440 butyl rubber.

2.02 DUCTWORK FABRICATION

- A. Fabricate and support in accordance with SMACNA (DCS) and as indicated.
- B. No variation of duct configuration or size permitted except by written permission. Size round duct installed in place of rectangular ducts in accordance with ASHRAE (FUND) Handbook - Fundamentals.
- C. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- D. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows must be used, provide air foil turning vanes of perforated metal with glass fiber insulation.
- E. Provide turning vanes of perforated metal with glass fiber insulation when acoustical lining is indicated.
- F. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- G. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA (DCS).
- H. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Use same material as duct, painted black on exterior side; seal to louver frame and duct.

2.03 MANUFACTURED DUCTWORK AND FITTINGS

- A. Flexible Ducts: UL 181, Class 1, polyethylene film, mechanically fastened and rolled using galvanized steel to form a spiral helix.
 - 1. Insulation: R6 insulation with aluminized vapor barrier film.
 - 2. Insulation: None.
 - 3. Pressure Rating: 10 in-wc positive and 5 in-wc negative.
 - 4. Maximum Velocity: 5500 fpm.
 - 5. Temperature Range: Minus 20 degrees F to 250 degrees F.
 - 6. Manufacturers:
 - a. Flexmaster USA, a brand of Masterduct, Inc; Type 1.
 - b. Thermaflex; Model MKE.
- B. Medium Pressure Flexible Ducts: UL 181, Class 1, aluminized laminate, mechanically fastened and rolled using galvanized steel to form a spiral helix.
 - 1. Insulation: R6 insulation with aluminized vapor barrier film.
 - 2. Inner Core: Tri-laminate of polyester, fiberglass, and aluminum foil.
 - 3. Pressure Rating: 15 in-wc positive and 5 in-wc negative.
 - 4. Maximum Velocity: 5500 fpm.
 - 5. Temperature Range: Minus 20 degrees F to 250 degrees F.
 - 6. Manufacturers:
 - a. Flexmaster USA, a brand of Masterduct, Inc; Type 5.
 - b. Thermaflex; Model MKC.

- C. Transverse Duct Connection System: SMACNA "E" rated rigidly class connection, interlocking angle and duct edge connection system with sealant, gasket, cleats, and corner clips in accordance with SMACNA (DCS).

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install, support, and seal ducts in accordance with SMACNA (DCS).
- B. Install in accordance with manufacturer's instructions.
- C. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- D. Flexible Ducts: Connect to metal ducts with mechanical fastener.
- E. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.
- F. Duct sizes indicated shall be of sizes indicated. However, necessary changes in shape offsets or crossovers to clear piping, lighting, building construction obstructions, etc. shall be made without additional cost.
- G. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.
- H. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- I. Use double nuts and lock washers on threaded rod supports.
- J. Connect terminal units to supply ducts directly or with 1 foot maximum length of flexible duct. Do not use flexible duct to change direction.
- K. 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.

3.02 CLEANING

- A. Clean duct system and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air, clean half the system at a time. Protect equipment that could be harmed by excessive dirt with temporary filters, or bypass during cleaning.

END OF SECTION

SECTION 23 33 00 AIR DUCT ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Backdraft dampers - metal.
- B. Duct access doors.
- C. Duct test holes.
- D. Fire dampers.
- E. Flexible duct connections and forming brace.
- F. Volume control dampers.
- G. Miscellaneous products:
 - 1. Internal strut end plugs.
 - 2. Duct opening closure film.

1.02 RELATED REQUIREMENTS

- A. Section 23 31 00 - HVAC Ducts and Casings.
- B. Section 23 36 00 - Air Terminal Units: Pressure regulating damper assemblies.

1.03 REFERENCE STANDARDS

- A. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.

1.04 SUBMITTALS

- A. Shop Drawings: Indicate for shop fabricated assemblies including volume control dampers.
- B. Manufacturer's Installation Instructions: Provide instructions for fire dampers.
- C. Project Record Drawings: Record actual locations of access doors and test holes.

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.

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. Manufacturers:

1. Ruskin Company.
 2. Greenheck.
 3. Vent Products.
- B. Gravity Backdraft Dampers, Size 18 by 18 inches or Smaller, Furnished with Air Moving Equipment: Air moving equipment manufacturer's standard construction.
- C. Multi-Blade, Parallel Action Gravity Balanced Backdraft Dampers: Galvanized steel, with center pivoted blades of maximum 6 inch width, with felt or flexible vinyl sealed edges, linked together in rattle-free manner with 90 degree stop, steel ball bearings, and plated steel pivot pin; adjustment device to permit setting for varying differential static pressure.

2.03 DUCT ACCESS DOORS

- A. Manufacturers:
1. Acudor Products Inc.
 2. Ruskin Company.
 3. Vent Products.
 4. Pottorff
- B. Fabrication: Rigid and close-fitting of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ducts, install minimum 1 inch thick insulation with sheet metal cover.
1. Larger Sizes: Provide an additional hinge.
- C. Access doors with sheet metal screw fasteners are not acceptable.

2.04 DUCT TEST HOLES

- A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.
- B. Permanent Test Holes: Factory fabricated, airtight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

2.05 FIRE DAMPERS

- A. Manufacturers:
1. Ruskin Company.
 2. Greenheck.
 3. Pottorff
- B. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.
- 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. Fusible Links: UL 33, separate at 160 degrees F with adjustable link straps for combination fire/balancing dampers.
- E. Rating: Dampers shall be marked with 1-1/2 or 3-hour fire protection rating as required for damper location.

2.06 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.
 - a. Net Fabric Width: Approximately 2 inches wide.

2.07 VOLUME CONTROL DAMPERS

- A. Manufacturers:
 - 1. Ruskin Company.
 - 2. Pottorff.
 - 3. Greenheck.
- B. Fabricate in accordance with SMACNA (DCS) and as indicated.
- C. Splitter Dampers:
 - 1. Material: Same gauge as duct to 24 inches size in either direction, and two gauges heavier for sizes over 24 inches.
 - 2. Blade: Fabricate of single thickness sheet metal to streamline shape, secured with continuous hinge or rod.
 - 3. Operator: Minimum 1/4 inch diameter rod in self aligning, universal joint action, flanged bushing with set screw.
- D. Single Blade Dampers:
 - 1. Fabricate for duct sizes up to 6 by 30 inch.
 - 2. Blade: 24 gage, 0.0239 inch, minimum.
- E. 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.
- F. End Bearings: Except in round ducts 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon, thermoplastic elastomer, or sintered bronze bearings.
- G. 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.

2.08 RETURN AIR CANOPY

- A. Manufacturer's:
 - 1. Titus; Model RCP.
 - 2. Price; Model RAC.
- B. Performance:
 - 1. Return air canopy performance characteristics, including noise reduction and pressure drop, shall be attained through testing using modified ASTM Standard E477.

2. Laboratory performance verification in the manufacturer's test facility may be requested, in which case a comparative test report shall be made available to the engineer.

C. Construction:

1. Return air canopies shall be constructed in accordance with ASHRAE and SMACNA Standards for the pressure and velocity classification specified for the air distribution system in which it is installed.
2. Return air canopies shall be constructed of:
3. 20-gauge solid steel casing
4. Acoustic media:
 - a. Absorptive acoustic fiberglass media.
5. Acoustic media:
 - a. Fiberglass media:
 - 1) Acoustic media shall be shot-free inorganic glass fiber with long, resilient fibers, bonded with thermosetting resin.
 - 2) Glass fiber shall be in accordance with erosion requirements of UL 181 and shall conform to the physical properties and requirements of ASTM C1071.

D. Fire-Performance Characteristics:

1. Air transfer silencer assemblies, including acoustic media fill, sealants, and acoustical spacers shall have combustion rating equal to or less than shown below when tested according to ASTM E84, NFPA 255 or UL 723:
2. Flame-spread index not exceeding 25
3. Smoke-developed index not exceeding 50

2.09 MISCELLANEOUS PRODUCTS

- A. Internal Strut End Plugs: Combination end-mounting and sealing plugs for metal conduit used as internal reinforcement struts for metal ducts; plug crimped inside conduit with outside gasketed washer seal.
- B. Duct Opening Closure Film: Mold-resistant, self-adhesive film to keep debris out of ducts during construction.
 1. Thickness: 2 mils.
 2. High tack water based adhesive.
 3. UV stable light blue color.
 4. Elongation Before Break: 325 percent, minimum.

PART 3 EXECUTION

3.01 PREPARATION

- A. Verify that electric power is available and of the correct characteristics.

3.02 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). Refer to Section 23 31 00 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 access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, combination fire and smoke dampers, and elsewhere as indicated. Provide minimum 8 by 8 inch size for hand access, 20 by 20 inch size for shoulder access, and as indicated. Provide 4 by 4 inch for balancing dampers only. Review locations prior to fabrication.
- D. Provide duct test holes where indicated and required for testing and balancing purposes.
- E. Provide fire 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.
- F. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.
- G. At equipment supported by vibration isolators, provide flexible duct connections immediately adjacent to the equipment.
- H. 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.
- I. Use splitter dampers only where indicated.
- J. 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

SECTION 23 34 16 CENTRIFUGAL HVAC FANS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Airfoil wheel centrifugal fans.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 83 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. AMCA 99 - Standards Handbook; 2016.

1.04 SUBMITTALS

- A. Product Data: Provide data on centrifugal fans and accessories including fan curves with specified operating point plotted, power, rpm, sound power levels for both fan inlet and outlet at rated capacity, and electrical characteristics and connection requirements.
- B. Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.
- C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Fan Belts: One set for each individual fan.

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.
- C. Fan shall be manufactured at an ISO 9001 certified facility. Fan shall be listed by Underwriters Laboratories (UL/cUL 705) for US and Canada. Fan shall bear the AMCA certified ratings seal for sound and air performance.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect motors, shafts, and bearings from weather and construction dust.

1.07 FIELD CONDITIONS

- A. Permanent fans may not be used for ventilation during construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS BY FAN TYPE

- A. Airfoil Centrifugal Fans:
 - 1. Loren Cook Company; CPS-A.
 - 2. Greenheck.
 - 3. Twin City Fan & Blower.

2.02 AIRFOIL CENTRIFUGAL FAN

A. General

1. Fan shall be a single width, single inlet, backward inclined airfoil, belt driven centrifugal vent set. Clockwise/Counter Clockwise horizontal, arrangement 10, Class I.

B. Construction

1. The fan shall be of bolted and welded construction utilizing corrosion resistant fasteners. The scroll wrapper shall be a minimum 14 gauge steel and the scroll side panels shall be a minimum 12 gauge steel. The entire fan housing shall have continuously welded seams for leakproof operation. A performance cut-off shall be furnished to prevent the recirculation of air in the fan housing. The fan housing shall be field rotatable to any one of eight discharge positions and shall have a minimum 1-1/2 inch outlet discharge flange. Bearing support shall be minimum 10 gauge welded steel. Side access inspection ports shall be provided with quick release latches for access to the motor compartment without removing the weather cover. Lifting lugs shall be provided for ease of installation. Unit shall bear an engraved aluminum nameplate. Nameplate shall indicate design CFM, static pressure, and maximum fan RPM. Unit shall be shipped in ISTA certified transit tested packaging.

C. Coating

1. Steel fan components shall be painted with an electrostatically applied, baked polyester powder coating. Each component shall be subject to a five stage environmentally friendly wash system, followed by a minimum 2 mil thick baked powder finish. Paint must exceed 1,000 hour salt spray under ASTM B117 test method.
2. Color = White.

D. Wheel and Fan Inlet

1. Wheel shall be steel centrifugal airfoil blade type. Blades shall be continuously welded to the back plate and deep spun inlet shroud. Wheel hub shall be keyed and securely attached to the fan shaft. Wheel inlet shall overlap an aerodynamic aluminum inlet cone to provide maximum performance and efficiency. Wheel shall be balanced in accordance with AMCA Standard 204-05, Balance Quality and Vibration Levels for Fans.

E. Motor

1. Motor shall be Nema design B with class B insulation rated for continuous duty and furnished at the specified voltage, phase and enclosure.
2. Premium efficiency motor (minimum 89.5%)
3. VFD Rated motor with shaft grounding ring.

F. Bearings

1. Bearings shall be designed and tested specifically for use in air handling applications. Construction shall be heavy duty regreasable ball or roller type in a cast iron pillow block housing selected for a minimum L10 life in excess of 200,000 hours at maximum cataloged operating speed.

G. Blower Shaft

1. Blower shaft shall be AISI C-1045 hot rolled and accurately turned, ground and polished. Shafting shall be sized for a critical speed of at least 125% of maximum RPM.
2. Belts shall be oil and heat resistant, static conducting. Drives shall be precision machined cast iron type, keyed and securely attached to the wheel and motor shafts. Drives shall be sized for

150% of the installed motor horsepower. The variable pitch motor drive must be factory set to the specified fan RPM.

H. Discharge Shutter

1. Galvanized steel blades and frame. Stainless steel pivots. Vinyl blade edge seals.
2. Line voltage motorized damper operator.

I. Accessories

1. Motorized discharge shutter.
2. OSHA belt guard and weather cover
3. Hinged Access door.
4. Steel drain.
5. Steel belt guard.
6. Extended lube lines.
7. Isolation rails.
8. Spring vibration isolators.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install flexible connections between fan inlet and discharge ductwork; see Section 23 33 00.
Ensure metal bands of connectors are parallel with minimum one inch flex between ductwork and fan while running.
- C. Provide safety screen where inlet or outlet is exposed.
- D. Provide backdraft dampers on discharge of exhaust fans and as indicated.

END OF SECTION

SECTION 23 34 23 HVAC POWER VENTILATORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Square inline centrifugal fans and blowers.

1.02 RELATED REQUIREMENTS

- A. Section 23 33 00 - Air Duct Accessories: Backdraft dampers.
- B. Section 26 05 83 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. AMCA (DIR) - (Directory of) Products Licensed Under AMCA International Certified Ratings Program; 2015.
- B. AMCA 99 - Standards Handbook; 2016.
- C. AMCA 204 - Balance Quality and Vibration Levels for Fans; 2020.
- D. AMCA 300 - Reverberant Room Method for Sound Testing of Fans; 2014.
- E. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data; 2022.

1.04 SUBMITTALS

- A. Product Data: Provide data on fans and accessories including fan curves with specified operating point clearly plotted, power, RPM, sound power levels at rated capacity, and electrical characteristics and connection requirements.
- B. Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

1.05 FIELD CONDITIONS

- A. Permanent ventilators may not be used for ventilation during construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Greenheck.
- B. Loren Cook Company; Model SQN-D VF.
- C. Twin City Fan & Blower.

2.02 POWER VENTILATORS - GENERAL

- A. Static and Dynamically Balanced: AMCA 204 - Balance Quality and Vibration Levels for Fans.
- B. Performance Ratings: Determined in accordance with AMCA 210 and bearing the AMCA Certified Rating Seal.
- C. Sound Ratings: AMCA 301, tested to AMCA 300 and bearing AMCA Certified Sound Rating Seal.

- D. Fabrication: Conform to AMCA 99.
- E. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

2.03 SQUARE INLINE CENTRIFUGAL FANS

- A. Centrifugal Fan Unit: Direct driven with galvanized steel housing lined with acoustic insulation, resilient mounted motor.
- B. The fan shall be of bolted construction utilizing corrosion resistant fasteners. Housing shall be minimum 18 gauge galvanized steel with integral duct collars. Bolted access doors shall be provided on three sides, sealed with closed cell neoprene gasketing. Housing shall be pre-drilled to accommodate universal mounting feet for vertical or horizontal installation. Unit shall bear an engraved aluminum nameplate. Nameplate shall indicate design CFM and static pressure. Unit shall be shipped in ISTA certified transit tested packaging.
- C. Wheel shall be centrifugal backward inclined, constructed of 100% aluminum, including a precision machined cast aluminum hub. Wheel inlet shall overlap an aerodynamic aluminum inlet cone to provide maximum performance and efficiency. Wheel shall be balanced in accordance with AMCA standard 204-05, balance quality and vibration levels for fans.
- D. Motor shall be an electronically commutated motor rated for continuous duty and furnished either with internally mounted potentiometer speed controller or with leads for connection to 0-10 VDC external controller.
- E. Accessories:
 - 1. External Signal Speed Control.
 - 2. VFPC Pressure Control.
 - 3. VFABK Air Balance Kit.
 - 4. Prewired disconnect switch, NEMA 1.
 - 5. Insulated Housing.
 - 6. Filter Box with MERV 8 filtration.
 - 7. Spring Isolators.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Hung Cabinet Fans:
 - 1. Install flexible connections between fan and ductwork. Ensure metal bands of connectors are parallel with minimum one inch flex between ductwork and fan while running.
- C. Provide sheaves required for final air balance.

END OF SECTION

SECTION 23 36 00 AIR TERMINAL UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Single-duct terminal units.
 - 1. Single-duct, variable-volume units.

1.02 RELATED REQUIREMENTS

- A. Section 23 09 23 - Direct-Digital Control System for HVAC.
- B. Section 23 21 13 - Hydronic Piping: Connections to heating coils.
- C. Section 23 31 00 - HVAC Ducts and Casings.
- D. Section 26 05 83 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. AHRI 410 - Forced-Circulation Air-Cooling and Air-Heating Coils; 2001, with Addenda (2011).
- B. AHRI 880 (I-P) - Performance Rating of Air Terminals; 2017 (Reaffirmed 2023).
- C. ASHRAE Std 130 - Laboratory Methods of Testing Air Terminal Units; 2016.
- D. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material); 2019.
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.
- G. SMACNA (SRM) - Seismic Restraint Manual Guidelines for Mechanical Systems; 2008.
- H. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. Product Data: Provide data indicating configuration, general assembly, and materials used in fabrication. Include catalog performance ratings that indicate air flow, static pressure, and NC designation. Include electrical characteristics and connection requirements.
- B. Shop Drawings: Indicate configuration, general assembly, and materials used in fabrication, and electrical characteristics and connection requirements.
 - 1. Include schedules listing discharge and radiated sound power level for each of second through sixth octave bands at inlet static pressures of 1 to 4 inch wg.
- C. Project Record Documents: Record actual locations of units and controls components and locations of access doors required for access of valving.
- D. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts lists. Include directions for resetting constant-

volume regulators.

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.

PART 2 PRODUCTS

2.01 SINGLE-DUCT, VARIABLE-VOLUME UNITS

- A. Manufacturers:
1. Price Industries, Inc.
 2. Titus.
 3. Nailor.
- B. General:
1. Factory-assembled, AHRI 880 (I-P) rated and bearing the AHRI seal, air volume control terminal with damper assembly, flow sensor, externally mounted volume controller, duct collars, and all required features.
 2. Control box bearing identification, including but not necessarily limited to nominal cfm, maximum and minimum factory-set airflow limits, coil type and coil (right or left hand) connection, where applicable.
- C. Unit Casing:
1. Minimum 22 gage, 0.0299 inch galvanized steel.
 - a. Assembled with longitudinal lock seam construction.
 - b. Casing leakage to meet ASHRAE Std 130.
 2. Air Inlet Collar: Provide round, suitable for standard flexible duct sizes.
 3. Unit Discharge: Rectangular, with slip-and-drive connections.
 4. Acceptable Liners:
 - a. 1/2 inch thick, coated, fibrous-glass complying with ASTM C1071.
 - 1) Secure with adhesive.
 - 2) Coat edges exposed to airstream with NFPA 90A approved sealant.
 - 3) Cover liner with non-porous foil.
 - b. Liner not to contain pentabrominated diphenyl ether (CAS #32534-81-9) or octabrominated diphenyl ether.
- D. Damper Assembly:
1. Heavy-gage, galvanized steel or extruded aluminum construction with solid steel, nickel-plated shaft pivoting on HDPE, self-lubricating bearings.
 2. Provide integral position indicator or alternative method for indicating damper position over full range of 90 degrees.
 3. Incorporate low leak damper blades for tight airflow shutoff.
- E. Access door:
1. Provide with premium camlock access door.
- F. Hot Water Heating Coil:
1. Coil Casing: Minimum 22 gage, 0.0299 inch galvanized steel, factory-installed on terminal discharge with rectangular outlet, duct connection type.
 - a. Right or left coil inlets.

2. Coil Fins: Aluminum or aluminum plated fins, mechanically-bonded to seamless copper tubes.
3. Coil leak tested to minimum 350 psig.
4. Base performance data on tests run in accordance with AHRI 410 and units to bear AHRI 410 label.

G. Electrical Requirements:

1. Single-point power connection.
2. Equipment wiring to comply with requirements of NFPA 70.

H. Control Transformers: Factory supplied and mounted for electric and electronic control applications.

I. Controls:

1. DDC (Direct-Digital Controls):
 - a. Include a factory-installed, unit-mounted, direct-digital controller.
 - b. Bi-directional Damper Actuator: 24 volt, powered closed, spring return open.
 - c. Microprocessor-Based Controller: Air volume controller, pressure-independent with electronic airflow transducers, factory-calibrated maximum and minimum CFM's.
 - 1) Occupied and unoccupied operating mode.
 - 2) Remote reset of temperature or CFM set points.
 - 3) Proportional, plus integral control of room temperature.
 - 4) Monitoring and adjusting with portable terminal.
2. Airflow Sensor: Differential pressure airflow device measuring total, static, and wake pressures.
 - a. Provides accuracy within 5 percent with a 90 degree sheet metal elbow directly at the inlet of the assembly.
 - b. Control tubing is protected by grommets at the wall of the air flow sensor's housing.
 - c. Provide sensor with a pressure transducer to interface with a DDC system.
 - d. Signal accuracy: Plus/minus five percent throughout terminal operating range.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that conditions are suitable for installation.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install the inlets of air terminal units and air flow sensors a minimum of four duct diameters from elbows, transitions, and duct takeoffs.
- C. Support units individually from structure in accordance with SMACNA (SRM).
- D. Do not support from ductwork.
- E. Connect to ductwork in accordance with Section 23 31 00.
- F. Verify that electric power is available and of the correct characteristics.

3.03 ADJUSTING

- A. Reset volume with damper operator attached to assembly allowing flow range modulation from 100 percent of design flow to zero percent full flow. Set units with heating coils for minimum scheduled

percent full flow.

3.04 CLEANING

A. Vacuum clean coils and inside of units.

END OF SECTION

SECTION 23 37 00 AIR OUTLETS AND INLETS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Diffusers:
- B. Registers/grilles:
 - 1. Ceiling-mounted, egg crate exhaust and return register/grilles.
 - 2. Ceiling-mounted, supply register/grilles.
- C. Extreme weather louvers.
- D. Louvers:
- E. Gravity ventilators.

1.02 REFERENCE STANDARDS

- A. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating; 2023.
- B. AMCA 511 - Certified Ratings Program Product Rating Manual for Air Control Devices; 2021, with Editorial Revision (2022).
- C. AMCA 550 - Test Method for High Velocity Wind Driven Rain Resistant Louvers; 2022.
- D. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.
- E. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.
- F. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.
- G. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.03 SUBMITTALS

- A. 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.

1.04 QUALITY ASSURANCE

- A. Test and rate louver performance in accordance with AMCA 500-L.
- B. 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 SQUARE PLAQUE FACE CEILING DIFFUSERS

- A. Manufacturers:
 - 1. Titus; Model OMNI.
 - 2. Price Industries; Model SPD.

- 3. Nailor Industries; Model UNI.
- B. Type: Provide square diffuser with steel backpan and inner plaque assembly with discharge air in 360 degree pattern.
- C. Connections: Round.
- D. Frame: Provide inverted T-bar type. In plaster ceilings, provide plaster frame and ceiling frame.
- E. Fabrication: Steel with baked enamel finish.
- F. Color: As selected by Architect/Engineer from manufacturer's standard range.
- G. Accessories: Provide radial opposed blade volume control damper; removable inner plaque assembly with damper adjustable from diffuser face.

2.02 PERFORATED FACE CEILING RETURN REGISTERS/GRILLES

- A. Manufacturers:
 - 1. Titus; Model PAR.
 - 2. Price Industries; Model PDDR.
 - 3. Nailor Industries; Model 4360.
- B. Type: Perforated face, removable from the grille face and shall be hinged for ease of removal of the screen.
- C. Frame: Inverted T-bar type. In plaster ceilings, provide plaster frame and ceiling frame.
- D. Fabrication: Steel with steel frame and baked enamel finish.
- E. Color: As selected by Architect with manufacturer's standard range.

2.03 CEILING EGG CRATE EXHAUST AND RETURN GRILLES

- A. Manufacturers:
 - 1. Titus; Model 50F.
 - 2. Price; Model 80.
 - 3. Nailor; Model 61EC.
- B. Type: Egg crate style face consisting of 1/2 by 1/2 by 1/2 inch grid core.
- C. Fabrication: Grid core consists of steel with baked enamel finish.
- D. Color: To be selected by Architect/Engineer from manufacturer's standard range.
- E. Frame: Channel lay-in frame for suspended grid ceilings.

2.04 GRAVITY VENTILATORS

- A. Hood Intake Gravity Ventilator:
 - 1. Manufacturers:
 - a. Greenheck Fan Corporation; Model WIH.
 - b. Loren Cook Company; Model TRE.
 - c. Twin City Fan; Model TIL.

2. Construction:
 - a. The unit shall be manufactured of 0.081 gauge extruded aluminum tiers welded to a minimum 8 gauge aluminum support structure. The aluminum hood shall be constructed of minimum 0.063 aluminum and provided with a layer of anticondensate coating. The aluminum base shall have continuously welded curb cap corners for maximum leak protection. Birdscreen constructed of 1/2" galvanized mesh shall be mounted across the relief opening. Unit shall bear an engraved aluminum nameplate. Nameplate shall indicate design CFM and static pressure. Unit shall be shipped in ISTA certified transit tested packaging.
3. Hood and Base:
 - a. Material: Aluminum.
 - b. Hood Construction: Precision formed, arched panels with interlocking seams.
 - c. Curb Cap: Pre-punched mounting holes for installation.
4. Options/Accessories:
 - a. Roof Curbs:
 - 1) Flat Roofs:
 - a) Welded, straight side curb with flashing flange and wood nailer.
 - b. Provide extended base minimum 7 inch extension to base height making overall base 12 inches in height to prevent snow or moisture intake.
 - c. Curb Seal: Rubber seal between fan and roof curb.
 - d. Insect Screen:
 - 1) Fabricate in accordance with ASTM B221 (ASTM B221M).
 - 2) Construct of fine mesh aluminum.
 - 3) Fitted to top of the throat to prevent entry of insects.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Comply with SMACNA (ASMM) for flashing/counter-flashing of roof penetrations and supports for roof curbs and roof mounted equipment.
- C. Check location of outlets and inlets and make necessary adjustments in position to comply with architectural features, symmetry, and lighting arrangement.
- D. Install diffusers to ductwork with air tight connection.
- E. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly.
- F. Secure extreme weather louvers to structure to comply with FEMA 361 and the following:
 1. Substrate: CMU, Grout filled. 1500 Min. PSI
 - a. Anchor Type: 3/8" DIA. Dewart screw-bolt+, carbon steel
 - b. Embedment: 3 1/4" minimum

END OF SECTION

SECTION 23 73 13
MODULAR CENTRAL-STATION AIR-HANDLING UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Air handling units.

1.02 RELATED REQUIREMENTS

- A. Section 23 05 93 - Testing, Adjusting, and Balancing for HVAC.
- B. Section 23 33 00 - Air Duct Accessories: Flexible duct connections.
- C. Section 26 05 83 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. ASHRAE Std 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size; 2017, with Addendum (2022).
- B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. UL (DIR) - Online Certifications Directory; Current Edition.

1.04 SUBMITTALS

- A. Product Data:
 - 1. Published Literature: Indicate dimensions, weights, capacities, ratings, gages and finishes of materials, and electrical characteristics and connection requirements.
 - 2. Filters: Data for filter media, filter performance data, filter assembly, and filter frames.
 - 3. Fans: Performance and fan curves with specified operating point clearly plotted, power, RPM.
 - 4. Sound Power Level Data: Fan outlet and casing radiation at rated capacity.
 - 5. Electrical Requirements: Power supply wiring including wiring diagrams for interlock and control wiring, clearly indicating factory-installed and field-installed wiring.
- B. Shop Drawings: Indicate assembly, unit dimensions, weight loading, required clearances, construction details, field connection details, and electrical characteristics and connection requirements.
- C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Fan Belts: One set for each unit.
 - 2. Extra Filters: One set 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.

1.06 REGULATORY REQUIREMENTS

- A. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified and indicated.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Accept products on site in factory-fabricated protective containers, with factory-installed shipping skids and lifting lugs. Inspect for damage.
- B. Store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.
- C. Do not operate units until ductwork is clean, filters are in place, bearings lubricated, and fan has been test run under observation.

1.08 WARRANTY

- A. Provide minimum one year manufacturer warranty covering repair or replacement due to defective materials or workmanship.

PART 2 PRODUCTS

2.01 PACKAGED AIR HANDLING UNITS

- A. Manufacturers:
 - 1. Trane.
 - 2. VTS.
 - 3. York.
- B. General:
 - 1. Unit layout and configuration shall be as defined in project plans and schedule.
 - 2. Manufacturer to provide a full perimeter integral base frame for either ceiling suspension of units or to support and raise all sections of the unit for proper trapping. Base frame will either be bolted construction or welded construction. Refer to schedule for base height and construction type. Contractor will be responsible for providing a housekeeping pad when unit base frame is not of sufficient height to properly trap unit. Unit base frames not constructed of galvanized steel shall be chemically cleaned and coated with both a rust-inhibiting primer and finished coat of rust-inhibiting enamel. Unit base height to be included in total height required for proper trap height.
- C. Unit Casing:
 - 1. Unit manufacturer shall ship unit in segments as specified by the contractor for ease of installation in tight spaces. The entire air handler shall be constructed of galvanized steel. Casing finished to meet ASTM B117 125-hour salt-spray test. The removal of access panels or access doors shall not affect the structural integrity of the unit. All removable panels shall be gasketed. All doors shall have gasketing around full perimeter to prevent air leakage. Contractor shall be responsible to provide connection flanges and all other framework that is needed to properly support the unit.
 - 2. Casing performance - Casing air leakage shall not exceed leak class 6 (CL = 6) per ASHRAE 111 at specified casing pressure, where maximum casing leakage (cfm/100 ft² of casing surface area) = CL X P^{0.65}.
 - 3. Air leakage shall be determined at 1.00 times maximum casing static pressure up to 8 inches w.g. Specified air leakage shall be accomplished without the use of caulk. Total estimated air leakage shall be reported for each unit in CFM, as a percentage of supply air, and as an ASHRAE 111 Leakage Class.

4. Under 55F supply air temperature and design conditions on the exterior of the unit of 81F dry bulb and 73F wet bulb, condensation shall not form on the casing exterior. The AHU manufacturer shall provide tested casing thermal performance for the scheduled supply air temperature plotted on a psychrometric chart. The design condition on the exterior of the unit shall also be plotted on the chart. If tested casing thermal data is not available, AHU manufacturer shall provide, in writing to the Engineer and Owner, a guarantee against condensation forming on the unit exterior at the stated design conditions above. The guarantee shall note that the AHU manufacturer will cover all expenses associated with modifying units in the field should external condensate form on them. In lieu of AHU manufacturer providing a written guarantee, the installing contractor must provide additional external insulation on AHU to prevent condensation.
5. Unit casing (wall/floor/roof panels and doors) shall be able to withstand up to 1.5 times design static pressure, or 8-inch w.g., whichever is less, and shall not exceed 0.0042 per inch of panel span (L/240).
6. Floor panels shall be double-wall construction and designed to support a 300-lb load during maintenance activities and shall deflect no more than 0.0042 per inch of panel span.
7. Unit casing panels shall be 2-inch double-wall construction, with solid galvanized exterior and solid galvanized interior, to facilitate cleaning of unit interior.
8. Unit casing panels (roof, walls, floor) and doors shall be provided with a minimum thermal resistance (R-value) of 13 Hr*Ft²*°F/BTU.
9. Unit casing panels (roof, walls, floor) and external structural frame members shall be completely insulated filling the entire panel cavity in all directions so that no voids exist. Panel insulation shall comply with NFPA 90A.
10. Casing panel inner liners must not extend to the exterior of the unit or contact the exterior frame. A mid-span, no-through-metal, internal thermal break shall be provided for all unit casing panels.
11. Access panels and/or access doors shall be provided in all sections to allow easy access to drain pan, coil(s), motor, drive components and bearings for cleaning, inspection, and maintenance.
12. Access panels and doors shall be fully removable without the use of specialized tools to allow complete access of interior surfaces.

D. Access Doors:

1. Access doors shall be 2-inch double-wall construction. Interior and exterior shall be of the same construction as the interior and exterior wall panels.
2. All doors shall be provided with a thermal break construction of door panel and door frame.
3. Gasketing shall be provided around the full perimeter of the doors to prevent air leakage.
4. Door hardware shall be surface-mounted to prevent through-cabinet penetrations that could likely weaken the casing leakage and thermal performance.
5. Handle hardware shall be designed to prevent unintended closure.
6. Access doors shall be hinged and removable without the use of specialized tools.
7. Hinges shall be interchangeable with the door handle hardware to allow for alternating door swing in the field to minimize access interference due to unforeseen job site obstructions.
8. Hinges shall be stainless steel.
9. Door handle hardware shall be adjustable and visually indicate locking position of door latch external to the section.

10. All doors shall be a 60-inch high when sufficient unit height is available, or the maximum height allowed by the unit height.
11. A single door handle shall be provided for each door linking multiple latching points necessary to maintain the specified air leakage integrity of the unit.
12. A shatterproof window shall be provided in access doors where indicated on the plans. Window shall either be thermal dual pane. Window shall be capable of withstanding unit operating pressures and shall be safe for viewing UV-C lamps.

E. Primary Drain Pans:

1. All cooling coil sections shall be provided with an insulated, double-wall, galvanized drain pan.
2. The drain pan shall be designed in accordance with ASHRAE 62.1 being of sufficient size to collect all condensation produced from the coil and sloped in two planes, pitched toward drain connections, promoting positive drainage to eliminate stagnant water conditions when unit is installed level and trapped per manufacturer's requirements.
3. The outlet shall be located at the lowest point of the pan and shall be sufficient diameter to preclude drain pan overflow under any normally expected operating condition.
4. All drain pan threaded connections shall be visible external to the unit. Threaded connections under the unit floor shall not be accepted.
5. Drain connections shall be of the same material as the primary drain pan and shall extend a minimum 2-1/2-inch beyond the base to ensure adequate room for field piping of condensate traps.
6. The installing contractor is responsible to ensure the unit is installed level, trapped in accordance with the manufacturer's requirements, and visually inspected to ensure proper drainage of condensate.
7. Coil support members inside the drain pan shall be of the same material as the drain pan and coil casing.
8. If drain pans are required for heating coils, access sections, or mixing sections they will be indicated in the plans.

F. Fans:

1. Fan sections shall have a minimum of one hinged and latched access door located on the drive side of the unit to allow inspection and maintenance of the fan, motor, and drive components.
2. All fans shall be statically and dynamically tested by the manufacturer for vibration and alignment as an assembly at the operating RPM to meet design specifications. Fans that are selected with inverter balancing shall first be dynamically balanced at design RPM. The fans then will be checked in the factory from 25% to 100% of design RPM to insure they are operating within vibration tolerance specifications, and that there are no resonant frequency issues throughout this operating range. Inverter balancing that requires lockout frequencies inputted into a variable frequency drive in order to bypass resonant frequencies shall not be acceptable. If supplied in this manner by the unit manufacturer, the contractor will be responsible for rebalancing in the field after unit installation. Fans selected with inverter balancing shall have a maintenance free grounding assembly installed on the fan motor to discharge both static and induced shaft currents to ground.
3. Direct drive plenum fans with integral frame motors, shall be mounted on isolation bases. Fan shall be dynamically balanced throughout the operating range to a BV-3 (0.20 in/s) per AMCA 204 test standard. Fan and motor shall be internally isolated with spring isolators. A flexible connection shall be installed between fan and unit casing to ensure complete isolation. Flexible connection shall comply with NFPA 90A and UL 181 requirements. If fans and motors are not

internally isolated, then the entire unit shall be externally isolated from the building, including supply and return duct work, piping, and electrical connections. External isolation shall be furnished by the installing contractor in order to avoid transmission of noise and vibration through the ductwork and building structure.

4. Each horizontal direct drive fan in a multiple-fan array shall be provided with integral back flow prevention: Blank-off Plate.

G. Motors and Drives:

1. Motors shall meet or exceed all NEMA Standards Publication MG 1 - 2006 requirements and comply with NEMA Premium efficiency levels when applicable. Motors shall comply with applicable requirements of NEC and shall be UL Listed.
2. Fan Motors shall be heavy duty, open drip-proof operable at scheduled voltage. If applicable, motor efficiency shall meet or exceed NEMA Premium efficiencies.
3. Direct driven fans utilizing integral frame motors shall use 2-pole (3600 rpm), 4-pole (1800 rpm) or 6-pole (1200 rpm) motors, NEMA Design B, with Class B insulation capable to operate continuously at 104 deg F (40 deg C) without tripping overloads.
4. Motors shall have a +/- 10 percent voltage utilization range to protect against voltage variation.

H. Coils:

1. Coils section header end panel shall be removable to allow for removal and replacement of coils without impacting the structural integrity of the unit.
2. Install coils such that headers and return bends are enclosed by unit casing to ensure that if condensate forms on the header or return bends, it is captured by the drain pan under the coil.
3. Coils shall be manufactured with plate fins to minimize water carryover and maximize airside thermal efficiency. Fin tube holes shall have drawn and belled collars to maintain consistent fin spacing to ensure performance and air pressure drop across the coil as scheduled. Tubes shall be mechanically expanded and bonded to fin collars for maximum thermal conductivity. Use of soldering or tinning during the fin-to-tube bonding process is not acceptable due to the inherent thermal stress and possible loss of bonding at that joint.
4. Construct coil casings of galvanized steel. End supports and tube sheets shall have belled tube holes to minimize wear of the tube wall during thermal expansion and contraction of the tube.
5. All coils shall be completely cleaned prior to installation into the air handling unit. Complete fin bundle in direction of airflow shall be degreased and steam cleaned to remove any lubricants used in the manufacturing of the fins, or dirt that may have accumulated, in order to minimize the chance for water carryover.
6. When two or more cooling coils are stacked in the unit, an intermediate drain pan shall be installed between each coil. The intermediate drain pan shall be designed being of sufficient size to collect all condensation produced from the coil and sloped to promote positive drainage to eliminate stagnant water conditions. The intermediate drain pan shall be constructed of the same material as the sections primary drain pan.
7. The intermediate drain pan shall begin at the leading face of the water-producing device and be of sufficient length extending downstream to prevent condensate from passing through the air stream of the lower coil.
8. Intermediate drain pan shall include downspouts to direct condensate to the primary drain pan. The intermediate drain pan outlet shall be located at the lowest point of the pan and shall be sufficient diameter to preclude drain pan overflow under any normally expected operating condition.
9. Hydronic Coils

- a. Supply and return header connections shall be clearly labeled on unit exterior such that direction of coil water-flow is counter to direction of unit air-flow.
 - b. Coils shall be proof-tested to 300 psig and leak-tested to 200 psig air pressure under water.
 - c. Headers shall be constructed of round copper pipe or cast iron.
 - d. Tubes shall be 5/8-inch .020 copper, with aluminum fins.
 - e. Hydronic coils shall be supplied with factory installed drain and vent piping to the unit exterior.
- I. Filters:
- 1. Provide factory-fabricated filter section of the same construction and finish as unit casings. Filter section shall have side access filter guides and access door(s) extending the full height of the casing to facilitate filter removal. Provide fixed filter blockoffs as required to prevent air bypass around filters. Blockoffs shall not need to be removed during filter replacement. Filters to be of size, and quantity needed to maximize filter face area of each particular unit size.
 - 2. Filter type: 2-inch. MERV rating: 8.
- J. Dampers:
- 1. All dampers, shall be internally mounted. Dampers shall be premium ultra low leak and located as indicated on the schedule and plans. Blade arrangement (parallel or opposed) shall be provided as indicated on the schedule and drawings. Dampers shall be Ruskin CD60 double-skin airfoil design or equivalent for minimal air leakage and pressure drop. Leakage rate shall not exceed 3 CFM/square foot at one inch water gauge complying with ASHRAE 90.1 maximum damper leakage and shall be AMCA licensed for Class 1A. All leakage testing and pressure ratings shall be based on AMCA Standard 500-D. Manufacturer shall submit brand and model of damper(s) being furnished, if not Ruskin CD60.
- K. Access Sections:
- 1. Access sections shall be provided where indicated in the schedule and plans to allow additional access for inspection, cleaning, and maintenance of unit components. The unit shall be installed for proper access. Procedure for proper access, inspection and cleaning of the unit shall be provided in the AHU manufacturer's maintenance manual.
- L. Marine Lights:
- 1. Marine lights shall be provided throughout AHUs as indicated on the schedule and plans. Lights shall be instant-on, light-emitting diode (LED) type to minimize amperage draw and shall produce lumens equivalent to a minimum 75W incandescent bulb (1200 lumens). LED lighting shall provide instant-on, white light and have a minimum 25,000 hr life.
 - 2. Light fixture shall be weather-resistant, enclosed and gasketed to prevent water and dust intrusion.
 - 3. Fixtures shall be designed for flexible positioning during maintenance and service activities for best possible location providing full light on work surface of interest and not being blocked by technician.
 - 4. All lights on a unit shall be wired in the factory to a single on-off switch.
 - 5. Installing contractor shall be responsible for providing 115V supply to the factory-mounted marine light circuit.
- M. Factory Wiring of Lights, VFDs, Motorized Impeller Control Panels, and Combination Starters/Disconnects
- 1. All power wiring for voltages greater than 24V and traveling through multiple unit sections shall be contained in an enclosed, metal, power-wiring raceway or EMT. Sections less than 6-inch in

length may be contained in FMC.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Bolt sections together with gaskets.
- C. The AHU manufacturer shall provide all screws and gaskets for joining of sections in the field.
- D. Install flexible duct connections between fan inlet and discharge ductwork and air handling unit sections. Ensure that metal bands of connectors are parallel with minimum one inch flex between ductwork and fan while running.
- E. Level all unit sections in accordance with the unit manufacturer's instructions. The Mechanical Contractor shall provide and install all necessary permanent shim material to ensure individual sections and entire assembled units are level.
- F. Install assembled unit on vibration isolators. Install isolated fans with resilient mountings and flexible electrical leads. Install restraining snubbers as indicated. Adjust snubbers to prevent tension in flexible connectors when fan is operating.
- G. Make connections to coils with unions or flanges.
- H. Cooling Coils:
 - 1. Pipe drain and overflow to nearest floor drain.
- I. Field-wire each factory provided control for field installation.

3.02 SYSTEM STARTUP

- A. Prepare and start equipment and systems in accordance with manufacturers' instructions and recommendations.
- B. The Mechanical Contractor shall verify that the following items have been completed prior to scheduling the AHU manufacturer's final inspection and start up:
 - 1. All spring-isolated components have had their shipping restraints removed and the components have been leveled.
 - 2. On all field-joined units, that all interconnections have been completed, i.e., electrical and control wiring, piping, casing joints, bolting, welding, etc.
 - 3. All water and steam piping connections have been completed and hydrostatically tested and all water flow rates have been set in accordance with the capacities scheduled on the Drawings.
 - 4. All ductwork connections have been completed and all ductwork has been pressure tested for its intended service.
 - 5. All power wiring, including motor starters and disconnects, serving the unit has been completed.
 - 6. All automatic temperature and safety controls have been completed.
 - 7. All dampers are fully operational.
 - 8. All shipping materials have been removed.
 - 9. All (clean) filter media has been installed in the units.

END OF SECTION

SECTION 26 05 00 BASIC ELECTRICAL REQUIREMENTS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions apply to this Section.

1.02 SECTION INCLUDES

- A. Basic Electrical Requirements and materials specifically applicable to Division 26 Sections.
Section includes:
 - 1. Electrical Identification.
 - 2. Minor Demolition.
 - 3. Conductors and Devices.
 - 4. Raceways and Boxes.
 - 5. Supporting Devices.

1.03 REGULATORY REQUIREMENTS

- A. Conform to NFPA 70 - National Electrical Code, latest edition with amendments as adopted by the City of Joliet, IL.
- B. Conform to building codes as adopted by the City of Joliet, IL.
- C. Install electrical Work in accordance with the NECA Standard of Installation.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.
- B. Ship products to the job site in their original packaging. Receive and store products in a suitable manner to prevent damage or deterioration. Keep equipment upright at all times.
- C. Investigate the spaces through which equipment must pass to reach its final destination.
Coordinate with the manufacturer to arrange delivery at the proper stage of construction and to provide shipping splits where necessary.

1.05 PROJECT/SITE CONDITIONS

- A. Install work in locations shown on Drawings, unless prevented by Project conditions. Drawings have omitted certain branch circuitry in areas for ease of reading. All branch circuitry is to be provided by Contractor.
- B. Prepare drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other Sections. Obtain permission from Architect/Engineer before proceeding as specified under modification procedures.

1.06 QUALITY ASSURANCE

- A. Provide Work as required for a complete and operational electrical installation.

- B. All products shall be designed, manufactured, and tested in accordance with industry standards. Standards, organizations, and their abbreviations as used hereafter, include the following:
 1. American National Standards Institute, Inc (ANSI).
 2. American Society for Testing and Materials (ASTM).
 3. National Electrical Manufacturers Association (NEMA).
 4. Underwriters Laboratories, Inc. (UL).
- C. Install all Work in accordance with the NECA Standard of Installation.

1.07 PROJECT MANAGEMENT AND COORDINATION

- A. Proper project management and coordination is critical for a successful project. Manage and coordinate the Work with all other trades. Reliance on the Drawings and Specifications only for exact project requirements is insufficient for proper coordination.

PART 2 PRODUCTS

2.01 WIRING METHODS

- A. All locations: Building wire in raceway.
- B. Use no wire smaller than 12 AWG for power and lighting circuits, and no smaller than 14 AWG for control wiring.
 1. Use 10 AWG conductor for 20 ampere, 120 volt branch circuit home runs longer than 100 feet.

2.02 WIRE AND CABLE

- A. Manufacturers:
 1. Okonite.
 2. Southwire.
 3. Collyer.
- B. Building Wire:
 1. Feeders and Branch Circuits Larger Than 6 AWG: Copper, stranded conductor, 600 volt insulation.
 2. Feeders and Branch Circuits 6 AWG and Smaller: Copper conductor, 600 volt insulation. 6 and 8 AWG, stranded conductor; smaller than 8 AWG, stranded conductor (solid for device terminations).
 3. Control Circuits: Copper, stranded conductor, 600 volt insulation.
 4. Use 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 75 feet.
 5. Use 10 AWG conductors for 20 ampere, 277 volt branch circuits longer than 200 feet.
 6. Use conductor not smaller than 12 AWG for power and lighting circuits.
 7. Use conductor not smaller than 16 AWG for control circuits.
- C. Locations:
 1. Concealed Dry Interior Locations: Use only building wire with Type THHN insulation in raceway.
 2. Exposed Dry Interior Locations: Use only building wire with Type THHN insulation in raceway.
 3. Above Accessible Ceilings: Use only building wire with Type THHN insulation in raceway.
 4. Wet or Damp Interior Locations: Use only building wire with Type THWN insulation in raceway.
 5. Exterior Locations: Use only building wire with Type XHHW insulation in raceway.
 6. Underground Installations: Use only building wire with Type XHHW insulation in raceway.

2.03 RACEWAY REQUIREMENTS

- A. Use only specified raceway in the following locations:
 - 1. Branch Circuits and Feeders:
 - a. Concealed Dry Interior Locations: Electrical metallic tubing.
 - b. Exposed Dry Interior Finished Locations: Electrical metallic tubing.
 - c. Exposed Dry Interior Unfinished Locations: Electrical metallic tubing.
 - d. All other locations: Galvanized Rigid Metallic Conduit.
- B. Size raceways for conductor type installed.
 - 1. Minimum Size Conduit Homerun to Panelboard: 3/4-inch.

2.04 METALLIC CONDUIT AND FITTINGS

- A. Conduit:
 - 1. Rigid Steel Conduit: ANSI C80.1.
 - 2. Electrical metallic tubing: ANSI C80.3.
 - 3. Flexible Conduit: UL 1, zinc-coated steel.
 - a. Liquidtight Flexible Conduit: UL360. Fittings shall be specifically approved for use with this raceway.
- B. Conduit Fittings:
 - 1. Metal Fittings and Conduit Bodies: NEMA FB 1.
 - a. EMT fittings: Use set-screw indentor-type fittings.

2.05 CONDUIT HANGERS

- A. Manufacturers:
 - 1. Minerrallac Electric Company.
 - 2. Substitutions: Or Approved Equal.
- B. Description:
 - 1. Standard conduit hanger, zinc-plated steel with bolts.
 - 2. Threaded rod and hardware: Plated finish, size and length as required for loading and conditions.

2.06 BEAM CLAMPS

- A. Manufacturers:
 - 1. Appleton.
 - 2. Midwest.
 - 3. Raco.
- B. Description: Malleable beam clamp, zinc plated steel.

2.07 ELECTRICAL BOXES

- A. Manufacturers:
 - 1. Raco.
 - 2. Steel City.
 - 3. Appleton.
 - 4. Substitutions: Or Approved Equal.

- B. Sheet Metal Outlet Boxes: ANSI/NEMA OS 1, galvanized steel, suitable for installation in masonry:
- C. Equipment Support Boxes: Rated for weight of equipment supported; include 2 inch male fixture studs where required.
- D. Wet Location Outlet Boxes: Cast aluminum: Cast alloy, deep type, gasket cover, threaded hubs.

2.08 PENETRATION SEALANTS

- A. Fire-rated assemblies: Provide firestopping of all penetrations made by Work under this Contract.
- B. Thermal and Moisture Protection: Provide thermal and moisture protection made by Work under this Contract of all exterior wall, floor and roof penetrations.

2.09 NAMEPLATES AND LABELS

- A. Nameplates: Engraved three-layer laminated plastic, black letters on white background.
- B. Locations:
 - 1. Each electrical distribution and control equipment enclosure.
- C. Letter Size:
 - 1. Use 1/8 inch letters for identifying individual equipment and loads.
 - 2. Use 1/4 inch letters for identifying grouped equipment and loads.
- D. Labels: Embossed adhesive tape, with 3/16 inch white letters on a black background. Use only for identification of individual wall switches and receptacles and control device stations.

2.10 WIRE AND CABLE MARKERS

- A. Manufacturers:
 - 1. Brady Model PCPS.
 - 2. Panduit Model PCM.
 - 3. T & B Model WM.
- B. Description: Cloth type wire markers.
- C. Locations: Each conductor at panelboard gutters, pull boxes, and each load connection.
- D. Legend:
 - 1. Power and Lighting Circuits: Branch circuit or feeder number indicated on drawings.

2.11 CONDUIT MARKERS

- A. Location: Furnish markers for each conduit longer than 6 feet.
- B. Spacing: 20 feet on center.
- C. Color:
 - 1. 480 Volt System: Orange
 - 2. 208 Volt System: Black
 - 3. Fire Alarm System: Red.

PART 3 EXECUTION

3.01 EXAMINATION AND PREPARATION

- A. Demolition Drawings are based on casual field observation and are intended to identify the limits of the construction site. Remove all electrical systems in their entirety in proper sequence with the Work.
- B. Disconnect electrical systems in walls, floors, and ceilings for removal.
- 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 and Emergency Electrical Service: Maintain existing system in service. Disable system only to make switchovers and connections. Obtain permission from Owner and Architect at least 24 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area.
- E. Existing Fire Alarm System: Maintain existing system in service until new system is accepted. Disable system only to make switchovers and connections. Notify Owner, Architect/Engineer and local fire service at least 24 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area.
- F. Beginning of demolition means installer accepts existing conditions.
- G. Verify that supporting surfaces are ready to receive work.
- H. Electrical boxes are shown on Drawings, in approximate locations, unless dimensioned.
 - 1. Obtain verification from Architect/Engineer for locations of outlets throughout prior to rough-in.
- I. Degrease and clean surfaces to receive wire markers.
- J. Verify that interior of building is physically protected from weather.
- K. Verify that mechanical work which is likely to injure conductors has been completed.
- L. Completely and thoroughly swab raceway system before installing conductors.

3.02 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

- A. Remove all existing electrical installations to accommodate new construction.
- B. Remove abandoned wiring to source of supply.
- C. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.
- D. Relocate existing fire alarm devices affected by wall, ceiling and floor demolition.
- E. Repair adjacent construction and finishes damaged during demolition and extension work.
- F. Properly dispose of all ballast to approved ballast recycler. Do not land fill ballasts.

3.03 APPLICATION

- A. Install nameplate and label parallel to equipment lines.

- B. Secure nameplate to equipment front using screws.
- C. Secure nameplates to inside surface of door on panelboard that is recessed in finished locations.
- D. Neatly train and secure wiring inside boxes, equipment, and panelboards.
- E. Use wire pulling lubricant for pulling 4 AWG and larger wires.
- F. Route wire and cable as required to meet project conditions.
 - 1. Wire and cable routing indicated is approximate unless dimensioned.
 - 2. Where wire and cable destination is indicated and routing is not shown, determine exact routing and lengths required.
- G. Pull all conductors into raceway at same time.
- H. Protect exposed cable from damage.
- I. Neatly train and lace wiring inside boxes, equipment and panelboards.
- J. Support cables above accessible ceilings to keep them from resting on ceiling tiles.
- K. Make splices, taps, and terminations to carry full ampacity of conductors without perceptible temperature rise.
- L. Use split bolt connectors for copper conductor splices and taps, 6 AWG and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.
- M. Provide anchors, fasteners, and supports in accordance with NECA "Standard of Installation".
- N. Do not fasten supports to pipes, ducts, mechanical equipment, and conduit.
- O. Do not use powder-actuated anchors.
- P. Do not drill or cut structural members.
- Q. Fabricate supports from structural steel or steel channel. Rigidly weld members or use hexagon head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.
- R. Install surface-mounted cabinets and panelboards with minimum of four anchors.
- S. In wet and damp locations use steel channel supports to stand cabinets and panelboards one inch off wall.
- T. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.
- U. Terminate spare conductors with electrical tape.
- V. Install wiring devices in accordance with manufacturer's instructions.
 - 1. Install wall switches at height shown on drawings, OFF position down.
 - 2. Install convenience receptacles at height shown on drawings grounding pole on bottom.
 - 3. Install specific purpose receptacles at heights shown on Drawings.
- W. Install wall plates flush and level.
 - 1. Install decorative plates on switch, receptacle, and blank outlets in finished areas.

2. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface-mounted outlets.

END OF SECTION

SECTION 26 24 10 ELECTRICAL DISTRIBUTION

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
1. Enclosed Switches.
 2. Lighting and Appliance Panelboards.
 3. Circuit Breakers.
 4. Single Pole Fused Switches.
 5. Single Pole Motor Rated Switches.

1.02 SUBMITTALS

- A. Submit :
1. Shop Drawings: Indicate relevant information on panelboards and transformers.
 2. Product Data: Provide data on enclosed switches and circuit breakers, fuses and panelboard circuit breakers.
 3. Test Reports: Submit for field inspection and testing. Include description of procedures, duration, instruments used, and test values obtained. Present information in table comparing acceptable values to actual values:
 - a. Indicate overall resistance to ground and resistance of each electrode.
 - b. Indicate final phase balance values for all panelboards, including neutral.
 4. Operating and Maintenance Instructions:
 - a. Panelboard: Submit NEMA PB 2.1.

1.03 QUALITY ASSURANCE

- A. Ground System Resistance: 5 ohms.
- B. Phase balance per panelboard: 10 percent.
- C. All panelboards shall be of same manufacturer for ease of future maintenance.

1.04 REFERENCES

- A. NECA (National Electrical Contractors Association) "Standard of Installation."
- B. NEMA PB 1 - Panelboards.
- C. NEMA KS 1 - Enclosed Switches.
- D. NEMA PB 1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.

PART 2 PRODUCTS

2.01 ENCLOSED SWITCHES

- A. Manufacturers:
1. Square D.
 2. General Electric.
 3. Siemens.

- 4. Substitutions: Or Approved Equal.
- B. Fusible Switch Assemblies: NEMA KS 1, Type HS or GS, horsepower rated, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position. Fuse clips: Designed to accommodate Class R fuses when used.
- C. Nonfusible Switch Assemblies: NEMA KS 1, Type HS or GS, horsepower rated, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in the OFF position.
- D. Enclosures:
 - 1. Interior Dry Locations: Type 1.
 - 2. Exterior Locations: Type 3R.

2.02 GROUNDING MATERIALS

- A. Manufacturers:
 - 1. ITT Blackburn.
 - 2. Burndy Corp.
 - 3. Steel City.
- B. Ground Rods: Copper-encased steel, 1/2 inch diameter, minimum length 10 feet.
- C. Wire: Stranded copper.
- D. Clamps: Bronze.
- E. Grounding Electrode Conductor: Size to meet NFPA 70 requirements.

2.03 LIGHTING AND APPLIANCE PANELBOARDS

- A. Manufacturers:
 - 1. Square D.
 - 2. General Electric.
 - 3. Siemens.
 - 4. Substitutions : Or Approved Equal.
- B. Lighting and Appliance Panelboards: NEMA PB 1; lighting and appliance circuit breaker type panelboard:
 - 1. Description: As scheduled on Drawings.
 - 2. Provide terminals rated and U.L. listed for use with 75 degrees C temperature rated conductors.
 - 3. Bussing: Shall be copper (all phases, neutral and ground)
 - 4. Breakers: As scheduled on Drawings and specified hereafter.
 - a. Heating, Ventilating and Air Conditioning: HACR rated.
 - 5. Breaker Accessories: As scheduled on Drawings.

2.04 GROUNDING AND BONDING

- 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.

2.05 CIRCUIT BREAKERS

- A. Underwriter Laboratories listed for intended branch circuit:
 - 1. Lighting: SWD.
 - 2. Heating, Ventilating and Air Conditioning: HACR rated.
- B. Provide accessories as scheduled.
- C. Handle Lock: Include provisions for sealing.
- D. Provide mechanical trip device.
- E. Provide insulated grounding lug in each enclosure.
- F. Provide products suitable for use as service entrance equipment where so applied.

2.06 SINGLE-POLE MOTOR RATED SWITCHES

- A. Manufacturers:
 - 1. Square D.
 - 2. General Electric.
 - 3. Siemens.
 - 4. Substitutions: Or Approved Equal.
- B. NEMA ICS 2; AC general purpose Class A manually operated, full-voltage controller for fractional horsepower induction motors, with thermal overload unit, toggle operator.
 - 1. Voltage: 120 Volt.
- C. Enclosure: NEMA 1, suitable for use in return air plenum where applicable.

PART 3 EXECUTION

3.01 EXAMINATION AND PREPARATION

- A. Verify that equipment is ready for electrical connection, wiring, and energization.

3.02 INSTALLATION

- A. Install equipment in accordance with manufacturer's instructions.
- B. Install panelboards to NEMA PB 1.1.
- C. Provide typed or neatly handwritten circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads.
- D. Provide engraved plastic nameplates.
- E. Measure steady state load currents at each panelboard feeder; rearrange circuits in the panelboard to balance the phase loads to within 20 percent of each other. Maintain proper phasing for multi-

wire branch circuits.

- F. Service equipment must be legibly field-marked with the maximum available fault current, including the date the fault current calculation was performed and be of sufficient durability to withstand the environment involved.
- G. Field mark electrical equipment to warn qualified persons on the danger of electric arc flash. The field-marking must be clearly visible to qualified persons before they inspect or work on the equipment.
- H. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.
- I. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.
- J. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.
- K. Install terminal block jumpers to complete equipment wiring requirements.
- L. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.
- M. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.

3.03 FIELD QUALITY CONTROL

- A. Inspect grounding and bonding system conductors and connections for tightness and proper installation.
- B. Measure ground resistance from system neutral connection at service entrance to convenient ground reference point by passing minimum current of 10 amperes DC and measuring voltage drop. Maximum resistance: 5 ohms.
- C. Measure primary and secondary transformer voltages and make appropriate tap adjustments.

3.04 CLEANING

- A. Clean equipment finishes to remove paint and concrete splatters.

END OF SECTION

SECTION 26 05 83 WIRING CONNECTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical connections to equipment and devices not an integral part of the electrical distribution system.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 00 - Basic Electrical Requirements

1.03 REFERENCE STANDARDS

- A. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (Reaffirmed 2020).

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Provide conduit rough-in and electrical connection to powered equipment and devices identified in the Project Manual and on the Drawings. Refer specifically, but not limited to, these Specification Sections for further information:
 - 1. Section 23 09 23 - Direct-Digital Control System for HVAC.
 - 2. Section 23 21 23 - Hydronic Pumps.
 - 3. Section 23 34 16 - Centrifugal HVAC Fans.
 - 4. Section 23 73 13 - Modular Central-Station Air-Handling Units.
- B. Coordination: Determine connection locations and requirements for furniture, equipment and devices furnished or provided under other sections.
 - 1. Do not rely solely on the Drawings and Project Manual for execution of the Work of this Section.
 - 2. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions.
 - 3. Include necessary field evaluation time to inspect connection requirements.
 - 4. Coordinate with other trades to determine exact rough-in requirements.
- C. Sequencing:
 - 1. Install rough-in of electrical connections before installation of furniture and equipment is required.
 - 2. Make electrical connections before required start-up of equipment.

1.05 SUBMITTALS

- A. Product Data: Provide wiring device manufacturer's catalog information showing dimensions, configurations, and construction.
- B. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Products: Listed, classified, and labeled as suitable for the purpose intended.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that equipment is ready for electrical connection, wiring, and energization.

3.02 ELECTRICAL CONNECTIONS

- A. Make electrical connections in accordance with equipment manufacturer's instructions.
- B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.
- C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.
- D. Provide receptacle outlet to accommodate connection with attachment plug.
- E. Provide cord and cap where field-supplied attachment plug is required.
- F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.
- G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.
- H. Install terminal block jumpers to complete equipment wiring requirements.
- I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

END OF SECTION

SECTION 26 51 00 LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Interior luminaires.

1.02 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.
- B. NECA/IESNA 501 - Recommended Practice for Installing Exterior Lighting Systems; National Electrical Contractors Association; 2006.
- C. NEMA LE 4 - Recessed Luminaires, Ceiling Compatibility; National Electrical Manufacturers Association; 2012.
- D. UL 1598 - Luminaires; Current Edition, Including All Revisions.
- E. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.
- F. IESNA LM-63 - ANSI Approved Standard File Format for Electronic Transfer of Photometric Data and Related Information; Illuminating Engineering Society; 2002 (Reaffirmed 2008).
- G. NECA/IESNA 500 - Standard for Installing Indoor Commercial Lighting Systems; National Electrical Contractors Association; 2006.
- H. UL 924 - Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.
- I. UL 1598 - Luminaires; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.
 - 2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
 - 3. Coordinate the placement of exit signs with furniture, equipment, signage or other potential obstructions to visibility installed under other sections or by others.
 - 4. Notify Architect/Engineer of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

1.04 SUBMITTALS

- A. Shop Drawings:
 - 1. Provide photometric calculations where luminaires are proposed for substitution upon request.
 - 2. Indicate construction, installation and mounting details for products.

3. Wiring Diagrams: Submit wiring diagrams for all exit sign, night light, self-contained back-up battery lighting, battery ballasts and associated circuit breakers, programmable circuit breakers and/or emergency circuit breakers.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.
 1. LED Luminaires:
 - a. Include IES LM-79 test report upon request.
 2. Lamps: Include rated life, color temperature, color rendering index (CRI), and initial and mean lumen output.
 3. Wiring diagrams: Provide wiring diagrams for dimmable ballasts and dimmable switches.
- C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- D. Operation and Maintenance Data: Instructions for each product including information on replacement parts.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
- F. Project Record Documents: Record actual connections and locations of luminaires and any associated remote components.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.06 DELIVERY, STORAGE, AND PROTECTION

- A. Receive, handle, and store products according to NECA/IESNA 500 (commercial lighting), NECA/IESNA 502 (industrial lighting), and manufacturer's written instructions.
- B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

1.07 FIELD CONDITIONS

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.08 WARRANTY

- A. Provide three year manufacturer warranty for all LED luminaires, including drivers.

PART 2 PRODUCTS

2.01 LUMINAIRE TYPES

- A. Furnish products as indicated in luminaire schedule included on the drawings.

2.02 LUMINAIRES

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Provide products complying with Federal Energy Management Program (FEMP) requirements.
- C. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- D. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.
- E. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- F. Recessed Luminaires:
 - 1. Ceiling Compatibility: Comply with NEMA LE 4.
- G. LED Luminaire Components: UL 8750 recognized or listed as applicable.

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 conductors in accordance with NFPA 70.
- C. Verify that suitable support frames are installed where required.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- E. Verify that conditions are satisfactory for installation prior to starting work.
- F. Examine substrate and supporting grids for luminaires.
- G. Examine each fixture to determine suitability for lamps specified.

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. Install products according to manufacturer's instructions.
- B. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 1 (general workmanship), NECA 500 (commercial lighting), and NECA 502 (industrial lighting).
- C. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- D. Locate recessed ceiling luminaires as indicated on reflected ceiling plan.

- E. Install accessories furnished with each luminaire.
- F. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.
- G. Suspended Ceiling Mounted Luminaires:
 - 1. Do not use ceiling tiles to bear weight of luminaires.
 - 2. Support luminaires larger than 2 foot by 4 foot size independent of ceiling framing.
 - 3. Secure lay-in luminaires to ceiling support channels using listed safety clips at four corners.
- H. Recessed Luminaires:
 - 1. Install trims tight to mounting surface with no visible light leakage.
 - 2. Install recessed luminaires to permit removal from below.
 - 3. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.
 - 4. Install clips to secure recessed grid-supported luminaires in place.
- I. Suspended Luminaires:
 - 1. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.
 - 2. Unless otherwise indicated, support pendants from swivel hangers.
- J. Install accessories furnished with each luminaire.
- K. Bond products and metal accessories to branch circuit equipment grounding conductor.

3.04 FIELD QUALITY CONTROL

- A. Inspect each product for damage and defects.
- B. Operate each luminaire after installation and connection to verify proper operation.
- C. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect/Engineer.

3.05 CLEANING

- A. Clean surfaces according to NECA 500 (commercial lighting), NECA 502 (industrial lighting), and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.06 CLOSEOUT ACTIVITIES

- A. Demonstration: Demonstrate proper operation of luminaires to Architect/Engineer, and correct deficiencies or make adjustments as directed.
- B. Just prior to Substantial Completion, replace all lamps that have failed.
- C. Project record documents: Accurately record location of each luminaire.

3.07 PROTECTION

- A. Protect installed luminaires from subsequent construction operations.

END OF SECTION

SECTION 28 46 00 FIRE DETECTION AND ALARM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Replacement and removal of existing fire alarm system components, wiring, and conduit indicated.

1.02 REFERENCE STANDARDS

- A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.
- B. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- C. IEEE C62.41.2 - IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits; 2002 (Corrigendum 2012).

1.03 MAINTENANCE

- A. Include operating instructions, and maintenance and repair procedures.
- B. Provide a one year full maintenance and inspection service from date of Final Acceptance. Conform to maintenance and inspection service requirements of NFPA 72.

PART 2 PRODUCTS

2.01 FIRE ALARM SYSTEM

- A. Fire Alarm System: Provide modifications and extensions to the existing automatic fire detection and alarm system:
 - 1. Provide all components necessary, regardless of whether shown in the contract documents or not.
 - 2. Protected Premises: Areas denoted on the drawings.
 - 3. Comply with the following; where requirements conflict, order of precedence of requirements is as listed:
 - a. ADA Standards.
 - b. The requirements of the local authority having jurisdiction, which is City of Joliet.
 - c. Applicable local codes.
 - d. The contract documents (drawings and specifications).
 - e. NFPA 72; where the word "should" is used consider that provision mandatory; where conflicts between requirements require deviation from NFPA 72, identify deviations clearly on design documents.
 - 4. Evacuation Alarm: Single smoke zone; general evacuation of entire premises.
 - 5. Zoning: Point addressable system with initiating devices being individually zoned.
 - 6. Existing Control Panel: Make modifications to the existing panel:
- B. Supervising Stations and Fire Department Connections:
 - 1. Existing connections to remain.
- C. Circuits:
 - 1. Initiating Device Circuits (IDC): Class B, Style A.
 - 2. Signaling Line Circuits (SLC) Within Single Building: Class B, Style 0.5.

- 3. Notification Appliance Circuits (NAC): Class B, Style W.
- 4. All cabling shall be plenum rated.

D. Spare Capacity:

- 1. Initiating Device Circuits: Minimum 25 percent spare capacity.
- 2. Notification Appliance Circuits: Minimum 25 percent spare capacity.
- 3. Master Control Unit: Capable of handling all circuits utilized to capacity without requiring additional components other than plug-in control modules.

E. Power Sources:

- 1. Primary: Dedicated branch circuits of the facility power distribution system.
- 2. Secondary: Storage batteries.
- 3. Capacity: Sufficient to operate entire system for period specified by NFPA 72.
- 4. Each Computer System: Provide uninterruptible power supply (UPS).

2.02 EXISTING COMPONENTS

- A. Clearly label components that are "Not In Service."
- B. Remove unused existing components and materials from site and dispose of properly.

2.03 FIRE SAFETY SYSTEMS INTERFACES

- A. Alarm: Provide alarm initiation in accordance with NFPA 72 for the following:
 - 1. Duct smoke detectors.
- B. HVAC:
 - 1. Duct Smoke Detectors: Close dampers indicated; shut down air handlers indicated.

2.04 COMPONENTS

- A. General:
 - 1. Provide legible, permanent labels for each control device, using identification used in operation and maintenance data.
- B. Fire Alarm Power Supplies, Initiating Devices, and Notification Appliances: Analog, addressable type; listed by Underwriters Laboratories as suitable for the purpose intended.
- C. Initiating Devices:
 - 1. Duct Mounted Smoke Detector: Addressable/Analog photoelectric type, duct sampling tubes extending width of duct, in duct-mounted housing compatible with control panel and air stream velocities. Fan control shall not be hard wired through duct detector. Fan shutdown shall be completed by fan shutdown relay.
- D. Zone Module Interface:
 - 1. Single zone interface module shall provide an addressable input interface to the control panel for monitoring normally open contact devices. Mount inside NEMA 1 enclosure within 10 feet of first monitored device of zone. Compatible with control panel.
- E. Control Relay Module:
 - 1. Programmable control relay shall be located within 10' of device to be controlled. Temporal sound pattern. Audio shall be synchronized.
- F. Circuit Conductors: Copper or optical fiber; provide 200 feet extra; color code and label.

G. Surge Protection: In accordance with IEEE C62.41.2 category B combination waveform and NFPA 70; except for optical fiber conductors.

1. Signaling Line Circuits: Provide surge protection at each point where circuit exits or enters a building, rated to protect applicable equipment.

PART 3 EXECUTION

3.01 EXAMINATION AND PREPARATION

- A. Field inspect existing fire alarm system installation to determine all required interface components necessary for fire alarm system replacement and relocation.
- B. Perform repair work on existing system to eliminate trouble conditions.

3.02 INSTALLATION

- A. Install in accordance with applicable codes, NFPA 72, NFPA 70, and the contract documents.
- B. Install fire alarm system in accordance with manufacturer's instructions.
 1. Mount end-of-line device in separate box adjacent to sprinkler flow switch.
 2. Make conduit and wiring connections to fire suppression system at fire sprinkler riser and elevator tamper switches and duct smoke detectors.
 3. Install manual station with operating handle 4 feet above floor. Install horn strobe units 7.5 feet above floor.
- C. Conceal all wiring, conduit, boxes, and supports where installed in finished areas.
- D. Obtain Owner's approval of locations of devices, before installation.
- E. Install instruction cards and labels.

3.03 INSPECTION AND TESTING FOR COMPLETION

- A. Perform field inspection and testing of fire alarm system.
- B. Notify Owner 7 days prior to beginning completion inspections and tests.
- C. Notify authorities having jurisdiction and comply with their requirements for scheduling inspections and tests and for observation by their personnel.
- D. Provide the services of the installer's supervisor or person with equivalent qualifications to supervise inspection and testing, correction, and adjustments.
- E. Prepare for testing by ensuring that all work is complete and correct; perform preliminary tests as required.
- F. Provide all tools, software, and supplies required to accomplish inspection and testing.
- G. Perform inspection and testing in accordance with NFPA 72 and requirements of local authorities; document each inspection and test.
 1. Include description of testing and results in test report.
 2. Perform 100 percent acceptance test to NFPA 72 standards on system.
- H. Correct defective work, adjust for proper operation, and retest until entire system complies with contract documents.

3.04 MANUFACTURER'S FIELD SERVICES

- A. Include services of technician to supervise installation, adjustments, final connections, and system testing.

3.05 CLOSEOUT

- A. Closeout Demonstration: Demonstrate proper operation of all functions to Owner.
 - 1. Be prepared to conduct any of the required tests.
 - 2. Have at least one copy of operation and maintenance data, preliminary copy of project record drawings, input/output matrix, and operator instruction chart(s) available during demonstration.
 - 3. Have authorized technical representative of control unit manufacturer present during demonstration.
 - 4. Demonstration may be combined with inspection and testing required by authority having jurisdiction; notify authority having jurisdiction in time to schedule demonstration.
 - 5. Repeat demonstration until successful.
- B. Substantial Completion of the project cannot be achieved until inspection and testing is successful and:
 - 1. Approved operating and maintenance data has been delivered.
 - 2. Spare parts, extra materials, and tools have been delivered.
 - 3. All aspects of operation have been demonstrated to Owner.
 - 4. Final acceptance of the fire alarm system has been given by authorities having jurisdiction.
- C. Perform post-occupancy instruction within 3 months after Substantial Completion.

3.06 MAINTENANCE

- A. Perform routine inspection, testing, and preventive maintenance required by NFPA 72, including:
 - 1. Maintenance of fire safety interface and supervisory devices connected to fire alarm system.
 - 2. Repairs required, unless due to improper use, accidents, or negligence beyond the control of the maintenance contractor.
 - 3. Record keeping required by NFPA 72 and authorities having jurisdiction.
- B. Provide trouble call-back service upon notification by Owner:
 - 1. Provide on-site response within 2 hours of notification.
 - 2. Include allowance for call-back service during normal working hours at no extra cost to Owner.
 - 3. Owner will pay for call-back service outside of normal working hours on an hourly basis, based on actual time spent at site and not including travel time; include hourly rate and definition of normal working hours in maintenance contract.
- C. Provide a complete description of preventive maintenance, systematic examination, adjustment, cleaning, inspection, and testing, with a detailed schedule.
- D. Maintain a log at each fire alarm control unit, listing the date and time of each inspection and call-back visit, the condition of the system, nature of the trouble, correction performed, and parts replaced. Submit duplicate of each log entry to Owner's representative upon completion of site visit.
- E. Comply with Owner's requirements for access to facility and security.

END OF SECTION



JOLIET JUNIOR COLLEGE
— 1901 —

CONTRACT AGREEMENT

Purchase Order#: XXXXXX Account #: XXX-XXX-XXX.XXX

Date: XXXXXX

Project: XXXXX

Between:

Joliet Junior College
1215 Houbolt Road
Joliet, Illinois 60431

AND

Contractor
Address
Address

In the amount of \$ xxxxxxxxxxxxxxxxxxxxxxxxxxxx and 00/100

ARTICLE 1

THE WORK

1.1 The Trade Contractor and JJC agree that the materials and equipment to be furnished and the work to be done by the Trade Contractor are as follows:

The Contract Sum includes, but is not limited to the following:

- 110% Performance and payment bond to Joliet Junior College, Illinois Community College District No. 525
- Insurance in accordance with Schedule "A" Insurance Requirements.

The Contract Sum excludes the following:

- All sales, consumer, use and other similar taxes on equipment and materials incorporated into the work for this project. Tax Exempt No E9992-4773-06 for Joliet Junior College, Illinois Community College District No. 525

1.2 The Trade Contractor shall be held accountable for the following Project related responsibilities: furnish all labor and supervision; furnish, supply and install all equipment, material supplies, tools, scaffolding, hoisting, transportation, unloading and handling; do all things required to complete the work described above on the Project all in accordance with the drawings, documents and specifications prepared by the Architect/Engineer/Owner; and furnish all necessary information, shop drawings, details, samples, brochures,

etc. for Owner/Architect approval, as may be required.

ARTICLE 2

TIME OF COMMENCEMENT AND COMPLETION

2.1 Trade Contractor shall start the work upon notice to proceed and shall execute the work with diligence and so as to maintain such schedules and milestones as established by JJC's Construction Manager. The Trade Contractor agrees to complete portions and the whole of the work by the following anticipated dates:

2.2 The Trade Contractor is cautioned that schedules and milestones are subject to review and revision. It is the sole responsibility of the Trade Contractor to attend job meetings, keep itself informed of any revisions, and conform to any such revisions.

2.3 In the event that the Trade Contractor should fail to maintain JJC's progress schedule or the schedule as established above, the JJC Construction Manager reserves the right, after 48 hours formal notice, either by letter or confirmed email to the Trade Contractor, to procure the materials, equipment, and labor necessary to proceed with, or to complete the work, or any portion thereof from other sources and charge the cost thereof to the Trade Contractor.

ARTICLE 3

THE CONTRACT SUM

3.1 JJC agrees to pay the Trade Contractor for the satisfactory performance of his work the total sum of:

Contract Amount: \$.00

Contract amount is made up of the following:

- Base Bid\$
- Alternate Bid No.\$
- Total Contract Amount.....\$

Allowances (if applicable):

Unit Prices (furnished and installed unless stated otherwise)

In current funds subject to additions and deductions for changes, as may be agreed upon, and to make payments on account thereof as follows:

- 3.2 On the established day of each month, the Trade Contractor shall deliver to the JJC Construction Manager (2) completed copies of the JJC Payment Application Package showing values of all materials delivered and work completed up to the established billing date for which payment is being requested. It is specifically understood and agreed that prior to submission of the first statement the Trade Contractor will deliver to the JJC Construction Manager, for review and approval, a detailed breakdown of this contract sum showing a schedule of values for the various parts of the work. Once accepted, this schedule of values will be used as a basis for checking the Trade Contractor's monthly statement.
- 3.3 The Trade Contractor shall, with the second and each succeeding monthly request for payment, submit a waiver of lien showing all payments made for labor and materials and on account for all work covered in the previous months request for payment. Affidavit and waiver of liens may be required to be submitted from Trade Contractors, suppliers, and/or Trade-Trade Contractors (all tier).
- 3.3.1 The Trade Contractor shall, with the second and each succeeding monthly request for payment, submit certified payroll for all labor and sub labor.
- 3.4 Ten percent (10%) of each payment shall be retained, unless specific provisions to the contrary are indicated in the contract documents.
- 3.5 No payment made under this Agreement, including the final payment, shall be conclusive evidence of the performance of the work, either wholly or in part, and no payment shall be construed as an acceptance of defective work or improper materials.
- 3.6 The Trade Contractor shall save and keep JJC's property free from all mechanics' and material liens and all other liens and claims, legal or equitable, arising out of the Trade Contractors work hereunder. In the event any such lien or claim is filed by anyone claiming by, through, or under the Trade Contractor, the Trade Contractor shall remove and discharge same, by bonding or otherwise, within five (5) days of the filing thereof.

ARTICLE 4

THE CONTRACT DOCUMENTS

- 4.1 The contract documents consist of this Agreement and any exhibits attached hereto; general conditions, supplementary, special and other conditions, the drawings, specifications, general instructions to bidders, supplements to bidder's documents, form of proposal, all addenda issued prior to and all modifications issued after execution of the Agreement. Any post bid review and/or pre-construction document shall be considered part of this Agreement.
- 4.2 The Trade Contractor agrees to perform the work under the general direction of the JJC Construction Manager.
- 4.3 If there is a provision for liquidated damages in the contract documents, the Trade Contractor shall be liable for any liquidated damages by reason of the failure of the Trade Contractor to prosecute the work diligently and properly.
- 4.4 No extra work shall be performed under this Agreement, except upon receipt of a written change

order from JJC. Should the Trade Contractor proceed with any work they consider extra to this contract without a fully executed JJC change order form, it is considered at their own risk and cost.

ARTICLE 5

INSURANCE AND INDEMNITY

5.1 The Trade Contractor agrees to at the time of execution of this Agreement furnish the Construction Manager with certificates of an insurance company (or other source). These certificates should certify that the Trade Contractor is protected on the work with worker's compensation and employer's liability, public liability and bodily injury, property damage insurance, and any other insurance as required by the contract documents and in accordance with the attachment to this Agreement entitled "Insurance Specifications". The Trade Contractor will not be permitted to start work at the site until these certificates are filed with the JJC Construction Manager. Compliance by the Trade Contractor with the foregoing requirements, as to carrying insurance and furnishing certificates, shall not relieve the Trade Contractor of its liabilities and obligations.

ARTICLE 6

PERFORMANCE BOND AND LABOR AND MATERIAL PAYMENT BOND

6.1 The Trade Contractor agrees to furnish and pay for a 110% Performance Bond and a 110% Labor and Material Payment Bond. The bonds are to be delivered within 10 days of receipt of a purchase order and execution of this agreement.

ARTICLE 7

WARRANTY

7.1 The Trade Contractor agrees to promptly make good, without cost to the JJC, any and all defects, due to faulty workmanship and/or materials, which may appear within the guarantee or warranty period so established in the contract documents. If no such period be stipulated in the contract documents, then such guarantee shall be for a period of one (1) year from date of completion and acceptance of the work by JJC. The Trade Contractor further agrees to provide any and all guarantees as required by the terms of the contract documents, as a condition precedent to final payment.

ARTICLE 8

CHANGES IN THE WORK

- A. 8.1 The Trade Contractor may be ordered in writing by JJC, without invalidating this Agreement, to make changes in the work within the general scope of this Agreement. These changes may consist of additions, deletions, or other revisions, the contract sum and the contract time being adjusted accordingly. The Trade Contractor, prior to the commencement of such changed or revised work, shall submit promptly to the JJC Construction Manager written copies of any claim for adjustment

to the contract sum and contract time for such revised work in a manner consistent with the contract documents. Any extra work done by the Contractor will be considered performed at no extra cost to JJC unless a written JJC change order form has been fully executed and signed by the Director of Business and Auxiliary Services. A contractor shall not be entitled to any compensation for extra work/material based on verbal conversations or email exchanges (the contractor is considered proceeding with extra work at their own risk without a fully executed JJC change order form). It is the contractor's responsibility to obtain a fully executed change order form from JJC. A change order or a combination of multiple change orders may not exceed 10% of the original contract without JJC seeking approval from the Board of Trustees.

8.2 Where changes in the work involve both additions and deletions, percentages for overhead and profit shall be applied to the net increase only of such values for labor and materials.

8.3 The amount to be paid by the Owner for changes in the work, as outlined in paragraph 8.1 above, shall be made on the basis of one of the following methods:

- (a) by mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation and agreed upon by the JJC Construction Manager and the Trade Contractor, or
- (b) by unit prices stated in the contract documents, or
- (c) if no such unit prices are set forth and if the parties cannot agree upon a lump sum, then the actual net cost in money to the Trade Contractor of materials and labor (including insurance and applicable taxes) required, plus rental of plant equipment (other than small tools and small equipment) plus compensation for overhead and for profit as noted in Article 12, field overhead will not be considered as part of actual net cost, or
- (d) by the method provided in subparagraph 8.4.

8.4 If none of the above methods set forth in clauses 8.3 (a), 8.3 (b), 8.3 (c) is agreed upon, the Trade Contractor, provided he receives a written order signed by JJC shall promptly proceed with the work involved. The cost of such work shall be determined by the JJC Construction Manager on the basis of reasonable expenditures and savings of those performing the work attributable to the change, including, in the case of an increase in the contract sum, a reasonable allowance for overhead and profit as set forth in the bid documents. In such case, and also under clauses 8.3 (c) and 8.3 (d) above, the Trade Contractor shall keep and present, in such form as the JJC Construction Manager may prescribe, an itemized accounting together with appropriate supporting data for inclusion in a change order. Unless otherwise provided in the contract documents, cost shall be limited to the following: cost of materials including sales tax and cost of delivery, cost of labor including social security, old age and unemployment insurance and fringe benefits required by Agreement or custom; workers or workmen's compensation insurance; bond premiums; rental value of equipment and machinery; and the additional costs of supervision and field office personnel directly attributable to the change. Pending final determination of cost, payments, on account shall be made as determined by the JJC. The amount of credit to be allowed by the Trade Contractor for any deletion or change which results in a net decrease in the contract sum will be the amount of the actual net cost as confirmed by JJC when both additions and credits covering related work or substitutions are involved in any one change, the allowance for overhead and profit shall be figured on the basis of the net increase, if any with respect to that

change.

8.5 For work performed by a Trade-Trade Contractor, the Trade Contractor will be allowed to add 5% only and said Trade-Trade Contractor mark-up shall not exceed the agreed upon percentages noted in Article 11 for overhead and profit.

ARTICLE 9

TRADE CONTRACTOR RESPONSIBILITIES

9.1 The Trade Contractor shall provide sufficient, safe, and proper facilities at all times for the inspection of the work by JJC. The Trade Contractor shall, within a 24-hour notice from the JJC Construction Manager, proceed to take down all portions of the work and remove from the grounds or buildings, all materials, whether worked or unworked, which the JJC Construction Manager shall condemn as unsound or improper, or as in any way failing to conform to the contract documents. The Trade Contractor shall make good at its own expense, all work damaged or destroyed thereby.

9.2 The Trade Contractor agrees, in the performance of this Agreement, to comply with all federal, state, municipal, and local laws, ordinances, codes and governing regulations, to pay all costs and expenses required thereby; to pay all fees, charges, assessments, and taxes, including sales and use taxes, and to pay all fringe and other benefits required by Agreement or law.

9.3 The Trade Contractor shall pay all royalties and license fees. He shall defend all suits or claims for infringement of any patent rights and shall save JJC harmless from loss on account thereof, except that JJC shall be responsible for all such loss when a particular design, process or the product of a particular manufacturer or manufacturers is specified, but if the Trade Contractor has reason to believe that the design, process or product specified is an infringement of a patent, he shall be responsible for such loss unless he promptly gives such information to the JJC Construction Manager.

9.4 Should the Trade Contractor become insolvent, or at any time, refuse or neglect to supply a sufficiency of properly skilled workers, or equipment and materials of the proper quality, or fail in any respect to prosecute the work with promptness and diligence, or fail in the performance of any of the Agreements herein contained, JJC shall be at liberty, after 48 hours written notice to the Trade Contractor, to provide any such labor, equipment, and materials and deduct the cost thereof, from any money then due or thereafter to become due to the Trade Contractor, under this Agreement if such refusal, neglect, or failure is sufficient ground for such actions, JJC shall also be at liberty to terminate the employment of the Trade Contractor. Consequently, JJC may enter upon the premises to take possession, for the purpose of completing the work included under this Agreement, of all materials, tools, and appliances thereon, and to employ any other person or persons to finish the work and provide the materials therefore. In case of such discontinuance of the employment, the Trade Contractor shall not be entitled to receive any further payment under this Agreement until the said work shall be wholly finished. If such expense shall exceed such unpaid balance, the Trade Contractor shall pay the difference to JJC. The expense incurred by JJC, as herein provided, either for furnishing materials, or finishing the work, and any damage incurred through such default, shall be chargeable to the Trade Contractor. In the event that a Termination for Cause is not upheld by a properly empowered judicial or arbitral authority, then the Termination for Cause shall be deemed a Termination for Convenience and construed under Section 9.4.1. hereof.

9.4.1 Notwithstanding the above paragraph, JJC reserves the right to terminate this Agreement for its convenience upon written notice to the Trade Contractor. In such instance the Trade Contractor will be paid

its share of the contract amount proportionate to the percentage of its work completed and other reasonable cancellation costs incurred as a result of said termination. No payments shall be made for anticipated overhead and profit. Prior to making any payments under this clause, JJC shall have the right to audit the records of the Trade Contractor.

9.5 The Trade Contractor agrees to adhere to the federal occupational safety act, state and local safety regulations and JJC's safety and health program so as to avoid injury or damage to persons or property, and to be directly responsible for damage to persons and property resulting from failure to do so.

9.6 In the event the Trade Contractor after a 24-hour written notice from JJC fails to take corrective action to insure compliance with said safety regulations or removal of rubbish and debris resulting from his work, JJC shall undertake these obligations and charge the cost of same to the Trade Contractor's account without further notice to the Trade Contractor.

9.7 The Trade Contractor agrees to notify the JJC Construction Manager of all accidents which may occur to persons or property and shall provide a copy of all accident reports on appropriate forms. All reports shall be signed by the Trade Contractor or his authorized representative and submitted within five (5) days of occurrence.

9.8 The Trade Contractor shall procure its materials from such sources, and employ such labor subject to contract terms and conditions in order to ensure harmonious labor relations on the site and prevent strikes or labor disputes by its employees or other trade employees. The Trade Contractor, in the event of a labor dispute including strikes, shall take whatever action is required in order to prevent the disruption of work on the Project site.

9.9 The Trade Contractor will not assign this Agreement or any moneys due or to become due under this Agreement, or sublet the whole or any part of the work to be performed hereunder, without the written consent of the Owner. In the event of such consent, a Trade-Trade Contractor must comply with all the requirements of this Agreement.

9.10 The Trade Contractor agrees that all disputes concerning the jurisdiction of trades shall be adjusted in accordance with any plan for the settlement of jurisdictional disputes which may be in effect either nationally or in the locality in which the work is being done. The Trade Contractor shall be bound by, and shall abide by, all such adjustments and settlements of jurisdictional disputes, whether or not the Trade Contractor is signature bound by the Agreement establishing the impartial jurisdictional disputes board and/or its successors. The Trade Contractor agrees not to cause work stoppage, due to the jurisdictional assignment of work.

9.11 The Trade Contractor shall submit to the JJC Construction Manager upon request, copies of orders placed for the various materials required for the Project or authentic stock lists if such material is normally a stock item. Order copies need not reflect prices but should indicate type of material, quantity, vendor name, and address, etc. The Trade Contractor shall be required to submit to the JJC Construction Manager a monthly material status report, or more often if required by the JJC Construction Manager, as a prerequisite for the monthly progress payment. The Trade Contractor shall notify the JJC Construction Manager immediately upon learning of a change of status of any material, equipment, or supplies.

9.12 The Trade Contractor shall continuously and adequately protect all his work and will immediately replace all damaged and defective work.

9.13 The Trade Contractor agrees to maintain an adequate force of experienced workers and the necessary materials, supplies, and equipment to meet the requirements of the JJC Construction Manager and other trades in order to maintain construction progress schedules, as established by the JJC Construction Manager. In the event that his force is, in the judgment of the JJC Construction Manager, inadequate to meet the established schedules during the regular working hours, the Trade Contractor agrees to work sufficient overtime hours or increase his work force to meet such schedules at no extra cost to JJC. If for reasons not already stated, the JJC Construction Manager requires and directs the Trade Contractor to work overtime, including Saturdays, Sundays or Holidays, the Trade Contractor will be reimbursed the net premium rate only. The net premium rate is understood to mean the actual premium labor cost, including applicable taxes and wage additives required by trade Agreement or by law, but without additives for overhead, labor efficiency, or profit.

9.14 The Trade Contractor agrees to employ competent administrative, supervisory, and field personnel to accomplish the work, including layout, engineering, and preparation and checking of shop drawings. If required, the Trade Contractor shall substantiate this employment of competent personnel to JJC's Construction Manager's satisfaction before initiating any work.

9.15 The Trade Contractor shall insure that all construction tools, equipment, temporary facilities, and other items used in accomplishing the work, whether purchased, rented, or otherwise provided by the Trade Contractor or provided by others, are in a safe, sound, and good condition, must be capable of performing the functions for which they are intended and must be maintained in conformance with applicable laws and regulations.

9.16 If the Trade Contractor is delayed at any time in the progress of the work by any act or neglect of JJC, the Architect/Engineer, or by any employee of either, or by any separate contractor employed by JJC, or by changes ordered in the work, or by labor disputes, fire, unusual delay in transportation, adverse weather conditions not reasonably anticipatable, unavoidable casualties or any causes beyond the Trade Contractor's control, or by delay authorized by JJC, or by any other cause which the JJC Construction Manager determines may justify the delay, then the contract time shall be extended by amendment for such reasonable time as the JJC Construction Manager may determine. In the event that a conflict exists between this section (9.16) and a like clause contained in a document having higher precedence, such like clause shall have preference to the extent of the conflict.

9.17 Right-To-Know- each Trade Contractor is required to implement the provisions of the right-to-know law, if any, as enacted by the state in which the work is being performed. Before using on site any material listed in the right-to-know substance list, each Trade Contractor will furnish the Construction Manager a copy of the material safety data sheet for that substance.

9.18 In the event the Trade Contractor employs independent contractors, as well as payroll labor, to discharge its obligations hereunder, the Trade Contractor acknowledges and understands that it does so at its own risk and that federal, state and/or local agencies may dispute the independent contractor status and assess penalties, fines, and costs should there be a determination to reclassify such workers. In that event, the Trade Contractor agrees that it will defend, indemnify and hold JJC harmless from any fines, costs, damages, penalties, attorneys fees, and causes of action, including without limitation, personal injury or property damage, arising out of or relating in any way to such a determination.

9.19 The Trade Contractor will have competent supervision on site at all times when work is proceeding. No subcontractor should be working on site without representation/supervision by this Trade Contractor. The JJC Construction Manager reserves the right to hire proper supervision of subcontractors, and fully back charge

this Trade Contractor for such services.

ARTICLE 10

EQUAL OPPORTUNITY

10.1 During the performance of this Agreement, the Trade Contractor agrees not to discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The Trade Contractor will take affirmative action to insure that applicants are employed without regard to their race, color, religion, sex, or national origin. The Trade Contractor will comply with all provisions of Executive Order No. 11246, Section 503 of the Rehabilitation Act of 1973, as Amended, the Vietnam Era Veterans' Readjustment Assistance Act of 1974, as Amended, (38 U.S.C. 4212) and their implementing regulations at 41 CFR Chapter 60.

ARTICLE 11

ALTERATIONS

11.1 The overhead and profit allowable under Article 8.3. A, 8.3 B, 8.3 C is:

- For the Trade Contractor, for any Work performed by the Trade Contractor's own forces- 12 percent of the cost
- For the Trade Contractor, for Work performed by his Subcontractor - 5 percent of the amount due the Subcontractor

11.2 All proposals, except those less than \$200 shall be accompanied by a complete itemization of costs including, labor, materials and subcontractors. Labor and material shall be itemized in the manner prescribed in Article 11.1. Where major cost items are subcontracts, they shall be itemized also. In no case will a change involving over \$200 be approved without such itemization.

ARTICLE 12

COMPLETE AGREEMENT

12.1 This Agreement, together with all documents, specifications, drawings, incorporated herein by reference, constitutes the entire Agreement between JJC and Trade Contractor. There are no terms, conditions, or provisions, either oral or written, between the parties hereto, other than those contained herein. This Agreement supersedes any and all written representations, inducements, or understandings of any kind or nature between the parties hereto, relating to the particular Project involved herein.

12.2 The said parties for themselves, their heirs, successors, executors, administrators and assigns, do hereby agree to the full performance of the covenants herein contained.

12.3 Governing Law; Venue - The validity, construction and interpretation of this Agreement shall be governed by the laws of the State of Illinois. The parties hereto irrevocably agree that all actions or proceedings in any way, manner or respect arising out of or from or related to his Agreement shall be litigated only in the Circuit Court, Twelfth Judicial Circuit, Will County, Illinois. Each party hereby consents and submits to personal jurisdiction in the State of Illinois and waives any rights such party may have to transfer the venue of any such action or proceeding.

In witness whereof they have hereunder set their hands the day and date first above written.
In the presence of

Trade Contractor

Witness

Accepted by: _____ (Signature)

Name: _____ (Print name)

Title: _____

Date: _____

Joliet Junior College
Owner

Witness

By: _____ (Signature)

Joliet Junior College

Name: _____ (Print name)

Title: _____

Date: _____

Date:

Time:

Project Title / Location:

Project Number:

FOR

1. **Introductions:** All project members are to introduce themselves including their name, organization, title, and role on the project.

A. Joliet Junior College Personnel:

1. Construction Manager:

- a. Phone:
- b. Cell:
- c. Email:

2. Alternate Contact:

- a. Phone:
- b. Cell:
- c. Email:

B. Contractor Personnel

1. Project Manager:

- a. Phone:
- b. Cell:
- c. Email

2. Construction Superintendent:

- a. Phone:
- b. Cell:
- c. Email:

2. **Communications:**

- A. Communications related to the project between Joliet Junior College and the Contractor shall be conducted through the Joliet Junior College Construction Manager (CM) only, unless directed otherwise.
- B. In the event of an emergency the Contractor is to contact Campus Police at 815-280-2234, or may pick-up any campus phone and dial 2911.
- C. RFI's: Requests for Information (RFI's): All Requests for Information shall be in written form to JJC's CM with a copy to the A/E when required. All responses will come from JJC or the A/E in writing addressed to the Contractor's Project Manager

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- D. Weekly Construction Reports: Contractor is to provide a weekly construction report to JJC CM. This report is to be inclusive of daily activities, potential delays, stoppage, problems, accidents, near misses, significant decisions, meetings, requests by JJC, etc.
- E. Correspondence: All correspondence shall be directed to the Construction Manager

Joliet Junior College
Facilities Services Department
ATTN: _____
1215 Houbolt Road
Joliet, IL 60431

Include Project Title, Project Number, Purchase Order Number on ALL correspondence.

3. Construction Schedule:

- A. Schedule of Values: Contractor is to provide a schedule of values (AIA document recommended) broken down into each division of the work as a minimum. The schedule of values will include as a minimum a listing of the work elements or branch values, the cost of each work element, and the percentage of total project "award" cost that the work element represents. The schedule of values will become the basis for "work elements" a.k.a. "branch values" of the Construction Schedule. These same "work elements" shall be used as the basis for the "branch values" of the Construction Progress Report as listed in item #2D above.
- B. Construction Schedule: Contractor is to submit within one week of pre-construction meeting, a fully developed gantt chart type construction schedule.
 - 1. Provide a task for each construction activity or "work element".
 - 2. No progress payment will be processed until the construction schedule is submitted and approved.
 - 3. Provide a revised, updated schedule with each progress payment request.

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Performance:

A. Commencement, Prosecution & Completion of Work

1. Purchase order/notice to proceed received: _____
2. Contract Amount: _____
3. Total Amount of Alternates Accepted: _____
4. Proposed start/mobilization date : _____
5. Preconstruction Submittals Received: Check one Y _____ N _____
6. Bonding & Insurance Requirements Received: Check one Y _____ N _____
7. Completion date: _____
8. Delays and time extensions: The Contractor is responsible for the completion of project work within the time designated above and in the construction schedule. Justified change orders may qualify a delay and require a time extension which must be discussed and approved by the JJC CM. Failure to complete the project on time will result in a negative evaluation of Contractor performance on the JJC project close-out documents.
9. All shop drawings will be submitted to the JJC CM or A/E when required. Material samples shall be submitted for approval when required.
10. The JJC CM and/or the A/E will provide a list of punch list items. The final punch list shall be completed within 2 weeks upon substantial completion. 10% of the contract amount will be withheld until all punch list items are completed.
11. Construction status meetings between the Contractor and JJC CM shall be held on a weekly basis in the JJC CM's office. At the JJC CM's discretion, this weekly meeting may be held via conference telephone call as the project dictates.
12. As-built drawings shall be maintained and kept on-site daily. Final as-built drawings are required to be turned over to the JJC CM at project completion. When AutoCAD drawings are available from the A/E, the Contractor will revise the drawings to reflect as-built conditions. Final payment will not be processed until all as-built drawings are received.

B. Coordination of Work:

1. The Contractor is responsible for coordination of all elements of the work and every aspect of the coordination of his subcontractors work.
2. The Contractor is required to have a competent construction supervisor in charge of the work at all times. Construction supervisor may be a working foreman. It is required that the contractor have their own supervisor on site anytime they have a subcontractor on site.
3. When the shut down of utilities is required, the Contractor shall coordinate with the JJC CM to schedule the shut down process. Allow a minimum of 5 days notice

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to allow for a shut down. Unless otherwise stated during the bidding process, a utility shut down will be required between the hours of 10:00 p.m. to 6:00 a.m.

4. The contractor is to consider any loud construction noise that may be disruptive to classes, faculty, students and staff (including but not limited to loud demolition, hammer drilling, concrete cutting/drilling, rock breaking, shooting of metal stud track into floors and ceilings, etc.). Such work shall be performed during the maintenance hours of 10:00 p.m. to 6:00 a.m.
5. The contractor will be responsible for providing and maintaining portable toilet facilities when the scope of work is an outdoor project. Location of the portable toilet(s) shall be coordinated with JJC.
6. Any project requiring excavation with remaining spoils shall be hauled off site as part of the contractor's base scope of work. Leaving/spreading spoils on site shall not be permitted.

C. Contractor Evaluation:

At the completion of the project, the JJC CM will complete a contractor evaluation. This evaluation is kept on file and is taken into consideration when considering the Contractor for future projects.

13. Mobilization: Prior to the Contractor mobilizing on site, the following requirements must be met and reviewed.

A. Pre-mobilization requirements:

1. Safety plan submitted and approved. Safety plan should address issues of excavation, crane lifts, hot work and other construction hazards that may apply to their work.
2. Schedule of Values and Construction Schedule submitted and approved.
3. Review Contractor's plan for mobilizing on site, including phasing, timing elements, crane operations, dumpster locations, gang box locations, deliveries, parking, storage of material, etc.
4. Contractor check-in with Facility Services. The Contractor's employees are required to obtain vehicle tags and I.D. badges. Any ticketing by Campus Police as a result of no vehicle tag will be the responsibility of the Contractor.

Preconstruction Conference Checklist

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14. Maintenance, Housekeeping and Clean-up: The Contractor is primarily responsible for housekeeping in its respective work areas, and for work performed by its employees and subcontractors. This means the Contractor's work area is required to be maintained in an orderly, safe and productive condition at all times.

- A. Accumulation of combustibles, flammable liquids, chemical products, tools not in use, trash and/or refuse is not acceptable and will not be allowed.
- B. Parking, staging and storage of materials and equipment shall be confined to designated areas only.
- C. When a Contractor's work material may be dislodged by wind and could create a hazard when left in an open area, it shall be secured by the Contractor.
- D. The Contractor will police its work area(s) at the end of the shift and leave the area in a condition that is acceptable to the JJC CM.
- E. In the event that housekeeping in a Contractor's work area is found to be in an unacceptable condition by the JJC CM, the CM will give notice once verbally to the Contractor's on-site supervisor or foreman. If the deficiency is not corrected in a timely manner (and no later than the end of the day's work shift), the JJC Facility Services Department may make provisions for clean-up (which may or may not be done by outside services), and fully back charged to the Contractor. The Contractor will be liable for all costs associated with clean-up at a minimum rate of \$125/man hour plus materials.
- F. The Contractor shall provide and install safety fencing or barricades around areas requiring protecting (including but not limited to trees, plantings, etc.). This includes installing cyclone fencing for outdoor projects to prevent anyone from entering the construction zone.
- G. The Contractor will be responsible for daily cleaning of mud off roadways where required, or caused by this Contractor.
- H. The Contractor will provide tree protection and install silt fencing when working in areas that such protection or erosion control is required.
- I. The Contractor will provide berms around storm drains to prevent mud run-off from entering the lake.

Preconstruction Conference Checklist

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- J. The contractor shall provide floor protection where necessary when the potential of damage to flooring may occur as a result of this contractors work. Contractor is to determine the necessary means, material and extent of floor protection required. Contractor should also photograph and document existing floor conditions prior to any work.
- K. Any landscape/lawn areas disturbed or damaged (inclusive of ruts, damaged trees, bushes, grass/turf, etc) as a result of this contractors work shall be repaired and/or replaced to original condition. Contractor shall take necessary means to protect such areas whenever possible.
- L. Where necessary, this contractor shall provide dust protection in all areas that may be impacted by their work. Means and methods of dust protection is to be determined by this contractor. Contractor will be fully responsible for cleaning all dust in any and all areas impacted by this project.

15. Conduct and Behavior:

The Contractor's employees and representatives must take into consideration the environment around them when holding conversations with fellow associates as well as JJC staff as to not interrupt classes that may be in session, or students in concourses that may be studying. Profanity/foul language, derogatory remarks or harassment of faculty, staff and/or students will not be tolerated and will be an immediate means for the employee dismissal from the project by JJC.

16. Progress Payments/Invoicing and Change Orders:

- A. A "pencil" copy of progress invoicing shall be submitted to the JJC CM & the A/E by the 1st of every month for review and approval. Final invoicing shall be in by the second week of the month for processing and board approval. No invoice will be processed without lien waiver(s) and certified payroll.
- B. Any extra work done by the Contractor will be considered performed at no extra cost to JJC unless a written JJC change order form has been fully executed and signed by the Director of Business and Auxiliary Services. A contractor shall not be entitled to any compensation for extra work/material based on verbal conversations (the contractor is considered proceeding with extra work at their own risk without a fully executed JJC change order form). It is the contractor's responsibility to obtain a fully executed change order form from JJC. A change order, or a combination of multiple change orders may not exceed 10% of the original contract without JJC seeking approval from the Board of Trustees.

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17. Miscellaneous:

- A. Soliciting or canvassing and posting or distributing printed material (except as permitted by law) is prohibited.
- B. Smoking and chewing tobacco is strictly prohibited on JJC property.
- C. Drinking, using, possessing or being under the influence of alcohol or controlled substances are prohibited, and a cause for immediate dismissal.
- D. No radios, CD Players or MP3 players shall be used during normal working hours.
- E. The Contractor shall perform his/her work in accordance to no less than the minimum requirements as established by the Occupational Safety and Health Association. Personal Protection equipment shall be provided by the Contractor and worn at all times.
- F. The Contractor will be responsible for securing materials and tools and shall be solely responsible for any such theft or damage.

By signing below, the Contractor certifies that he, his employees, subcontractors, or assigns will abide to this Preconstruction Conference Checklist during the course of the project. This document shall be attached and included as part of the contract for this project.

Contractor: _____
Print name: _____
Sign name: _____
Title: _____
Date signed: _____

JJC CM: _____
Sign name: _____
Date signed: _____

August 2008

Safety Requirements for Contractors and Subcontractors

Environmental Health and Safety
Facility Service Department
(815) 280-2384

Environmental Health and Safety

Safety Requirements for Contractors And Subcontractors

Environmental Health and Safety

Facility Services Department

1215 Houbolt Rd.

Joliet, IL 60431

Phone: (815) 280-2384 Fax (815) 280-6673

[http: // www.jjc.edu/ehs](http://www.jjc.edu/ehs)

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Introduction

EHS Information

The mission of Environmental Health and Safety (EHS) is to:

- Work toward providing a safe and healthful living, learning, and working environment for every member of the greater college community by assuring safe work practices through educating, training, and assisting individuals and departments;
- Help individuals and departments achieve compliance with all health and safety state and federal regulations and college policies as economically as possible and
- Act as liaison with external regulatory agencies, and to monitor college compliance with mandatory health and safety standards whenever necessary.

Purpose

Joliet Junior College developed *Safety Requirements for Contractors and Subcontractors* to assure the safety of college employees and the public who may be in proximity to renovation, demolition, installation, or maintenance operations performed by Contractors or Subcontractors. Every Contractor is expected to take steps as necessary to protect the safety and health of college employees, students, and visitors during the performance of their work. Each Contractor that coordinates the work of Subcontractors shall assure that they abide by the requirements outlined herein.

Application

Each department that coordinates or uses the services of a Contractor to perform maintenance, repair, installation, renovation or construction-related operations is expected to designate one or more persons to coordinate this program within his or her department. These coordinators are expected to assure that the Contractor is:

- Informed of the presence of hazards in or near the work area.
- Informed about JJC's requirements related to lead, confined space entry, lockout/tagout, hot work, and excavation operations.
- Aware of the colleges' expectations regarding safety compliance and the control of worksite hazards.

A representative from EHS will serve as the coordinator for the purposes of this program on capital renovation and construction projects.

Scope

This program applies to all JJC properties, and to all work performed by Contractors and Subcontractors in or on property owned, leased or occupied by JJC or employees of JJC.

General Requirements

Contractual Obligations

A copy of this document shall be made available upon request to prospective bidders/offerors at the pre-bid/pre-proposal conference for the work. This document shall be either included with, or referenced in, the contract documents.

Contractors performing building, facilities or equipment-related construction, repair, installation, renovation or maintenance activities shall attend a safety orientation as follows:

- On capital projects, this orientation will be conducted during the pre-construction conference or as determined by the Project Manager.
- For non-capital construction/renovation work, the Project Coordinator shall arrange the safety orientation with EHS and the Contractor prior to the start of work by contacting EHS at (815) 280-2384. Contractors retained on a term contract need only attend one safety orientation held prior to the award of the first project under that contract.

The Contractor shall provide the Project Manager/Coordinator with emergency contact phone number(s), usable 24 hours a day, for the Contractor's representative. These phone numbers shall be copied to EHS and the JJC Police Department prior to the work.

The Contractor bears sole responsibility for the safety of his or her employees. The Contractor is expected to take all steps necessary to establish, administer, and enforce safety rules that meet the regulatory requirements of the Illinois Department of Labor (IDOL) and the Occupational Safety and Health Administration (OSHA). These regulations include, but are not limited to:

- Title 29 of the Code of Federal Regulations (CFR) Parts 1910, Occupational Safety and Health Administration (OSHA) Standards for General Industry,
- Title 29 of the Code of Federal Regulations (CFR) Parts 1926, Occupational Safety and Health Administration (OSHA) Standards for the Construction Industry.

The Contractor bears sole responsibility for communication of safety-related information and requirements to his or her Subcontractors. Contractors shall assure that their Subcontractors comply with the requirements outlined herein.

Submittals

Submittals, where required from the Contractor by this document, shall be made in writing, directly to the Project Manager/Coordinator and copied to EHS. Submittals shall be made sufficiently in advance to avoid delay of the project. Where review, approval, or coordination of submittals is required, submittals shall be made at least ten (10) working days prior to the start of the project unless prior arrangements have been made. Post-job submittals, where required

as outlined in this document, shall be made no later than fifteen (15) working days after completion of the project or as specified herein.

Control of Fugitive Emissions

The Contractor shall take all reasonable precautions necessary to control fugitive emissions from the job site. Fugitive emissions include, but are not limited to: nuisance dust, chemical odors/vapors/gases, hazardous materials (such as lead dust or asbestos), and noise.

Where the product(s) or material(s) to be used by the Contractor has a permissible exposure limit (PEL) established by OSHA or IDOL and where college employees or the public may be exposed to the product or material, the Contractor shall take all reasonable steps to maintain exposures below the PEL where an exposure condition during use exceeding the PEL could reasonably be anticipated. In such instances, the Contractor shall monitor, or shall contract to have monitored, work area exposure conditions. Monitoring shall occur, at a minimum, during the start of work and whenever there is a change in procedure, process, or chemical or material used. If it is deemed not practicable to maintain exposures below the PEL, the Contractor shall restrict access to all areas where exposures exceed the PEL to authorize personnel only.

Accidental Spills and Releases

In the event of an accidental release or spill of chemicals or other hazardous materials the Contractor shall:

- Immediately take action as appropriate to contain the spill if this action can be taken without jeopardizing the health or safety of employees,
- Notify the fire department, campus police, or other entities as needed or required,
- Contact EHS, and
- Contact the Project Manager/Coordinator.

EHS emergency response personnel may be reached after normal business hours by contacting the Campus Police Department at (815) 280-2234 or 2811 from a house phone.

The following phone numbers may be used in the event of an emergency during normal working hours:

	Outside	On-Campus
Joliet Fire Department and Ambulance		911
JJC Campus Police	(815) 280-2911	Extension 2911
North Campus-Romeoville Fire/Ambulance	911	911
Morris Fire/Ambulance	911	911
Environmental, Health and Safety	(815) 280-2384	Extension 2384
East Joliet Fire/Ambulance	(815) 723-1504	911
Facility Services	(815) 280-2332	Extension 2332

All college costs associated with responding to or remediation of a chemical or hazardous material spill or release may be assessed by the Contractor.

General Work Requirements

The Contractor shall abide by the requirements of any sign posted in a building that requires the use of specific personal protective equipment, that restricts access to qualified or authorized persons only, or that establishes other requirements for entry.

The Contractor shall not conduct work or operations that obstruct exits or the means of egress from an occupied building without the prior approval of EHS and the Project Manager/Coordinator. Equipment and materials are not to be stored in exits or exit stairwells at any time, and may not be stored in the means of egress without prior approval. Fire rated doors shall not be chocked or blocked open except temporarily and event of a building fire alarm or similar emergency.

Compressed gases shall be stored, used and transported in accordance of the NFPA, OSHA and DOT. New compressed gas installations shall comply with these agency requirements.

All tents, stages and temporary structures shall comply with the requirements of the NFPA.

Contractors shall not use College equipment or vehicles nor shall the Contractor allow college employees to use the Contractors' equipment or vehicles without the approval of Risk Management and EHS. If an employee of a Contractor needs to use specialized equipment owned by JJC, such as powered industrial trucks, the Contractor must provide suitable documentation that the employee has been trained and certified (if required) to use such equipment.

Specific Program Requirements

Non-capital Projects

Asbestos and Suspect Asbestos Containing Building Materials

It is the responsibility of the Contractor to provide his or her own asbestos awareness program which shall include, but is not limited to, the information contained in this section and the OSHA asbestos-related regulations (29 CFR 1926.1101). Verification that this training has been conducted shall be supplied to the college upon request.

Contractors employed by the college to perform building or facilities-related maintenance, repair or renovation shall be informed by the Project Coordinator of the location of suspect and known asbestos-containing materials (ACM) in the work area(s) to which they are assigned by one of the following means:

- The Project Coordinator shall provide the Contractor with a copy of a completed "Work Order Review Form" or an asbestos inspection report specific to their work and the materials that are to be distributed, or
- Where the construction documents for a project clearly detail asbestos material locations within the work area, these documents may serve in lieu of the "Work Order Review Form" or inspection report.

The "Work Order Review Form" is used internally at the College to document that the proposed scope of work has been reviewed for the presence of suspect or known ACM. The "Work Order Review Form" will be completed by either EHS or the individual within the Department approved by EHS to perform this review. Questions related to this issue should be addressed to EHS at (815) 280-2384. An asbestos inspection report may, at the discretion of the Contracting Department, be prepared by an asbestos consultant licensed in Illinois to perform the duties of Asbestos Inspector and Asbestos Management Planner, this report shall be copied to EHS upon receipt.

Contractors shall, under no circumstances, damage or disturb suspect or known *friable* ACM unless they are a licensed Illinois Asbestos Abatement Contractor and have been specifically employed to perform asbestos repair or removal. Contractors may remove *non-friable* ACM, or perform work that will potentially disturb non-friable ACM, only with prior approval by EHS of the Contractors proposed work methods, employee training and waste disposal site. If suspect asbestos materials are discovered during the course of the work, the Contractor shall stop work immediately and notify the Project Coordinator or other person as indicated in the contract documents.

The Contractor shall not proceed with any change in work which requires a material to be disturbed that the "Work Order Review Form", asbestos inspection report, or construction documents show has not previously been tested (e.g., "suspect" ACM). If a change in the scope of work becomes necessary, the revised scope of work shall be reviewed and pre-approved by EHS or other authorized person.

Asbestos materials may not be used or installed in College facilities.

Lead-Containing Building Materials

Contractors employed by the college to perform building or facilities-related maintenance, repair or renovation shall be informed by the Project Coordinator of the location of lead-containing building materials in the work area(s) to which they are assigned by one of the following means:

- The Project Coordinator shall provide the Contractor with a copy of the completed “Work Order Review Form” or a lead inspection report specific to their work and the materials that are to be disturbed, or
- Where the construction documents for a project clearly detail the location of lead-containing building materials within the work area, these documents may serve in lieu of the “Work Order Review Form” or inspection report.

The Project Coordinator may obtain information regarding the location of lead materials within a work site from the Department Safety Representative or by contacting EHS at (815) 280-2384. A lead inspection report may, at the discretion of the Contracting Department, be prepared by a lead consultant licensed in Illinois to perform the duties of Lead Inspector, this report shall be copied to EHS upon receipt. Contractors that will disturb lead-containing building materials during the course of work shall take all necessary precautions to protect college employees and the public from exposure to lead dust or contamination. These measures shall conform, at a minimum, to the OSHA requirements detailed in 29 CFR 1926.62 and applicable local, state and federal regulation. The Contractor shall submit a copy of his or her lead compliance program, as required by 29 CFR 1926.62(e), with required supporting documentation for prior review and approval to EHS. This submittal shall be made sufficiently in advance of construction to avoid delay of the project. Where the Contractor is engaged in work in child-occupied facilities (as defined by 40 CFR Part 745), such work shall be performed in accordance with 40 CFR Part 745, and clearance testing shall be performed by EHS or a licensed consultant at the conclusion of the project in accordance with the requirements of this regulation.

A copy of the analytical report(s) for any personal air samples taken during the course of the work shall be provided to EHS.

The Contractor shall not proceed with any change in work that requires a material be disturbed that the “Work Order Review Form”, lead inspection report, or construction documents shows has not previously been tested unless pre-approved work procedure will be followed.

On projects where lead-containing materials will be disturbed or removed during the course of work, the Project Designer shall contact EHS at (815) 280-2384 to determine disposal requirements. If the lead-containing materials will constitute a hazardous waste, disposal of these materials shall be coordinated with EHS. The disposal requirements must be established during the design of the project.

Confined Spaces

When the College arranges to have a Contractor perform work that involves entry into a confined space, the Project Coordinator shall:

- Inform the Contractor that the workplace contains confined spaces and that the entry is allowed only through compliance with a confined space program meeting the requirements set forth by the DOL and the OSHA.
- Apprise the Contractor of the elements, including the hazard(s) identified and the college's experience with the space.
- Apprise the Contractor of any precautions or procedures that the college has implemented for the protection of college employees in or near confined spaces where contractor personnel will be working.
- Coordinate entry operations with the Contractor when both College personnel and contractor personnel will be working in or near confined spaces.
- Debrief the Contractor at the conclusion of the entry operations regarding the confined space program followed and any hazards confronted or created in confined spaces during entry operations
- Provide a copy of JJC Confined Space Entry Program to the Contractor upon request.

Information on JJC Confined Space Program and information on specific confined spaces on JJC Properties may be obtained by contacting EHS at (815) 280-2384.

Each Contractor who is retained to perform work that will require permit space entry operations shall:

- Coordinate entry operations with the Project Coordinator when both the Contractor and College personnel will be working in or near permit spaces;
- Inform the Project Coordinator in writing of the permit space program the Contractor will follow;
- Inform the Project Coordinator of any hazards confronted or created in permit spaces during entry operations;
- Provide a copy of the Contractor's Confined Space Program to the College upon request;
- Inform the Project Coordinator in writing of the rescue services/team they will be using during permit entry; and
- Provide a copy of the canceled permit(s) to the Project Coordinator and EHS at the conclusion of entry operation.

Confined Spaces

The Contractor shall maintain, on-site, Material Safety Data Sheets (MSDS's) for all chemicals used or stored at his or her job site as required by IDOL/OSHA regulations and the contract documents. The Contractor shall provide copies of MSDS's to the Project Coordinator and EHS upon request.

Chemicals are used extensively on the JJC campus. Chemicals use and/or storage is routine in, but not limited to, the following areas or locations:

- Laboratories
- Fume hood exhausts on the roofs of laboratory buildings. (In general, signs have been posted on the roof access hatch or door restricting access to the roofs of buildings where fume hood exhausts are located).
- Chemical stock rooms.
- Agricultural Shops, Areas, and Chemical Storage.
- Chemical waste accumulation areas.
- Facility Services and Kitchen, paint and chemical storage areas.
- Custodial Closets.

The Project Coordinator shall inform the Contractor of the following:

- Known hazards and any required safety procedures that must be followed in the Contractor's work area.
- Methods for obtaining access to Material Safety Data Sheets (MSDS) for hazardous chemicals present in the Contractor's work area.
- Information about the labeling system used in the work area (NFPA 701).
- Emergency procedures that the Contractor is to follow in the event of accidental exposures or releases of hazardous chemicals.

If the work will be conducted on the roof of a building where fume hood exhausts are located, the Project Coordinator shall coordinate access with Facility Services, the departments within the building, and EHS, as necessary to ensure that:

- Fume hoods within, or adjacent to, the work area are shut down,
- No experiments are in-progress that would generate toxic or hazardous airborne contaminants;
- All chemicals stored within the fume hoods are capped or otherwise sealed; and
- The Contractor is informed of any special precautions that must be taken to prevent employee exposure to hazardous chemicals.

A minimum of seven days advance notice is generally required to coordinate fume hood shutdowns. In emergency situations (for example, when the Contractor's personnel must conduct work on, or in proximity to, active fume hood exhausts), the Contractor may access these roof areas if appropriate personal protective equipment is used. The Contractor shall be

informed in writing by the Project Coordinator of the precautions that should be taken to protect his or employees while conducting such work. This information may be obtained by contacting EHS at (815) 280-2384.

Given the number of chemicals used, and changing work within chemical laboratories, it is impractical for the college to provide the Contractor with a MSDS for any chemical potentially in-use within any given laboratory. However, MSDS's are required to be maintained and to be accessible to employees in each work area, and MSDS's for all chemicals may be obtained from Campus Police or EHS.

The Contractor shall assume that all hazardous chemicals or materials are handled and disposed of in accordance with federal and state regulations. Where a hazardous waste disposal manifest is required by these regulations, the Contractor shall contact EHS at (815) 280-2384 to assure that manifesting, storage, and the proposed disposal method and disposal site meet college and EPA requirements. The Contractor shall supply a copy of the completed waste manifest to EHS within 24 hours of receipt.

Where the Contractor has secured air samples documenting employee exposure to airborne chemical or particulate hazards during the course of his or her work, a copy of all air sample results shall be provided to EHS within 24-hours of receipt by the Contractor.

Electrical Safety and Lockout/Tagout

If College employees will be present on the Contractors worksite, and employees of either JJC and/or the Contractor will be performing work that requires the use of lockout and/or tagout devices, the following requirements shall apply:

- The Project Coordinator and Contractor shall inform each other of their respective lockout/tagout procedures.
- The Project Coordinator and Contractor shall each inform their personnel regarding the energy control procedures that are to be followed on the project site.
- A copy of JJC 's Electrical Safety and Lockout/Tagout programs shall be provided to the Contractor upon request.
- A copy of the Contractors electrical safety and lockout/tagout program shall be made available to the college upon request.

Trenching and Excavations

The Contractor shall coordinate trenching and excavation work with the Project Coordinator, Facility Services, and JULIE to assure the coordination of work and shutdown of utilities if necessary.

The design of sloping and benching systems, support systems, shield systems or other protective systems shall confirm, at a minimum, to the OSHA requirements detailed in 29 CFR 1926 Subpart P requirements.

Trenching or excavations below the level of the base or footing of any foundation or retaining wall, or adjacent to any utility, sidewalk or roadway, will not be permitted unless:

- A support system, such as underpinning, is provided to ensure the safety of employees and the stability of the structure, or
- The excavation is in stable rock, or
- A registered professional engineer has approved the determination that such excavation work will not pose a hazard to employees or the structure.

This determination is the responsibility of the Contractor except as permitted, required or otherwise allowed by the project specifications or drawings

The Contractor shall notify the Project Coordinator of the name of the individual that is to serve as the Contractor's competent person as defined by this program and the OSHA regulations. The Contractor's designated competent person shall maintain a written log of the daily inspections made of excavations, adjacent areas, and protective systems. A copy of this written log shall be made available to the college upon request.

Where the design of a sloping and benching system, support system, shield systems or other protective systems requires review and approval by a registered professional engineer, the Contractor shall submit a copy of the completed review to the Project Coordinator and EHS prior to the start of work.

Hot Work

Contractors performing hot work shall maintain a Hot Work Permit Program and employee-training program that meets the OSHA requirements found in 29 CFR 1926.352 and ANSI Z49.1-88 and NFPA 51B. Examples of hot work include, but are not limited to, use of open flames, compressed gasses or supplied fuel burning, brazing, cutting, grinding, soldering, thawing, pipe, torch applied roofing, and welding.

A copy of the canceled permit(s) shall be provided to the Project Coordinator and EHS after completion of the work.

Capital Projects

Asbestos and Suspect Asbestos Containing Building Materials

It is the responsibility of the Contractor to provide his or her own asbestos awareness program which shall include, but is not limited to, the information contained in this section and the OSHA asbestos-related regulations (29 CFR 1926.1101). Verification that this training has been conducted shall be supplied to the Architect/Engineer of record for the project and/or the college upon request.

The location of asbestos materials, where present within the jobsite, will be detailed in the construction documents for that project.

Asbestos materials may not be used or installed in College facilities.

Lead-containing Building Materials

The location of lead materials, where present, will be detailed in the construction documents for that project.

Contractors that will disturb lead-containing building materials during the course of work shall take all necessary precautions to protect college employees and the public from exposure to lead dust or contamination. These measures shall conform, at a minimum, to the OSHA requirements detailed in 29 CFR 1926.62 and applicable local, state and federal regulations related to health, safety, transportation and disposal.

Confined Spaces

Where the work of the Contractor involves entry into confined spaces, the Contractor shall perform such entry in accordance with the OSHA (e.g., 29 CFR 1926.20 and/or 1910.146) requirements. Where the work involves an existing college permit-required confined space, the Project Manager and/or Field Engineer shall coordinate with EHS to assure that:

- The Contractor is apprised of the elements, including the hazard(s) identified and the college's experience with the space, that make it a permit-required confined space.
- The Contractor is apprised of any precautions or procedures that the college has implemented for the protection of college employees in or near permit spaces where contractor personnel will be working.
- The Contractor is debriefed at the conclusion of the entry operations regarding the permit space program followed and any hazards confronted or created in permit spaces during entry operations.

The Contractor shall provide at least 24-hours advance notice to the Field Engineer when both college personnel and the Contractor's personnel will be working in or near permit-required confined spaces. The Field Engineer shall notify EHS at (815) 280-2384, and EHS shall assure that the college personnel have been informed of the precautions and procedures to be followed during entry operations. Under these circumstances the Contractor shall:

- Inform EHS of the permit space procedures the Contractor will follow;
- Inform EHS of any hazards confronted or created in permit spaces during entry operations.

Hazard Communication

SAFETY REQUIREMENTS FOR CONTRACTORS AND SUBCONTRACTORS

The Contractor shall maintain, on-site, Material Safety Data Sheets (MSDS's) for all chemicals used or stored at the job site as required by IDOL/OSHA regulations and the contract documents.

Chemicals are used extensively on the JJC campus. Chemical use is routine in, but not limited to, the following areas or locations:

- Laboratories.
- Fume hood exhausts on the roofs of laboratory buildings. (In general, signs have been posted on the roof access hatch or door restricting access to the roofs of buildings where fume-hood exhausts are located).
- Chemical stock rooms.
- Agricultural shop, areas, and chemical storage.
- Chemical waste accumulation areas.
- Facility Services and Residential and Dining Programs paint and chemical storage areas.
- Custodial closets.

Where necessitated by the work, the Field Engineer and/or Project Manager shall coordinate with EHS to assure that the Contractor is informed of the following:

- Known hazards and any required safety procedures that must be followed in the Contractor's work area.
- Methods for obtaining access to Material Safety Data Sheets (MSDS) for hazardous chemicals present in the Contractor's work area.
- Information about the labeling system used in the work area (NFPA 701).
- Emergency procedures that the Contractor is to follow in the event of accidental exposures or releases of hazardous chemicals.

If work will be conducted on the roof of a building, where fume hood exhausts are located, the Field Engineer shall coordinate access with Facility Services, the departments within the building and EHS as necessary to ensure that:

- Fume hoods within, or adjacent to, the work area are shut down,
- No experiments are in-progress that would generate toxic or hazardous airborne contaminants;
- All chemicals stored within the fume hoods are capped or otherwise sealed; and,
- The Contractor is informed of any special precautions that must be taken to prevent employee exposure to hazardous chemicals.

A minimum of seven days advance notice is generally required to coordinate fume hood shutdowns. In emergency situations (for example, when the Contractor's personnel must conduct work on, or in proximity to, active fume hood exhausts), the Contractor may access these roof areas if appropriate personal protective equipment is used. The Contractor shall be informed in writing by EHS of the precautions that should be taken to protect his or her

employees while conducting such work. The Field Engineer may request this information by contacting EHS at (815) 280-2384.

Given the number of chemicals used, and changing work within chemical laboratories, it is impractical for the college to provide the Contractor with a MSDS for any chemical potentially in-use within any given laboratory. However, MSDS's are required to be maintained and to be accessible to employees in each work area, and MSDS's for all chemicals may be obtained from EHS.

The Contractor shall assure that all hazardous chemicals or materials are handled and disposed of in accordance with federal and state regulations and the contract requirements.

Electrical Safety and Lockout/Tagout

If college employees will be present on the Contractors worksite, and employees of either JJC and/or the Contractor will be performing work that requires the use of lockout and/or tagout devices, the following requirements shall apply:

- The EHS representative and the Contractor shall inform each other of their respective lockout/tagout procedures.
- The Project Manager and/or Field Engineer will coordinate with the EHS representative to assure that college personnel understand the energy control procedures that are to be followed in the project site.
- The Contractor shall assure that his/her personnel understand the energy control procedures that are to be followed on the project site.
- A copy of JJC's Electrical Safety and Lockout/Tagout programs shall be provided to the Contractor upon request.
- A copy of the Contractors electrical safety and lockout/tagout procedures shall be made available to the college upon request.

Trenching and Excavations

The Contractor shall coordinate trenching and excavation work with the Project Manager and/or Field Engineer and JULIE to assure the coordination of work and shutdown of utilities as necessary.

The design of sloping and benching systems, support systems, shield systems or other protective systems shall conform, at a minimum, to the OSHA requirements detailed in 29 CFR 1926 Subpart P, and the requirements of the contract.

Hot Work

Contractors performing hot work shall maintain a Hot Work Permit Program and employee-training program that meets the OSHA requirements found in 29 CFR 1926.352 and ANSI Z49.1-88 and NFPA 51B. Examples of hot work include, but are not limited to, use of open

flames, compressed gases or supplied fuel burning, brazing, cutting, grinding, soldering, thawing pipe, torch applied roofing, and welding.

Agencies/Firms With No Contractual Relationship with JJC

All agencies/firms conducting work on JJC property shall comply with the requirements of NFPA, EPA, DOL, OSHA and this program, even where no formal contractual relationship exists between JJC and the agency/firm. The agency/firm shall maintain appropriate insurance, including general liability, auto liability, and workers compensation insurance. Verification of insurance shall be coordinated with JJC's Director of Risk Management, who may be reached at (815) 280-2325, prior to the start of work. Such agencies/firms shall not, without prior written approval of EHS:

- Use a product(s) or material(s) that has a permissible exposure limit (PEL) established by OSHA.
- Perform work on JJC property that may damage or disturb known or suspect asbestos materials,
- Perform work on JJC property that may damage or disturb known or suspect lead-containing materials,
- Perform work on JJC property that involves entry into a permit-required confined space,
- Perform work on any electrical system or utility,
- Construct nor enter excavations, nor
- Perform hot work.

Work Site Inspections

Non-capital Projects

Work site inspections may be conducted by EHS or other designated college personnel. These inspections are conducted solely for the benefit of the college, and shall not relieve the contractor of responsibility for enforcement of, and compliance with, OSHA, NFPA or EPA regulations.

In the event that work site conditions exist that potentially impact the safety of college employees, students, or the public, the college inspector shall issue a verbal or written warning to the Contractor and shall notify the Project Coordinator. If the unsafe conditions cannot be immediately corrected and represent a danger or have a potential to harm college employees, students or the public, then the college inspector will:

- Detail the NFPA, EPA or OSHA violations that were noted, and explain the potential impact upon college employees, students or the public,
- Require that the Project Coordinator have the Contractor either stop work or implement measures to isolate the hazardous condition until the unsafe condition can be mitigated,
- Issue a formal written report of the violation(s) to the Contractor. This report shall be copied to the Project Coordinator.

Reports of deficiencies may be factored into the evaluation of the contract by the college, and may be included in a vendor complaint file that is available for review by other state agencies. Repeat safety violations of a similar nature and/or a single serious willful safety violation by a Contractor may warrant review and termination of the contract.

Capital Projects

Work site inspections may be conducted by EHS or other designated college representatives. Such inspections shall be coordinated with the Field Engineer and/or Project Manager. These inspections are conducted solely for the benefit of college personnel who may be working on the site and shall not relieve the contractor of responsibility for enforcement of, and compliance with NFPA, EPA, and OSHA regulations.

In the event that work site conditions exist that potentially impact the safety of college employees or the public, EHS shall notify the college Field Engineer and the Contractor of the hazard, and will assure that other college personnel present on-site are warned to avoid the area of the hazardous condition. The Contractor shall take prompt action to correct the hazardous condition. If the hazardous condition cannot be immediately corrected, the Contractor shall take effective steps to isolate the hazardous condition and/or shall stop work that is causing the hazardous condition until the hazard can be mitigated.

In the event that work site conditions exist that present an immediate safety hazard for the Contractors personnel, EHS may, as a courtesy, notify the Field Engineer and the Contractor of the hazardous condition. The Contractor shall take prompt action to correct the hazardous condition as required by the *General Conditions of the Construction Contract*.

Agencies/Firms Where No Formal Contractual Relationship Exists

When hazardous condition are identified by EHS related to work performed by agencies/firms conducting work on JJC property where no formal contractual relationship exists between JJC and the agency/firm, the hazardous condition shall be immediately corrected. If the hazardous condition cannot be immediately corrected, the agency/firm shall stop work and shall take effective steps to isolate the hazardous condition from personnel and the public. Repeat safety violations of a similar nature or willful disregard for the NFPA, EPA or OSHA requirements or the requirements outlined in this program will result in immediate removal from JJC property.

Definitions

Capital Project: A capital project is one whose total project cost exceeds \$500,000.

Competent Person: As related to excavation, trenching or shoring work, the Contractor's "competent person" means one who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

Confined Space: A confined space is a space that is large enough for a person to enter, that has limited means for entry or exit, and that is not designed for continuous occupancy. Example include tanks, silos, storage bins or hopper, utility vaults and pits.

Contracting Department: The Department at the college that has contracted for work to be performed by a Contractor. In regards to agencies/firms conducting work on JJC property, where no formal contractual relationship exists between JJC and the agency/firm, the department that is coordinating or approving the work of the agency/firm is the Contracting Department.

Contractor: An entity or agency employed by the college to perform the installation or maintenance of equipment or the renovation or construction of a building, room or space on college property, or that provides services to the college on college property including, but not limited to, vending, supplies, erection of tents and other services.

Field Engineer: The representative from JJC's Facility Services department that oversees capital construction and/or renovation activities.

Friable Asbestos: An asbestos material that is capable of being reduced to powder by hand pressure when dry, or a nonfriable asbestos material that is subject to grinding, sanding, cutting or abrading or that is otherwise rendered by mechanical means.

Lockout/Tagout: A program used to ensure that employees are protected from sources of potentially hazardous energy. The program requires that hazardous energy sources be identified and locked and/or tagged-out before work is done on the system(s).

Permit-required confined space: A permit-required confined space is a confined space that contains potential or known safety hazards that must be dealt with prior to or during entry to assure the safety of those employees performing the work.

Project Coordinator: The individual(s) within a Department that has been assigned duties related to oversight or coordination of work performed by a Contractor as defined in this program.

Project Manager: The representative from JJC's Facility Services department that coordinates the work of the Field Engineer and the Architect/Engineer related to capital construction and/or renovation projects.

Serious, willful safety violation: “Serious, willful safety violation” is defined, for the purposes of this program, as a work activity with a substantial probability that death or serious physical harm could result and where the hazard was known or should have been known, but where the work activity was continued regardless of the existence of the safety hazard.

LABOR MANAGEMENT PROJECT AGREEMENT

This Agreement is entered into this ____ day of ____, 20__ by and between Joliet Junior College, Illinois Community College District 525 of Will, Grundy, Kendall, LaSalle, Kankakee, Livingston, and Cook, Illinois, (hereinafter called the "Owner"); and _____ (hereinafter called the "Project Contractor"); and the _____ Building Trades Council (hereinafter called the "Union"), acting in their own behalf and on behalf of their respective affiliates and members; and the THREE RIVERS CONSTRUCTION ALLIANCE, acting on their own behalf and on the behalf of their respective affiliates and members, with respect to all construction projects at Joliet Junior College, which includes the Master Plan and Capital Improvement Plans thru August 2013, located in Will County, Illinois.

WITNESSETH:

WHEREAS, to accomplish the goals of quality, cost effectiveness and timelessness requires that all participants exhibit a positive attitude intent on success; and

WHEREAS, there must exist amongst all parties a willingness to cooperate fully in devoting themselves to the goals of the Project; and

WHEREAS, this program has no room for adverse relationships, but only a true spirit of cooperation and commitment; and

WHEREAS, it is essential that the work required to construct this Project be accomplished in an efficient and economical manner so as to provide productivity, the highest levels of quality and the total elimination of delays thereby fostering new plateaus in labor/management cooperation; and

WHEREAS, Joliet Junior College, Illinois Community College District 525 of Will, Grundy, Kendall, LaSalle, Kankakee, Livingston, and Cook, Illinois, (hereinafter referred to as

the "Owner"), its general Contractor(s), its subcontractor(s) of whatever tier, the local Building Trades Council, the THREE RIVERS CONSTRUCTION ALLIANCE dedicate themselves to the goal that together, in full cooperation, local labor, and management will produce a project of excellent quality, as economically as possible, in a safe environment, under favorable working conditions; and

WHEREAS, nothing contained herein shall prevent the Owner from considering bids for the Project so long as the General Contractor and its Subcontractors agree to abide by the terms and provisions of this Agreement.

NOW, THEREFORE, for and in consideration of the mutual covenants above-contained and other good and valuable consideration, as hereinafter set forth, the parties do hereby agree as follows:

SECTION 1. Introduction

It is understood by the parties to this Agreement that other contractors awarded construction work directly or indirectly by the Owner will execute this Agreement and become signatory contractors for the purpose of this work.

The intent of the parties to this Agreement is to establish labor and management cooperation between the Owner, Project Contractor, all Contractors and Subcontractors performing construction work in this Project site, and the appropriate Unions signatory to this Agreement for the express purpose of producing a quality project on schedule, and, as economically as possible, in a safe environment under favorable working conditions.

SECTION 2. Scope of the Agreement.

A. This Project Agreement shall apply and is limited to the recognized and accepted historical definition of new construction work under the direction of and performed by the

Contractor(s), of whatever tier, which may include the Project Contractor, who have contracts awarded for such work on the Project. Such work shall include site preparation work and dedicated off-site work.

It is agreed that the Project Contractor shall require all Contractors of whatever tier who have been awarded contracts for work covered by this Agreement, to accept and be bound by the terms and conditions of this Agreement by executing the Letter of Assent (Attachment A) prior to commencing work. The Project Contractor shall assure compliance with this Agreement by the Contractors. It is further agreed that, where there is a conflict, the terms and conditions of this Agreement shall supersede and override terms and conditions of any and all other national, area, or local collective bargaining agreements, except for all work performed under the NTL Articles of Agreement, and the National Stack/Chimney Agreement, the National Cooling Tower Agreement. All instrument calibration work and loop checking shall be performed under the terms of the UA/IBEW Joint National Agreement for Instrument and Control Systems Technicians, and the National Agreement of the International Union of Elevator Constructors, with the exception of Section 4, 5 and 6 of this Agreement, which shall apply to such work.

B. Nothing contained herein shall be construed to prohibit, restrict or interfere with the performance of any other operation, work, or function which may occur at the Project site or be associated with the development of the Project.

C. This Agreement shall only be binding on the signatory parties hereto and shall not apply to their parents, affiliates or subsidiaries.

D. The Owner and/or the Project Contractor have the absolute right to select any qualified bidder for the award of contracts on this Project without reference to the existence or non-existence of any agreements between such bidder and any party to this Agreement;

provided, however, only that such bidder is willing, ready and able to become a party to and comply with this Agreement, should it be designated the successful bidder.

E. The provisions of this Agreement shall not apply to Owner, and nothing contained herein shall be construed to prohibit or restrict Owner or its employees from performing work not covered by this Agreement on the Project site. As areas and systems of the Project are inspected and construction tested by the Project Contractor or Contractors and accepted by the Owner, the Agreement will not have further force or effect on such items or areas, except when the Project Contractor or Contractors are directed by the Owner to engage in repairs, modifications, check-out, and warranty functions required by its contract with the Owner during the term of this Agreement.

F. It is understood that the Owner, at its sole option, may terminate, delay and/or suspend any or all portions of the Project at any time.

G. It is understood that the liability of any employer and the liability of the separate unions under this Agreement shall be several and not joint. The unions agree that this Agreement does not have the effect of creating any joint employer status between or among the Owner, Contractor(s) or any employer.

SECTION 3. Labor-Management Cooperation Committee

The parties to this Agreement hereby reaffirm the necessity for joint cooperation and participation by Labor and Management in interpreting and analyzing the effectiveness of management's application of this Agreement as well as Labor's response and any other matter affecting quality, safety, working conditions and productivity. Therefore, to secure this end, it is hereby agreed that a "Labor-Management Cooperation Committee" will be established composed of three representatives from Labor and three representatives from Management; one

representative from labor and one from Management shall be Co-Chairpersons of this Committee.

The Labor-Management Cooperation Committee shall meet a minimum of once each month, at the job site, and shall discuss the following; reports concerning any violation, dispute, questions or interpretation of the application of practices arising out of this Agreement; safety; working conditions; absenteeism; labor turnover; availability of qualified journeymen; need for training; and any other matter affecting productivity and efficiency on this project.

In the event a dispute is not resolved by the Labor-Management Cooperation Committee, such matter shall then be settled as outlined by the grievance procedure and/or arbitration provisions contained in Section 6 or 7 of this Agreement. The Labor-Management Cooperation Committee shall have no authority to render a decision involving a jurisdictional dispute.

SECTION 4. Contractor's Commitment

A Work assignments will be made in accordance with area practice, consistent with the efficient and economical performance of the work.

B. Before performing the work at the job site, the Contractor or Subcontractors of whatever tier actually performing the work will become signatory to the appropriate collective bargaining agreement.

C. The Contractors and Subcontractors shall exercise their management rights. These rights shall include planning, directing, hiring, dismissal, lay-off, transferring, appointing foremen and general foremen and otherwise directing the work force.

D. The Project Contractor agrees that neither it nor any of its contractors or subcontractors will subcontract any work to be done on the Project except to a person, firm or corporation who is or agrees to become party to this Agreement. Any contractor or subcontractor

working on the Project shall, as a condition to working on said Project, become signatory to and perform all work under the terms of this Agreement.

SECTION 5. Union (Craftsman) Commitment

A. Qualified and skilled craftsmen will be furnished as required by the Contractor in the fulfillment of its obligations of the Owner.

B. Craftsmen shall be at their place of work at the regular starting time and shall remain at their place of work until quitting time. There shall be no limit on production by Craftsmen nor restrictions on the use of tools or equipment other than that which may be required by safety practice.

C. Where stewards are appointed by respective unions, the steward shall be qualified craftsmen performing the work of his craft who shall exercise no supervisory functions. There shall be no non-working stewards.

SECTION 6. Disputes and Grievances

A. This Agreement is intended to provide close cooperation between management and labor. Each of the Unions will assign a representative to this Project for the purpose of completing the construction of the Project economically, efficiently, continuously, and without interruptions, delays, or work stoppages.

B. The Contractors, Unions, and the employees, collectively and individually, realize the importance to all parties to maintain continuous and uninterrupted performance of the work of the Project, and agree to resolve disputes in accordance with the grievance-arbitration provisions set forth in this Article.

C. Any question or dispute arising out of and during the term of this Project Agreement (other than grievances not covered by a local Collective Bargaining Agreement or trade

jurisdictional disputes) shall be considered a grievance and subject to resolution under the following procedures:

Step 1. (a) When any employee subject to the provisions of this Agreement feels he or she is aggrieved by a violation of this Agreement, he or she, through his or her local union business representative or job steward, shall, within five (5) working days after the occurrence of the violation, give notice to the work-site representative of the involved Contractor stating the provision(s) alleged to have been violated. The business representative of the local union or the job steward and the work-site representative of the involved Contractor and the Project Contractor shall meet and endeavor to adjust the matter within three (3) working days after timely notice has been given. The representative of the Contractor shall keep the meeting minutes and shall respond to the Union representative in writing (copying the Project Contractor) at the conclusion of the meeting but not later than twenty-four (24) hours thereafter. If they fail to resolve the matter within the prescribed period, the grieving party may, within forty-eight (48) hours thereafter, pursue Step 2 of the Grievance Procedure, provided the grievance is reduced to writing, setting forth the relevant information concerning the alleged grievance, including a short description thereof, the date on which the grievance occurred, and the provision(s) of the Agreement alleged to have been violated.

(b) Should the Local Union(s) or the Project Contractor or any Contractor have a dispute with the other party and, if after conferring, a settlement is not reached within three (3) working days, the dispute may be reduced to writing and proceed to Step 2 in the same manner as outlined herein for the adjustment of an employee complaint.

Step 2. The International Union Representative and the involved Contractor shall meet within seven (7) working days of the referral of a dispute to this second step to arrive at a

satisfactory settlement thereof. Meeting minutes shall be kept by the Contractor. If the parties fail to reach an agreement, the dispute may be appealed in writing in accordance with the provisions of Step 3 within seven (7) calendar days thereafter.

Step 3. (a) If the grievance has been submitted but not adjusted under Step 2, either party may request in writing, within seven (7) calendar days thereafter, that the grievance be submitted to an Arbitrator mutually agreed by them. The Contractor and the involved Union shall attempt mutually to select an arbitrator, but if they are unable to do so, they shall request the American Arbitration Association to provide them with a list of arbitrators from which the Arbitrator shall be selected. The rules of the American Arbitration Association shall govern the conduct of the arbitration hearing. The decision of the Arbitrator shall be final and binding on all parties. The fee and expenses of such Arbitration shall be borne equally by the Contractor and the involved Local Union(s).

(b) Failure of the grieving party to adhere to the time limits established herein shall render the grievance null and void. The time limits established herein may be extended only by written consent of the parties involved at the particular step where the extension is agreed upon. The Arbitrator shall have the authority to make decisions only on issues presented to him or her, and he or she shall not have authority to change, amend, add to or detract from any of the provisions of this Agreement.

D. The Project Contractor and Owner shall be notified of all actions at Steps 2 and 3 and shall, upon their request, be permitted to participate in all proceedings at these steps.

SECTION 7. Jurisdictional Disputes

A. The assignment of work will be solely the responsibility of the Contractor performing the work involved; and such work assignments will be in accordance with the Plan for the

Settlement of Jurisdictional Disputes in the Construction Industry (the "Plan") or any successor Plan.

B. All jurisdictional disputes on this Project, between or among Building and Construction Trades Unions and employers, parties to this Agreement, shall be settled and adjusted according to the present Plan established by the Building and Construction Trades Department or any other plan or method of procedure that may be adopted in the future by the Building and Construction Trades Department. Decisions rendered shall be final, binding and conclusive on the Contractors and Unions parties to this Agreement.

C. All jurisdictional disputes shall be resolved without the occurrence of any strike, work stoppage, or slow-down of any nature, and the Contractor's assignment shall be adhered to until the dispute is resolved. Individuals violating this section shall be subject to immediate discharge.

D. Each Contractor will conduct a pre-job conference with the appropriate Building and Construction Trades Council prior to commencing work. The Project Contractor and the Owner will be advised in advance of all such conferences and may participate if they wish.

SECTION 8. Joint Commitment (Contractor/Union)

A. Utilization of Union apprentices will be maximized consistent with the best interest of the job in compliance with Local Union Agreements. The high level of union apprenticeship training will be maintained to provide the Industry with productive and knowledgeable craftsmen for the long term.

B. Every reasonable and practicable measure, consistent with the protection of human-dignity, will be taken to assure a work place free of alcohol and drugs. The use of liquor, drugs or any other illegal activities at the Project site, including parking lots, is strictly prohibited.

C. Employees will take their breaks only in their immediate work areas.

D. Acknowledging the safety concerns of Owner and its risk management professionals, we assure the Owner that the parties are committed to safe working practices on the project. The parties, drawing upon the comprehensive safety programs and resources developed by the union construction community, will comply with federal, state and local safety regulations. Both contractors and union craftsmen are well trained in safety practices and commit themselves to applying such practices on this job.

E. The Contractors and Unions agree that there will be no lockouts or work stoppages.

(1) The Contractors and Subcontractors shall not cause, incite, encourage or participate in any lockout of employees on the project during the term of this Agreement.

(2) The Union and its members, agents, representatives, and employees shall not allow, incite, encourage, condone or participate in any strike, walkout, slowdown, picketing, sympathy strike or other work stoppage of any nature whatsoever, whether jurisdictional or otherwise, or observe any picket of any nature during the term of this Agreement. Any such action by the Union or its members, agents, representatives or employees shall be considered a violation of this Agreement.

(3) All employees shall continue to work and to perform all their obligations on the project despite the expiration of any local or other collective bargaining agreement. Any future wage or fringe benefit increase, decrease or modification legally negotiated and established by appropriate local collective bargaining agreement of the Local Unions which are signatories to this Agreement shall be paid retroactively to the expiration date of the preceding local Agreement.

(4) Should any unauthorized strike, slowdown, stoppage of work or interference with construction occur, the Union shall take all necessary steps to bring such activity to a prompt resolution.

SECTION 9. Helmets To Hardhats

A. The Contractors and the Unions recognize a desire to facilitate the entry into the building and construction trades of veterans who are interested in careers in the building and construction industry. The Contractors and Unions agree to utilize the Center for Military Recruitment, Assessment and Veterans Employment (hereinafter "Center") and the Center's "Helmets to Hardhats" program to serve as a resource for preliminary orientation, assessment of construction aptitude, referral to apprenticeship programs or hiring halls, counseling and mentoring, support network, employment opportunities and other needs as identified by the parties.

B. The Unions and Contractors agree to coordinate with the Center to create and maintain an integrated database of veterans interested in working on this Project and of apprenticeship and employment opportunities for this Project. To the extent permitted by law, the Unions will give credit to such veterans for bona fide, provable past experience.

SECTION 10. Term of Agreement.

A. This Agreement shall become effective on _____, 20____, and shall remain in full force and effect as long as signatory contractors are working on this project.

B. Any of the undersigned parties shall have the right to terminate this Agreement by notifying all other parties in writing, within at least thirty (30) calendar days from the proposed termination date.

SECTION 11. Notices

The address and telephone number of all of the undersigned shall be on file with Owner's Director of Facility Services at the Highland Building, 1215 Houbolt Road, Joliet, Illinois, 60431, Attention: Patrick VanDuyne. All notices, request and other communications under this Agreement shall be in writing and shall be personally served or sent by certified mail, postage prepaid, return receipt requested, facsimile, or by licensed overnight courier to the appropriate party at the address set forth below or as may otherwise be on file with the Director of Physical Plant as provided herein. Notice shall be deemed given at the time delivered, if personally delivered, at the time indicated on the duly completed postal service return receipt, if delivered, at the time indicated on the duly completed postal service return receipt, if delivered by certified mail, at the time the facsimile is transmitted, if delivered by facsimile, or on the next business day after such notice is sent, if delivered by overnight courier. If a person elects to change their address, they shall do so by notifying the Owner's Director of Facility Services in the manner as provided for herein for the delivery of a notice.

SECTION 12. Miscellaneous Provisions.

A. Assignment. No party may assign its rights hereunder without the prior written consent of the other parties.

B. Entire Agreement. This Agreement contains the entire agreement between the parties with respect to the subject matter hereof and may not be modified, except in writing signed by the parties hereto. Furthermore, the parties hereto specifically agree that all prior agreements, whether written or oral, relating to the subject matter hereof shall be of no further force or effect from and after the date hereof.

C. Non-Partnership. This Agreement shall not create a partnership, joint venture or other joint enterprises between the parties hereto.

D. Severability. If any phrase, clause or provision of this Agreement is declared invalid or unenforceable by a court of competent jurisdiction, such phrase, clause or provisions shall be deemed severed from this Agreement, but will not affect any other provision of this Agreement, which shall otherwise remain in full force and effect. If any restriction or limitation in this Agreement is deemed to be unreasonable, onerous and unduly restrictive by a court of competent jurisdiction, it shall not be stricken in its entirety and held totally void and unenforceable, but shall not be deemed rewritten and shall remain effective to the maximum extent permissible within reasonable bounds.

E. Prevailing Party. The prevailing party or parties in any litigation arising out of or from this Agreement shall be entitled to recover from the non-prevailing party or parties all costs and expenses reasonably incurred litigating such action, including without limitation, reasonable attorneys' and paralegals' fees and court cost.

F. Neutral Reading. It is the intent of the parties that this Agreement be deemed to have been prepared by all of the parties hereto.

G. Waiver. No waiver of any breach or default hereunder shall be considered valid unless in writing and signed by the party given such waiver and no such waiver shall be deemed a waiver of any subsequent breach or default of the same or similar nature.


H. Headings. The section and subsection headings contained herein are for convenience of the parties only and are not intended to define or limit the context of said Sections and subsections.

I. Governing Law; Venue. The validity, construction and interpretation of this Agreement shall be governed by the State of Illinois. The parties hereto irrevocably agree that all actions or proceedings in any way, manner or respect arising out of or from or related to this Agreement shall be litigated only in the Circuit Court Twelfth Judicial Circuit, Will County, Illinois.

J. Counterparts. This Agreement may be executed in two or more counterparts, each of which may be deemed to be an original.

IN WITNESS WHEREOF, the parties have executed this Agreement on the day and year first above written.

SIGNED FOR THE OWNER:



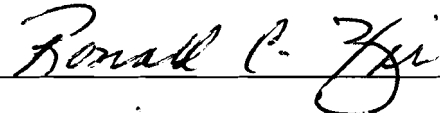
Firm: Joliet Junior College

Title: Director of Facility Services

Date: 4-15-09

Address: 1215 Houbolt Road
Joliet, Illinois 60431

SIGNED FOR THE UNION:




 Building Trades Council

Title: President

Date: 4-15-09

Address: 2082 Oakleaf St.
Joliet IL 60436

SIGNED FOR THE ALLIANCE:



Firm: Three River's Construction Alliance

Title: Co-Chair TRCA

Date: 4/15/09

Address: 2134 Maxim Dr.
Rockdale IL 60436

SIGNED FOR BY THE CONTRACTOR:

Firm: _____

Title: _____

Date: _____

Address: _____



*Skilled Union Craftsmen
Professional Union Contractors*

BLUEPRINT FOR SUCCESS

A Labor-Management Project Agreement

I. Preamble

To accomplish the goals of quality, cost effectiveness and timeliness requires that all participants exhibit a positive attitude intent on success. There must exist amongst all parties a willingness to cooperate fully in devoting themselves to the goals of the project.

This program has no room for adverse relationships, but only a true spirit of cooperation and commitment. It is essential that the work required to construct this project be accomplished in an efficient and economical manner so as to provide productivity, the highest levels of quality, and the total elimination of delays. This commitment will establish new plateaus in labor/management cooperation.

Therefore, Joliet Junior College, Illinois Community College District 525, of Will, Grundy, Kendall, LaSalle, Kankakee, Livingston and Cook, Illinois, (hereinafter referred to as the "Owner"), its subcontractor(s) of whatever tier, the Will & Grundy Counties Building Trades Council, and the THREE RIVERS' CONSTRUCTION ALLIANCE dedicate themselves to the goal that together, in full cooperation, local labor and management will produce a project of excellent quality, as economically as possible, in a safe environment, under favorable working conditions.

II. Introduction

This Agreement is entered into this day of by and between Joliet Junior College (hereinafter called the "Owner"); and (hereinafter called and the "Project Contractor"; and the Will & Grundy Counties Building Trades Council (hereinafter called the "Union"), acting in their own behalf and on behalf of their respective affiliates and members; and the THREE RIVERS CONSTRUCTION ALLIANCE, acting on their own behalf and on behalf of their respective affiliates and members, with respect to all construction projects at Joliet Junior College, which includes the Master Plan and Capital Improvement Plan projects thru located in Will County, Illinois.

It is understood by the parties to this Agreement that other contractors awarded construction work directly or indirectly by the "Owner" will execute this Agreement and become signatory contractors for the purpose of this work.

The intent of the parties to this Agreement is to establish labor and management cooperation between the Project Contractor, all Contractors and Subcontractors performing construction work on this project site, and the appropriate Unions signatory to this Agreement for the express purpose of producing a quality project on schedule and as economically as possible, in a safe environment under favorable working conditions.

III. Scope Of The Agreement

A. This Project Agreement shall apply and is limited to the recognized and accepted historical definition of new construction work under the direction of and performed by the Contractor(s), of whatever tier, which may include the Project Contractor, who have contracts awarded for such work on the Project. Such work shall include site preparation work and dedicated off-site work.

It is agreed that the Project Contractor shall require all Contractors of whatever tier who have been awarded contracts for work covered by this Agreement, to accept and be bound by the terms and conditions of this Project Agreement by executing the Letter of Assent (Attachment A) prior to commencing work. The Project Contractor shall assure compliance with this Agreement by the Contractors. It is further agreed that, where there is a conflict, the terms and conditions of this Project Agreement shall supersede and override terms and conditions of any and all other national, area, or local collective bargaining agreements, except for all work performed under the NTL Articles of Agreement, the National Stack/Chimney Agreement, the National Cooling Tower Agreement, all instrument calibration work and loop checking shall be performed under the terms of the UA/IBEW Joint National Agreement for Instrument and Control Systems Technicians, and the National Agreement of the International Union of Elevator Constructors, with the exception of Article V, VI, and VII of this Project Agreement, which shall apply to such work.

B. Nothing contained herein shall be construed to prohibit, restrict or interfere with the performance of any other operation, work, or function which may occur at the Project site or be associated with the development of the Project.

C. This Agreement shall only be binding on the signatory parties hereto and shall not apply to their parents, affiliates or subsidiaries.

D. The Owner and/or the Project Contractor have the absolute right to select any qualified bidder for the award of contracts on this Project without reference to the existence or non-existence of any agreements between such bidder and any party to this Agreement; provided, however, only that such bidder is willing, ready and able to become a party to and comply with this Project Agreement, should it be designated the successful bidder.

E. It is understood that the Owner, at its sole option, may terminate, delay and/or suspend any or all portions of the Project at any time.

F. It is understood that the liability of any employer and the liability of the separate unions under this Agreement shall be several and not joint. The unions agree that this Agreement does not have the effect of creating any joint employer status between or among the Owner, Contractor(s) or any employer.

IV. Labor-Management Cooperation Committee

The parties to this Agreement hereby reaffirm the necessity for joint cooperation and participation by Labor and Management in interpreting and analyzing the effectiveness of management's application of this Agreement as well as Labor's response and any other matter affecting quality, safety, working conditions and productivity. Therefore, to secure this end, it is hereby agreed that a "Labor-Management Cooperation Committee" will be established composed of three representatives from Labor and three representatives from Management; one representative from Labor and one from Management shall be Co-Chairmen of this Committee.

The Labor-Management Cooperation Committee shall meet a minimum of once each month, at the jobsite, and shall discuss the following: reports concerning any violation, dispute, questions or interpretation of the application of practices arising out of this Agreement; safety; working conditions; absenteeism; labor turnover; availability of qualified journeymen; need for training; and any other matter affecting productivity and efficiency on this project.

In the event a dispute is not resolved by the Labor-Management Cooperation Committee, such matter shall then be settled as outlined by the grievance procedure and/or arbitration provisions contained in Articles VII or VIII of this Agreement. The Labor-Management Cooperation Committee shall not have authority to render a decision involving a jurisdictional dispute.

V. Contractors' Commitment

A. Work assignments will be made in accordance with area practice, consistent with the efficient and economical performance of the work.

B. Before performing work at the job site, the Contractor or Subcontractors of whatever tier actually performing the work will become signatory to the appropriate collective bargaining agreement.

C. The Contractors and Subcontractors shall exercise their management rights. These rights shall include planning, directing, hiring, dismissal, lay-off, transferring, appointing foremen and general foremen and otherwise directing the work force.

D. The Project Contractor agrees that neither it nor any of its contractors or subcontractors will subcontract any work to be done on the Project except to a person, firm or corporation who is or agrees to become party to this Agreement. Any contractor or subcontractor working on the Project shall, as a condition to working on said Project, become signatory to and perform all work under the terms of this Agreement.

VI. Union (Craftsmen) Commitment

A. Qualified and skilled craftsmen will be furnished as required by the Contractor in the fulfillment of its obligations to the Owner.

B. Craftsmen shall be at their place of work at the regular starting time and shall remain at their place of work until quitting time. There shall be no limit on production by Craftsmen nor restrictions on the use of tools or equipment other than that which may be required by safety practice.

C. Where stewards are appointed by respective unions, the steward shall be a qualified craftsman performing the work of his craft who shall exercise no supervisory functions. There shall be no non-working stewards.

VII. Owner Commitment

A. The Owner agrees that during the life of this agreement he shall assign construction work on this project only to contractors who are signatory to this agreement and applicable local collective bargaining agreements.

VIII. Disputes & Grievances

A. This Agreement is intended to provide close cooperation between management and labor. Each of the Unions will assign a representative to this Project for the purpose of completing the construction of the Project economically, efficiently, continuously, and without interruptions, delays, or work stoppages.

B. The Contractors, Unions, and the employees, collectively and individually, realize the importance to all parties to maintain continuous and uninterrupted performance of the work of the Project, and agree to resolve disputes in accordance with the grievance-arbitration provisions set forth in this Article.

C. Any question or dispute arising out of and during the term of this Project Agreement (other than grievances not covered by a local Collective Bargaining Agreement or trade jurisdictional disputes) shall be considered a grievance and subject to resolution under the following procedures:

Step 1. (a) When any employee subject to the provisions of this Agreement feels he or she is aggrieved by a violation of this Agreement, he or she, through his or her local union business representative or job steward, shall, within five (5) working days after the occurrence of the violation, give notice to the work-site representative of the involved Contractor stating the provision(s) alleged to have been violated. The business representative of the local union or the job steward and the work-site representative of the involved Contractor and the Project Contractor shall meet and endeavor to adjust the matter within three (3) working days after timely notice has been given. The representative of the Contractor shall keep the meeting minutes and shall respond to the Union representative in writing (copying the Project Contractor) at the conclusion of the meeting but not later than twenty-four (24) hours thereafter. If they fail to resolve the matter within the prescribed period, the grieving party may, within forty-eight (48) hours thereafter, pursue Step 2 of the Grievance Procedure, provided the grievance is reduced to writing, setting forth the relevant information concerning the alleged grievance, including a short description thereof, the date on which the grievance occurred, and the provision(s) of the Agreement alleged to have been violated.

(b) Should the Local Union(s) or the Project Contractor or any Contractor have a dispute with the other party and, if after conferring, a settlement is not reached within three (3) working days, the dispute may be reduced to writing and proceed to Step 2 in the same manner as outlined herein for the adjustment of an employee complaint.

Step 2. The International Union Representative and the involved Contractor shall meet within seven (7) working days of the referral of a dispute to this second step to arrive at a satisfactory settlement thereof. Meeting minutes shall be kept by the Contractor. If the parties fail to reach an agreement, the dispute may be appealed in writing in accordance with the provisions of Step 3 within seven (7) calendar days thereafter.

Step 3. (a) If the grievance has been submitted but not adjusted under Step 2, either party may request in writing, within seven (7) calendar days thereafter, that the grievance be submitted to an Arbitrator mutually agreed upon by them. The Contractor and the involved Union shall attempt mutually to select an arbitrator, but if they are unable to do so, they shall request the American Arbitration Association to provide them with a list of arbitrators from which the Arbitrator shall be selected. The rules of the American Arbitration Association shall govern the conduct of the arbitration hearing. The decision of the Arbitrator shall be final and binding on all parties. The fee and expenses of such Arbitration shall be borne equally by the Contractor and the involved Local Union(s).

(b) Failure of the grieving party to adhere to the time limits established herein shall render the grievance null and void. The time limits established herein may be extended only by written consent of the parties involved at the particular step where the extension is agreed upon. The Arbitrator shall have the authority to make decisions only on issues presented to him or her, and he or she shall not have authority to change, amend, add to or detract from any of the provisions of this Agreement.

D. The Project Contractor and Owner shall be notified of all actions at Steps 2 and 3 and shall, upon their request, be permitted to participate in all proceedings at these steps.

IX. Jurisdictional Disputes

A. The assignment of work will be solely the responsibility of the Contractor performing the work involved; and such work assignments will be in accordance with the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry (the "Plan") or any successor Plan.

B. All jurisdictional disputes on this Project, between or among Building and Construction Trades Unions and employers, parties to this Agreement, shall be settled and adjusted according to the present Plan established by the Building and Construction Trades Department or any other plan or method of procedure that may be

adopted in the future by the Building and Construction Trades Department. Decisions rendered shall be final, binding and conclusive on the Contractors and Unions parties to this Agreement.

C. All jurisdictional disputes shall be resolved without the occurrence of any strike, work stoppage, or slow-down of any nature, and the Contractor's assignment shall be adhered to until the dispute is resolved. Individuals violating this section shall be subject to immediate discharge.

D. Each Contractor will conduct a pre-job conference with the appropriate Building and Construction Trades Council prior to commencing work. The Project Contractor and the Owner will be advised in advance of all such conferences and may participate if they wish.

X. Joint Commitment (Contractor/Union)

A. Utilization of Union apprentices will be maximized consistent with the best interest of the job in compliance with Local Union Agreements. The high level of union apprenticeship training will be maintained to provide the Industry with productive and knowledgeable craftsmen for the long term.

B. Every reasonable and practicable measure, consistent with the protection of human dignity, will be taken to assure a work place free of alcohol and drugs. The use of liquor, drugs or any other illegal activities at the Project site, including parking lots, is strictly prohibited.

C. Employees will take their breaks only in their immediate work areas.

D. Acknowledging the safety concerns of today's construction Owner and its risk management professionals, we assure the Owner that the parties are committed to safe working practices on the project. The parties, drawing upon the comprehensive safety programs and resources developed by the Union construction community, will comply with federal, state, and local safety regulations. Both contractors and union craftsmen are well trained in safety practices and commit themselves to applying such practices on this job.

E. The Contractors and Unions agree that there will be no lockouts or work stoppages.

(1) The Contractors and Subcontractors shall not cause, incite, encourage or participate in any lockout of employees on the project during the term of this Agreement.

(2) The Union and its members, agents, representatives, and employees shall not allow, incite, encourage, condone or participate in any strike, walkout, slowdown, picketing, sympathy strike or other work stoppage of any nature whatsoever, whether jurisdictional or otherwise, or observe any picket of any nature during the term of this Agreement. Any such action by the Union or its members, agents, representatives or employees shall constitute a violation of this Agreement.

(3) All employees shall continue to work and to perform all their obligations on the project despite the expiration of any local or other collective bargaining agreement. Any future wage or fringe benefit increase, decrease or modification legally negotiated and established by appropriate local collective bargaining agreements of the Local Unions which are signatories to this Agreement shall be paid retroactively to the expiration of the preceding local Agreement.

(4) Should any unauthorized strike, slowdown, stoppage of work or interference with construction occur, the Union shall take all necessary steps to bring such activity to a prompt resolution.

XI. Helmets To Hardhats

A. The Employers and the Unions recognize a desire to facilitate the entry into the building and construction trades of veterans who are interested in careers in the building and construction industry. The Employers and Unions agree to utilize the Center for Military Recruitment, Assessment and Veterans Employment (hereinafter "Center") and the Center's "Helmets to Hardhats" program to serve as a resource for preliminary orientation, assessment of construction aptitude, referral to apprenticeship programs or hiring halls, counseling and mentoring, support network, employment opportunities and other needs as identified by the parties.

B. The Unions and Employers agree to coordinate with the Center to create and maintain an integrated database of veterans interested in working on this Project and of apprenticeship and employment opportunities for this Project. To the extent permitted by law, the Unions will give credit to such veterans for bona fide, provable past experience.

XII. Term of Agreement

A. This Agreement shall become effective on April 15, 2009, and shall remain in full force and effect as long as signatory contractors are working on this project.

B. Either party shall have the right to terminate this Agreement by notifying all other parties, in writing, within at least thirty (30) calendar days from the proposed termination date.

FOR THE OWNER:


JOLIET JUNIOR COLLEGE

TITLE: President

DATE: 4-15-09

FOR THE PROJECT CONTRACTOR:

TITLE: _____

DATE: _____

FOR THE ALLIANCE:


THREE RIVERS CONSTRUCTION

TITLE: Co-Chair TRCA

DATE: 4/15/09

FOR THE BUILDING TRADES:


WILL & GRUNDY BUILDING TRADES

TITLE: Presid.

DATE: 4-15-09



*Skilled Union Craftsmen
Professional Union Contractors*

BLUEPRINT FOR SUCCESS

A Labor-Management Project Agreement

Addendum To TRCA/JJC Project Labor Agreement Dated 4-15-09

1. It is agreed by all parties that while the College has completed their Master Plan projects, the parties to the Agreement wish to continue on with the 'Blueprint for Success, A Labor-Management Project Agreement' signed on April 15, 2009. The conditions of the existing Agreement shall remain in effect thru April 2018 until such time as both parties have the opportunity to evaluate current and future construction projects at the College as explained in Article XII of the Agreement.
2. The pre-job conferences called for in Article IX Section D will apply to all bids with a gross value in excess of \$25,000.00. Bids less than the stated \$25,000.00 will be exempt from the pre-job conference but the OWNER agrees to notify TRCA of any such bid lettings in a timely manner.
3. This Agreement covers all new construction and improvement projects but is not intended to nor will it interfere with the OWNER's right to perform general routine maintenance on their facilities.

FOR THE OWNER:

Judy Mitchell
Joliet Junior College

Judy Mitchell, EdD
Printed Name

TITLE: *VP Administrative Svcs*

DATE: *3-9-15*

FOR THE BUILDING TRADES

Don Gregory
Will & Grundy Counties Building Trades Council

Don Gregory
Printed Name

TITLE: *President*

DATE: *3-9-15*

FOR THE ALLIANCE:

Thomas A. White
T.R.C.A.

Thomas A. White
Printed Name

TITLE: *Executive Director*

DATE: *3-9-15*

Will County Prevailing Wage Rates posted on 1/25/2024

						Overtime										
Trade Title	Rg	Type	C	Base	Foreman	M-F	Sa	Su	Hol	H/W	Pension	Vac	Trng	Other Ins	Add OT 1.5x owed	Add OT 2.0x owed
ASBESTOS ABT-GEN	All	ALL		48.90	49.90	1.5	1.5	2.0	2.0	17.37	15.91	0.00	0.91		0.00	0.00
ASBESTOS ABT-MEC	All	BLD		40.59	43.84	1.5	1.5	2.0	2.0	15.22	15.16	0.00	0.88		2.80	5.60
BOILERMAKER	All	BLD		54.71	59.63	2.0	2.0	2.0	2.0	6.97	25.06	0.00	2.83		0.00	0.00
BRICK MASON	All	BLD		50.81	55.89	1.5	1.5	2.0	2.0	12.50	23.01	0.00	1.16	0.00	0.00	0.00
CARPENTER	All	ALL		53.51	58.86	2.0	2.0	2.0	2.0	12.29	29.38	0.25	0.81		0.00	0.00
CEMENT MASON	All	ALL		46.25	48.25	2.0	1.5	2.0	2.0	12.39	31.82	0.00	0.80	0.00	0.00	0.00
CERAMIC TILE FINISHER	All	BLD		45.62	45.62	1.5	1.5	2.0	2.0	12.75	15.64	0.00	1.04	0.00	0.00	0.00
CERAMIC TILE LAYER	All	BLD		53.14	58.14	1.5	1.5	2.0	2.0	12.75	19.41	0.00	1.12	0.00	0.00	0.00
COMMUNICATION TECHNICIAN	All	BLD		43.00	47.30	1.5	1.5	2.0	2.0	16.89	16.10	0.00	0.75	2.37	0.00	0.00
ELECTRIC PWR EQMT OP	All	ALL		60.15	66.00	1.5	1.5	2.0	2.0	13.08	20.29	0.00	3.25	0.00	0.00	0.00
ELECTRIC PWR GRNDMAN	All	ALL		46.92	66.00	1.5	1.5	2.0	2.0	10.21	15.83	0.00	2.54	0.00	0.00	0.00
ELECTRIC PWR LINEMAN	All	ALL		60.15	66.00	1.5	1.5	2.0	2.0	13.08	20.29	0.00	3.25	0.00	0.00	0.00
ELECTRICIAN	All	BLD		52.00	56.68	1.5	1.5	2.0	2.0	17.34	21.56	0.00	1.35	4.76	0.00	0.00
ELEVATOR CONSTRUCTOR	All	BLD		65.12	73.26	2.0	2.0	2.0	2.0	16.08	20.56	5.20	0.70		0.00	0.00
GLAZIER	All	BLD		49.75	51.25	1.5	2.0	2.0	2.0	15.44	25.36	0.00	2.07	0.00	0.00	0.00
HEAT/FROST INSULATOR	All	BLD		54.12	57.37	1.5	1.5	2.0	2.0	15.22	17.86	0.00	0.88		4.15	8.30
IRON WORKER	All	ALL		49.00	53.90	2.0	2.0	2.0	2.0	13.81	29.18	0.00	1.00	0.00	0.00	0.00
LABORER	All	ALL		48.90	49.65	1.5	1.5	2.0	2.0	17.37	15.91	0.00	0.91		0.00	0.00
LATHER	All	ALL		53.51	58.86	2.0	2.0	2.0	2.0	12.29	29.38	0.25	0.81		0.00	0.00
MACHINIST	All	BLD		55.74	59.74	1.5	1.5	2.0	2.0	9.93	8.95	1.85	1.47		0.00	0.00
MARBLE FINISHER	All	ALL		38.75	52.46	1.5	1.5	2.0	2.0	12.50	20.95	0.00	0.66	0.00	0.00	0.00
MARBLE SETTER	All	BLD		49.96	54.96	1.5	1.5	2.0	2.0	12.50	22.31	0.00	0.85	0.00	0.00	0.00
MATERIAL TESTER I	All	ALL		38.90		1.5	1.5	2.0	2.0	17.37	15.91	0.00	0.91		0.00	0.00
MATERIALS TESTER II	All	ALL		43.90		1.5	1.5	2.0	2.0	17.37	15.91	0.00	0.91		0.00	0.00
MILLWRIGHT	All	ALL		53.51	58.86	2.0	2.0	2.0	2.0	12.29	29.38	0.25	0.81		0.00	0.00
OPERATING ENGINEER	All	BLD	1	56.60	60.60	2.0	2.0	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00

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OPERATING ENGINEER	All	BLD	2	55.30	60.60	2.0	2.0	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	BLD	3	52.75	60.60	2.0	2.0	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	BLD	4	51.00	60.60	2.0	2.0	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	BLD	5	60.35	60.60	2.0	2.0	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	BLD	6	57.60	60.60	2.0	2.0	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	BLD	7	59.60	60.60	2.0	2.0	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	FLT	1	64.55	64.55	1.5	1.5	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	FLT	2	63.05	64.55	1.5	1.5	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	FLT	3	58.55	64.55	1.5	1.5	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	FLT	4	54.05	64.55	1.5	1.5	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	FLT	5	66.05	64.55	1.5	1.5	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	FLT	6	54.05	64.55	1.5	1.5	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	HWY	1	54.80	58.80	1.5	1.5	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	HWY	2	54.25	58.80	1.5	1.5	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	HWY	3	52.20	58.80	1.5	1.5	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	HWY	4	50.80	58.80	1.5	1.5	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	HWY	5	49.60	58.80	1.5	1.5	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	HWY	6	57.80	58.80	1.5	1.5	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	HWY	7	55.80	58.80	1.5	1.5	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
PAINTER	All	ALL		51.55	57.99	1.5	1.5	1.5	2.0	14.76	15.69	0.00	1.86	0.00	0.00	0.00
PAINTER - SIGNS	All	BLD		45.49	51.09	1.5	1.5	2.0	2.0	8.20	16.81	0.00	0.00	0.00	0.00	0.00
PILEDRIIVER	All	ALL		53.51	58.86	2.0	2.0	2.0	2.0	12.29	29.38	0.25	0.81		0.00	0.00
PIPEFITTER	All	BLD		55.00	58.00	1.5	1.5	2.0	2.0	12.65	22.85	0.00	3.12	0.00	0.00	0.00
PLASTERER	All	BLD		48.75	51.68	1.5	1.5	2.0	2.0	17.33	20.33	0.00	1.15	0.00	0.00	0.00
PLUMBER	All	BLD		56.80	60.20	1.5	1.5	2.0	2.0	17.00	17.29	0.00	1.73		0.00	0.00
ROOFER	All	BLD		49.25	54.25	1.5	1.5	2.0	2.0	11.83	16.14	0.00	1.11	0.00	0.00	0.00
SHEETMETAL WORKER	All	BLD		54.25	56.96	1.5	1.5	2.0	2.0	13.60	19.43	0.00	1.59	2.62	0.00	0.00
SPRINKLER FITTER	All	BLD		56.60	59.35	1.5	1.5	2.0	2.0	14.45	18.80	0.00	0.75	0.00	0.00	0.00
STONE MASON	All	BLD		50.81	55.89	1.5	1.5	2.0	2.0	12.50	23.01	0.00	1.16	0.00	0.00	0.00
TERRAZZO FINISHER	All	BLD		46.94	46.94	1.5	1.5	2.0	2.0	12.75	17.73	0.00	1.07	0.00	0.00	0.00

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TERRAZZO MECHANIC	All	BLD		50.85	54.35	1.5	1.5	2.0	2.0	12.75	19.12	0.00	1.10	0.00	0.00	0.00
TRAFFIC SAFETY WORKER I	All	HWY		40.10	41.70	1.5	1.5	2.0	2.0	10.60	9.35	0.00	1.00	0.00	0.00	0.00
TRAFFIC SAFETY WORKER II	ALL	HWY		41.10	42.70	1.5	1.5	2.0	2.0	10.60	9.35	0.00	1.00	0.00	0.00	0.00
TRUCK DRIVER	All	ALL	1	43.70	44.25	1.5	1.5	2.0	2.0	11.15	13.26	0.00	0.15	0.00	0.00	0.00
TRUCK DRIVER	All	ALL	2	43.85	44.25	1.5	1.5	2.0	2.0	11.15	13.26	0.00	0.15	0.00	0.00	0.00
TRUCK DRIVER	All	ALL	3	44.05	44.25	1.5	1.5	2.0	2.0	11.15	13.26	0.00	0.15	0.00	0.00	0.00
TRUCK DRIVER	All	ALL	4	44.25	44.25	1.5	1.5	2.0	2.0	11.15	13.26	0.00	0.15	0.00	0.00	0.00
TUCKPOINTER	All	BLD		50.53	51.53	1.5	1.5	2.0	2.0	9.55	21.72	0.00	1.11	0.00	0.00	0.00

Legend

Rg Region

Type Trade Type - All,Highway,Building,Floating,Oil & Chip,Rivers

C Class

Base Base Wage Rate

OT M-F Unless otherwise noted, OT pay is required for any hour greater than 8 worked each day, Mon through Fri. The number listed is the multiple of the base wage.

OT Sa Overtime pay required for every hour worked on Saturdays

OT Su Overtime pay required for every hour worked on Sundays

OT Hol Overtime pay required for every hour worked on Holidays

H/W Health/Welfare benefit

Vac Vacation

Trng Training

Other Ins Employer hourly cost for any other type(s) of insurance provided for benefit of worker.

Explanations WILL COUNTY

The following list is considered as those days for which holiday rates of wages for work performed apply: New Years Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day, Christmas Day and Veterans Day in some classifications/counties. Generally, any of these holidays which fall on a Sunday is celebrated on the following Monday. This then makes work performed on that Monday payable at the appropriate overtime rate for holiday pay. Common practice in a given local may alter certain days of celebration. If in doubt, please check with IDOL.

EXPLANATION OF CLASSES

ASBESTOS - GENERAL - removal of asbestos material/mold and hazardous materials from any place in a building, including mechanical systems where those mechanical systems are to be removed. This includes the removal of asbestos materials/mold and hazardous materials from ductwork or pipes in a building when the building is to be demolished at the time or at some close future date.

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ASBESTOS - MECHANICAL - removal of asbestos material from mechanical systems, such as pipes, ducts, and boilers, where the mechanical systems are to remain.

CERAMIC TILE FINISHER

The grouting, cleaning, and polishing of all classes of tile, whether for interior or exterior purposes, all burned, glazed or unglazed products; all composition materials, granite tiles, warning detectable tiles, cement tiles, epoxy composite materials, pavers, glass, mosaics, fiberglass, and all substitute materials, for tile made in tile-like units; all mixtures in tile like form of cement, metals, and other materials that are for and intended for use as a finished floor surface, stair treads, promenade roofs, walks, walls, ceilings, swimming pools, and all other places where tile is to form a finished interior or exterior. The mixing of all setting mortars including but not limited to thin-set mortars, epoxies, wall mud, and any other sand and cement mixtures or adhesives when used in the preparation, installation, repair, or maintenance of tile and/or similar materials. The handling and unloading of all sand, cement, lime, tile, fixtures, equipment, adhesives, or any other materials to be used in the preparation, installation, repair, or maintenance of tile and/or similar materials. Ceramic Tile Finishers shall fill all joints and voids regardless of method on all tile work, particularly and especially after installation of said tile work. Application of any and all protective coverings to all types of tile installations including, but not be limited to, all soap compounds, paper products, tapes, and all polyethylene coverings, plywood, masonite, cardboard, and any new type of products that may be used to protect tile installations, Blastrac equipment, and all floor scarifying equipment used in preparing floors to receive tile. The clean up and removal of all waste and materials. All demolition of existing tile floors and walls to be re-tiled.

COMMUNICATIONS TECHNICIAN

Installation, operation, inspection, maintenance, repair and service of radio, television, recording, voice, sound and vision production and reproduction, telephone and telephone interconnect, facsimile, equipment and appliances used for domestic, commercial, educational and entertainment purposes, pulling of wire through conduit but not the installation of conduit.

MARBLE FINISHER

Loading and unloading trucks, distribution of all materials (all stone, sand, etc.), stocking of floors with material, performing all rigging for heavy work, the handling of all material that may be needed for the installation of such materials, building of scaffolding, polishing if needed, patching, waxing of material if damaged, pointing up, caulking, grouting and cleaning of marble, holding water on diamond or Carborundum blade or saw for setters cutting, use of tub saw or any other saw needed for preparation of material, drilling of holes for wires that anchor material set by setters, mixing up of molding plaster for installation of material, mixing up thin set for the installation of material, mixing up of sand to cement for the installation of material and such other work as may be required in helping a Marble Setter in the handling of all material in the erection or installation of interior marble, slate, travertine, art marble, serpentine, alberene stone, blue stone, granite and other stones (meaning as to stone any foreign or domestic materials as are specified and used in building interiors and exteriors and customarily known as stone in the trade), carrara, sanionyx, vitrolite and similar opaque glass and the laying of all marble tile, terrazzo tile, slate tile and precast tile, steps, risers treads, base, or any other materials that may be used as substitutes for any of the aforementioned materials and which are used on interior and exterior which are installed in a similar manner.

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MATERIAL TESTER I: Hand coring and drilling for testing of materials; field inspection of uncured concrete and asphalt.

MATERIAL TESTER II: Field inspection of welds, structural steel, fireproofing, masonry, soil, facade, reinforcing steel, formwork, cured concrete, and concrete and asphalt batch plants; adjusting proportions of bituminous mixtures.

OPERATING ENGINEER - BUILDING

Class 1. Asphalt Plant; Asphalt Spreader; Autograde; Backhoes with Caisson Attachment; Batch Plant; Benoto (requires Two Engineers); Boiler and Throttle Valve; Caisson Rigs; Central Redi-Mix Plant; Combination Back Hoe Front End-loader Machine; Compressor and Throttle Valve; Concrete Breaker (Truck Mounted); Concrete Conveyor; Concrete Conveyor (Truck Mounted); Concrete Paver Over 27E cu. ft; Concrete Paver 27E cu. ft. and Under; Concrete Placer; Concrete Placing Boom; Concrete Pump (Truck Mounted); Concrete Tower; Cranes, All; Cranes, Hammerhead; Cranes, (GCI and similar Type); Creter Crane; Spider Crane; Crusher, Stone, etc.; Derricks, All; Derricks, Traveling; Formless Curb and Gutter Machine; Grader, Elevating; Grouting Machines; Heavy Duty Self-Propelled Transporter or Prime Mover; Highlift Shovels or Front Endloader 2-1/4 yd. and over; Hoists, Elevators, outside type rack and pinion and similar machines; Hoists, One, Two and Three Drum; Hoists, Two Tugger One Floor; Hydraulic Backhoes; Hydraulic Boom Trucks; Hydro Vac (and similar equipment); Locomotives, All; Motor Patrol; Lubrication Technician; Manipulators; Pile Drivers and Skid Rig; Post Hole Digger; Pre-Stress Machine; Pump Cretes Dual Ram; Pump Cretes: Squeeze Cretes-Screw Type Pumps; Gypsum Bulker and Pump; Raised and Blind Hole Drill; Roto Mill Grinder; Scoops - Tractor Drawn; Slip-Form Paver; Straddle Buggies; Operation of Tie Back Machine; Tournapull; Tractor with Boom and Side Boom; Trenching Machines.

Class 2. Boilers; Broom, All Power Propelled; Bulldozers; Concrete Mixer (Two Bag and Over); Conveyor, Portable; Forklift Trucks; Highlift Shovels or Front Endloaders under 2-1/4 yd.; Hoists, Automatic; Hoists, Inside Elevators; Hoists, Sewer Dragging Machine; Hoists, Tugger Single Drum; Laser Screed; Rock Drill (Self-Propelled); Rock Drill (Truck Mounted); Rollers, All; Steam Generators; Tractors, All; Tractor Drawn Vibratory Roller; Winch Trucks with "A" Frame.

Class 3. Air Compressor; Combination Small Equipment Operator; Generators; Heaters, Mechanical; Hoists, Inside Elevators (remodeling or renovation work); Hydraulic Power Units (Pile Driving, Extracting, and Drilling); Pumps, over 3" (1 to 3 not to exceed a total of 300 ft.); Low Boys; Pumps, Well Points; Welding Machines (2 through 5); Winches, 4 Small Electric Drill Winches.

Class 4. Bobcats and/or other Skid Steer Loaders; Oilers; and Brick Forklift.

Class 5. Assistant Craft Foreman.

Class 6. Gradall.

Class 7. Mechanics; Welders.

OPERATING ENGINEERS - HIGHWAY CONSTRUCTION

Class 1. Asphalt Plant; Asphalt Heater and Planer Combination; Asphalt Heater Scarfire; Asphalt Spreader; Autograder/GOMACO or other similar type machines; ABG Paver; Backhoes with Caisson Attachment; Ballast Regulator; Belt Loader; Caisson Rigs; Car Dumper; Central Redi-Mix Plant; Combination Backhoe Front Endloader Machine, (1 cu. yd. Backhoe Bucket or over or with

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attachments); Concrete Breaker (Truck Mounted); Concrete Conveyor; Concrete Paver over 27E cu. ft.; Concrete Placer; Concrete Tube Float; Cranes, all attachments; Cranes, Tower Cranes of all types: Creter Crane: Spider Crane; Crusher, Stone, etc.; Derricks, All; Derrick Boats; Derricks, Traveling; Dredges; Elevators, Outside type Rack & Pinion and Similar Machines; Formless Curb and Gutter Machine; Grader, Elevating; Grader, Motor Grader, Motor Patrol, Auto Patrol, Form Grader, Pull Grader, Subgrader; Guard Rail Post Driver Truck Mounted; Hoists, One, Two and Three Drum; Heavy Duty Self-Propelled Transporter or Prime Mover; Hydraulic Backhoes; Backhoes with shear attachments up to 40' of boom reach; Lubrication Technician; Manipulators; Mucking Machine; Pile Drivers and Skid Rig; Pre-Stress Machine; Pump Cretes Dual Ram; Rock Drill - Crawler or Skid Rig; Rock Drill - Truck Mounted; Rock/Track Tamper; Roto Mill Grinder; Slip-Form Paver; Snow Melters; Soil Test Drill Rig (Truck Mounted); Straddle Buggies; Hydraulic Telescoping Form (Tunnel); Operation of Tieback Machine; Tractor Drawn Belt Loader; Tractor Drawn Belt Loader (with attached pusher - two engineers); Tractor with Boom; Tractaire with Attachments; Traffic Barrier Transfer Machine; Trenching; Truck Mounted Concrete Pump with Boom; Raised or Blind Hole Drills (Tunnel Shaft); Underground Boring and/or Mining Machines 5 ft. in diameter and over tunnel, etc; Underground Boring and/or Mining Machines under 5 ft. in diameter; Wheel Excavator; Widener (APSCO).

Class 2. Batch Plant; Bituminous Mixer; Boiler and Throttle Valve; Bulldozers; Car Loader Trailing Conveyors; Combination Backhoe Front Endloader Machine (Less than 1 cu. yd. Backhoe Bucket or over or with attachments); Compressor and Throttle Valve; Compressor, Common Receiver (3); Concrete Breaker or Hydro Hammer; Concrete Grinding Machine; Concrete Mixer or Paver 7S Series to and including 27 cu. ft.; Concrete Spreader; Concrete Curing Machine, Burlap Machine, Belting Machine and Sealing Machine; Concrete Wheel Saw; Conveyor Muck Cars (Haglund or Similar Type); Drills, All; Finishing Machine - Concrete; Highlift Shovels or Front Endloader; Hoist - Sewer Dragging Machine; Hydraulic Boom Trucks (All Attachments); Hydro-Blaster; Hydro Excavating (excluding hose work); Laser Screed; All Locomotives, Dinky; Off-Road Hauling Units (including articulating) Non Self-Loading Ejection Dump; Pump Cretes: Squeeze Cretes - Screw Type Pumps, Gypsum Bulker and Pump; Roller, Asphalt; Rotary Snow Plows; Rototiller, Seaman, etc., self-propelled; Self-Propelled Compactor; Spreader - Chip - Stone, etc.; Scraper - Single/Twin Engine/Push and Pull; Scraper - Prime Mover in Tandem (Regardless of Size); Tractors pulling attachments, Sheeps Foot, Disc, Compactor, etc.; Tug Boats.

Class 3. Boilers; Brooms, All Power Propelled; Cement Supply Tender; Compressor, Common Receiver (2); Concrete Mixer (Two Bag and Over); Conveyor, Portable; Farm-Type Tractors Used for Mowing, Seeding, etc.; Forklift Trucks; Grouting Machine; Hoists, Automatic; Hoists, All Elevators; Hoists, Tugger Single Drum; Jeep Diggers; Low Boys; Pipe Jacking Machines; Post-Hole Digger; Power Saw, Concrete Power Driven; Pug Mills; Rollers, other than Asphalt; Seed and Straw Blower; Steam Generators; Stump Machine; Winch Trucks with "A" Frame; Work Boats; Tamper-Form-Motor Driven.

Class 4. Air Compressor; Combination - Small Equipment Operator; Directional Boring Machine; Generators; Heaters, Mechanical; Hydraulic Power Unit (Pile Driving, Extracting, or Drilling); Light Plants, All (1 through 5); Pumps, over 3" (1 to 3 not to exceed a total of 300 ft.); Pumps, Well Points; Vacuum Trucks (excluding hose work); Welding Machines (2 through 5); Winches, 4 Small Electric Drill Winches.

Class 5. SkidSteer Loader (all); Brick Forklifts; Oilers.

Class 6. Field Mechanics and Field Welders

Class 7. Dowell Machine with Air Compressor; Gradall and machines of like nature.

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OPERATING ENGINEER - FLOATING

Class 1. Craft Foreman; Master Mechanic; Diver/Wet Tender; Engineer; Engineer (Hydraulic Dredge).

Class 2. Crane/Backhoe Operator; Boat Operator with towing endorsement; Mechanic/Welder; Assistant Engineer (Hydraulic Dredge); Leverman (Hydraulic Dredge); Diver Tender.

Class 3. Deck Equipment Operator, Machineryman, Maintenance of Crane (over 50 ton capacity) or Backhoe (115,000 lbs. or more); Tug/Launch Operator; Loader/Dozer and like equipment on Barge, Breakwater Wall, Slip/Dock, or Scow, Deck Machinery, etc.

Class 4. Deck Equipment Operator, Machineryman/Fireman (4 Equipment Units or More); Off Road Trucks; Deck Hand, Tug Engineer, Crane Maintenance (50 Ton Capacity and Under) or Backhoe Weighing (115,000 pounds or less); Assistant Tug Operator.

Class 5. Friction or Lattice Boom Cranes.

Class 6. ROV Pilot, ROV Tender

TRAFFIC SAFETY Worker I

Traffic Safety Worker I - work associated with the delivery, installation, pick-up and servicing of safety devices during periods of roadway construction, including such work as set-up and maintenance of barricades, barrier wall reflectors, drums, cones, delineators, signs, crash attenuators, glare screen and other such items, and the layout and application or removal of conflicting and/or temporary roadway markings utilized to control traffic in construction zones, as well as flagging for these operations.

TRAFFIC SAFETY WORKER II

Work associated with the installation and removal of permanent pavement markings and/or pavement markers including both installations performed by hand and installations performed by truck.

TRUCK DRIVER - BUILDING, HEAVY AND HIGHWAY CONSTRUCTION

Class 1. Two or three Axle Trucks. A-frame Truck when used for transportation purposes; Air Compressors and Welding Machines, including those pulled by cars, pick-up trucks and tractors; Ambulances; Batch Gate Lockers; Batch Hopperman; Car and Truck Washers; Carry-alls; Fork Lifts and Hoisters; Helpers; Mechanics Helpers and Greasers; Oil Distributors 2-man operation; Pavement Breakers; Pole Trailer, up to 40 feet; Power Mower Tractors; Self-propelled Chip Spreader; Skipman; Slurry Trucks, 2-man operation; Slurry Truck Conveyor Operation, 2 or 3 man; Teamsters; Unskilled Dumpman; and Truck Drivers hauling warning lights, barricades, and portable toilets on the job site.

Class 2. Four axle trucks; Dump Crets and Adgetors under 7 yards; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment under 16 cubic yards; Mixer Trucks under 7 yards; Ready-mix Plant Hopper Operator, and Winch Trucks, 2 Axles.

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Class 3. Five axle trucks; Dump Crets and Adgetors 7 yards and over; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnatrailers or turnapulls when pulling other than self-loading equipment or similar equipment over 16 cubic yards; Explosives and/or Fission Material Trucks; Mixer Trucks 7 yards or over; Mobile Cranes while in transit; Oil Distributors, 1-man operation; Pole Trailer, over 40 feet; Pole and Expandable Trailers hauling material over 50 feet long; Slurry trucks, 1-man operation; Winch trucks, 3 axles or more; Mechanic--Truck Welder and Truck Painter.

Class 4. Six axle trucks; Dual-purpose vehicles, such as mounted crane trucks with hoist and accessories; Foreman; Master Mechanic; Self-loading equipment like P.B. and trucks with scoops on the front.

TERRAZZO FINISHER

The handling of sand, cement, marble chips, and all other materials that may be used by the Mosaic Terrazzo Mechanic, and the mixing, grinding, grouting, cleaning and sealing of all Marble, Mosaic, and Terrazzo work, floors, base, stairs, and wainscoting by hand or machine, and in addition, assisting and aiding Marble, Masonic, and Terrazzo Mechanics.

Other Classifications of Work:

For definitions of classifications not otherwise set out, the Department generally has on file such definitions which are available. If a task to be performed is not subject to one of the classifications of pay set out, the Department will upon being contacted state which neighboring county has such a classification and provide such rate, such rate being deemed to exist by reference in this document. If no neighboring county rate applies to the task, the Department shall undertake a special determination, such special determination being then deemed to have existed under this determination. If a project requires these, or any classification not listed, please contact IDOL at 217-782-1710 for wage rates or clarifications.

LANDSCAPING

Landscaping work falls under the existing classifications for laborer, operating engineer and truck driver. The work performed by landscape plantsman and landscape laborer is covered by the existing classification of laborer. The work performed by landscape operators (regardless of equipment used or its size) is covered by the classifications of operating engineer. The work performed by landscape truck drivers (regardless of size of truck driven) is covered by the classifications of truck driver.

MATERIAL TESTER & MATERIAL TESTER/INSPECTOR I AND II

Notwithstanding the difference in the classification title, the classification entitled "Material Tester I" involves the same job duties as the classification entitled "Material Tester/Inspector I". Likewise, the classification entitled "Material Tester II" involves the same job duties as the classification entitled "Material Tester/Inspector II".

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2006

STATE OF ILLINOIS
BUSINESS ENTERPRISE PROGRAM
MINORITIES, FEMALES, PERSONS WITH
DISABILITY PARTICIPATION AND UTILIZATION
PLAN FOR ILLINOIS COMMUNITY COLLEGES

The Business Enterprise Program (BEP) Act for Minorities, Females and Persons with Disabilities (30 ILCS 575) establishes a goal for Community Colleges to contract with businesses that have been certified as owned and controlled by persons who are minorities, female, or persons with disabilities.

Certifications through the following authorities will be recognized: State of Illinois Department of Central Management Services (CMS), Illinois Department of Transportation, Cook County, Chicago Minority Supplier Development Council, Women's Business Development Center, and City of Chicago.

Contract goal to be achieved by Vendor: This solicitation includes a specific BEP participation goal of 30% based on the availability of BEP certified vendors to perform or provide the anticipated services and/or supplies required by this solicitation.

The BEP participation goal is applicable to all bids or offers. In addition to the other award criteria established for this solicitation, the Community College will award this contract to a Vendor that meets the goal or makes reasonable good faith efforts to meet the goal. If the Vendor is BEP certified, the entire goal is met and no subcontracting with a BEP certified vendor is required; however, Vendor must submit a Utilization Plan indicating that the goal will be met by self-performance.

For more information on the State of Illinois Central Management Services' Business Enterprise Program (BEP), please visit: <https://www2.illinois.gov/cms/business/sell2/bep/Pages/Default.aspx>

Vendor should include any additional information that will add clarity to Vendor's proposed utilization of certified BEP vendors to meet the targeted goal. Any submission of good faith efforts by Vendor shall be considered as a request for a full or partial waiver. At the time of bid or offer, Vendor, or Vendor's proposed Subcontractor, must be certified through a recognized authority as a minority-owned (MBE), female-owned (FBE), and/or persons with a disability-owned (DBE) business enterprise.

Good Faith Effort Procedures: Vendor must submit a Utilization Plan and Letters of Intent that meet or exceed the published goal. If Vendor cannot meet the stated goal, Vendor must document and explain within the Utilization Plan the good faith efforts it undertook to meet the goal. Utilization Plans are due at the time of bid or offer submission.

Contract Compliance: Compliance with this section is an essential part of the contract. The following administrative procedures and remedies govern Vendor's compliance with the contractual obligations established by the Utilization Plan. After approval of the Plan and award of the contract, the Utilization Plan becomes part of the contract. If Vendor did not succeed in obtaining BEP participation to achieve the goal and the Utilization Plan was approved and contract awarded based upon a determination of good faith, the total dollar value of MBE/FBE/DBE certified vendor work calculated in the approved Utilization Plan as a percentage of the awarded contract value shall become the contract goal. The Utilization Plan may not be amended after contract execution without the Community College's prior written approval.

If it becomes necessary to substitute a certified vendor the Vendor must notify the Community College in writing of the request to substitute a certified vendor or otherwise change the Utilization Plan. The request must state specific reasons

B24015
for the substitution or change.

Vendor shall maintain a record of all relevant data with respect to the utilization of MBE/FBE/DBE certified vendors, including but without limitation, payroll records, invoices, canceled checks and books of account for a period of at least three years after the completion of the contract. Full access to these records shall be granted by Vendor upon 48 hours written demand by the Community College to any duly authorized representative thereof, or to any municipal, state or federal authorities. The Community College shall have the right to obtain from Vendor any additional data reasonably related or necessary to verify any representations by Vendor.

The Community College reserves the right to periodically review Vendor's compliance with these provisions and the terms of its contract. Without limitation, Vendor's failure to comply with these provisions or its contractual commitments as contained in the Utilization Plan, failure to cooperate in providing information regarding its compliance with these provisions or its Utilization Plan, or provision of false or misleading information or statements concerning compliance, certification status or eligibility of the certified vendor, good faith efforts or any other material fact or representation shall constitute a material breach of this contract and entitle the Community College to declare a default, terminate the contract, or exercise those remedies provided for in the contract or at law or in equity.

**ILLINOIS COMMUNITY COLLEGE
UTILIZATION PLAN**

_____ submits the following Utilization Plan as part of our bid or offer in accordance with the requirements of the BEP Program Status and Participation section of the solicitation for _____, Community College Reference Number _____. We understand that all subcontractors listed must be certified with a recognized authority at the time of submission of all bids and offers. **We understand that compliance with this section is an essential part of this contract and that the Utilization Plan will become a part of the contract, if awarded.**

Vendor makes the following assurance and agrees to include the assurance in each agreement, subcontract and purchase order with a subcontractor or supplier utilized on this contract: We shall not discriminate on the basis of race, color, national origin, sexual orientation or sex in the performance of this contract. Failure to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy, as the Community College deems appropriate.

Vendor submits the following statement:

- ☐ Vendor is a BEP certified firm and plans to fully meet the goal through self-performance.
- ☐ Vendor has identified BEP certified subcontractor(s) to fully meet the established goal and submits the attached executed Letter(s) of Intent; or
- ☐ Vendor has made good faith efforts towards meeting the entire goal, or a portion of the goal, and hereby requests a waiver (complete checklist below).

Vendor's individual responsible for compliance with this BEP goal:

Name: _____

Title: _____

Phone: _____

Email: _____

The individual identified above is responsible to notify Joliet Junior College with any changes to the submitted utilization plan. No subcontractor with a Business Enterprise Program certification may be terminated from a contract without the written consent of Joliet Junior College.

DEMONSTRATION OF GOOD FAITH EFFORTS TO ACHIEVE GOAL AND REQUEST FOR WAIVER

If the BEP participation goal was not achieved, good faith efforts must be demonstrated. Vendors providing Good Faith Effort documentation and request for waiver must complete and submit the Good Faith Effort Contact Log with the bid or offer. Failure to submit Good Faith Effort documentation in its entirety may, at the discretion of the Community College, render Vendor's bid or offer non-responsive or not responsible and may cause it to be rejected or render Vendor ineligible for contract award.

Below is a checklist of actions that will be used to evaluate a Vendor's Demonstration of Good Faith Efforts and Request for Waiver. **Please check the actions which you've completed.** If any of the following actions are not completed, please attach a detailed written explanation indicating why such action was not completed. If any other efforts were made to obtain BEP participation in addition to the items listed below, attach a detailed description of such efforts.

- ☐ Utilize the Sell2Illinois website: <https://cms.diversitycompliance.com/> to identify BEP certified vendors within the respective commodity/service codes denoted above and at a minimum email all listed vendors and solicit quotes from all vendors who express an interest via follow-up emails or telephone calls.
- ☐ Solicit through all reasonable and available means (e.g., attendance at a vendor conference, advertising and/or written notices) the interest of MBE/FBE/DBE certified vendors that have the capability to perform the work of the contract. Vendor must solicit this interest within sufficient time to allow the certified vendors to respond to the solicitation. Vendor must determine with certainty if the certified vendors are interested by taking appropriate steps to follow up initial solicitations and encourage them to submit a bid or proposal. Vendor must provide interested certified vendors with adequate information about the plans, specifications, and requirements of the contract in a timely manner to assist them in responding promptly to the solicitation.
- ☐ Select portions of the work to be performed by certified vendors in order to increase the likelihood that the goal will be achieved. This includes, where appropriate, breaking out contract work items into economically feasible units to facilitate MBE/FBE/DBE certified vendor participation.
- ☐ Make a portion of the work available to certified vendors and selecting those portions of the work or material needs consistent with their availability, so as to facilitate MBE/FBE/DBE certified vendor participation.
- ☐ Negotiate in good faith with interested MBE/FBE/DBE certified vendors. Evidence of such negotiation must include the names, addresses, email addresses, and telephone numbers of BEP certified vendors that were considered; a description of the information provided regarding the plans and specifications for the work selected for subcontracting and evidence as to why additional agreements could not be reached for MBE/FBE/DBE certified vendors to perform the work. A Vendor using good business judgment may consider a number of factors in negotiating with certified vendors and may take a firm's price and capabilities into consideration. The fact that there may be some additional costs involved in finding and using certified vendors may not be in itself sufficient reason for a Vendor's failure to meet the goal, as long as such costs are reasonable. Vendors are not required to accept higher quotes from certified vendors if the price difference is excessive or unreasonable.
- ☐ Thoroughly investigate the capabilities of certified vendors and not reject them as unqualified without documented reasons. The certified vendor's memberships in specific groups, organizations, or associations and political or social affiliations are not legitimate causes for the rejection or non-solicitation of bids and proposals in Vendor's efforts to meet the goal.
- ☐ Make efforts to assist interested MBE/FBE/DBE certified vendors in obtaining lines of credit or insurance as required by the Community College.
- ☐ Make efforts to assist interested MBE/FBE/DBE certified vendors in obtaining necessary equipment, supplies, materials, or related assistance or services.

GOOD FAITH EFFORTS CONTACT LOG

Use this Log to document all contacts and responses (telephone, e-mail, etc.) regarding the solicitation of MBE/FBE/DBE certified vendors within the specific scope of work selected. It is not necessary to show contacts with certified vendors who are identified on the Letter(s) of Intent. **Keep and submit copies of all emails sent and received from prospective certified vendors. Include a copy of the commodity list or scope of work you solicited prospective certified vendors to perform.** Duplicate this log as necessary; do not limit your contacts to the number of spaces shown.

[illegible]

LETTER OF INTENT

BUSINESS ENTERPRISE PROGRAM OR VETERAN SMALL BUSINESS

The Prime Vendor is required to submit a separate, signed Letter of Intent (LOI) from each BEP/VSB certified vendor. **LOIs must be submitted with the bid/offer and must be signed by both parties.** The Prime Vendor shall not prohibit or otherwise limit the BEP/VSB certified vendor(s) from providing subcontractor quotes to other potential bidders/vendors. Each LOI must include the negotiated contract percentage, a detailed scope of work to be performed by each identified BEP/VSB certified vendor and the amount of the subcontract, if known. All LOI's shall be subject to Agency approval. Any changes involving or affecting the identified BEP/VSB certified vendor may not be permitted without written approval of the procuring Agency.

Project Name: _____ Project/Solicitation Number: _____

Name of Prime Vendor: _____ BEP/VSB Compliance Contact: _____

Address: _____

City: _____ State: _____ Zip Code: _____

Telephone: _____ Fax: _____ Email: _____

Name of Certified ☐ BEP or ☐ VSB Vendor: _____

Address: _____ BEP/VSB Compliance Contact: _____

City: _____ State: _____ Zip Code: _____

Telephone: _____ Fax: _____ Email: _____

Type of agreement: ☐ Services ☐ Supplies ☐ Both Services/Supplies

Anticipated start date of the Certified BEP/VSB Vendor: _____

Proposed ____ % of Contract to be performed by the BEP/VSB Vendor.

Proposed Subcontract Amount, if known \$ _____

NOTE: The Prime Vendor must indicate the percentage of the estimated contract award that will be subcontracted to the certified BEP/VSB Vendor.

Detailed description of work to be performed or goods/equipment to be provided by the BEP/VSB Vendor:

The Vendor and the certified vendor above hereby agree that upon the execution of a contract for the above-named project between the Vendor and the State of Illinois, the Certified ☐ BEP ☐ VSB Vendor will perform the scope of work for the amount/percentage as indicated above.

Vendor (Company Name and D/B/A): _____

Certified BEP/VSB Vendor (Company Name and D/B/A): _____

Signature _____

Signature _____

Print Name: _____

Print Name: _____

Title: _____

Title: _____

Date: _____

Date: _____

CERTIFICATION OF CONTRACT/BIDDER

The below signed contractor/bidder hereby certifies that it is not barred from bidding on this or any other contract due to any violation of either Section 33E-3 or 33E-4 of Article 33E, Public Contracts, of the Illinois Criminal Code of 1961, as amended. This certification is required by Public Act 85-1295. This Act relates to interference with public contracting, bid rigging and rotating, kickbacks and bribery.

SIGNATURE OF CONTRACTOR/BIDDER

TITLE

DATE

THIS FORM **MUST** BE RETURNED WITH YOUR BID TO:

Joliet Junior College District #525
Office of Facility Services
Main Campus L Building, L1005
1215 Houbolt Road
Joliet, IL 60431-8938

CERTIFICATE OF COMPLIANCE WITH
ILLINOIS DRUG-FREE WORKPLACE ACT

_____, does hereby certify pursuant to the *Illinois Drug-Free Workplace Act* (30 ILCS 580/) that [he, she, it] shall provide a drug-free workplace for all employees engaged in the performance of work under the contract by complying with the requirements of the *Illinois Drug-Free Workplace Act* and, further certifies, that [he, she, it] is not ineligible for award of this contract by reason of debarment for a violation of the *Illinois Drug-Free Workplace Act*.

 By Authorized Agent

 Date

SUBSCRIBED AND SWORN TO before me
 This ____ day of _____, 20__.

 NOTARY PUBLIC

EXECUTE AND ATTACH TO PROPOSAL FORM**JOLIET JUNIOR COLLEGE – REQUEST FOR BID****DRAWINGS ARE AVAILABLE ON THE FOLLOWING WEBSITE:****WWW.JJC.EDU/COMMUNITY/VENDORS****BID FORM**

To: Joliet Junior College
 1215 Houbolt Road
 Joliet, IL 60431-8938

Project: _____

Date: _____

Submitted by:

 (Full Name)

 (Address)

 (City, State, Zip)

 (Phone)

 (Fax)

 (Email)

PART 1 OFFER

Having examined the site and having familiarized itself with the conditions affecting the cost of the work associated with the _____, and with the bidding documents, Bidder hereby proposes to perform everything required and to furnish all labor, materials, necessary tools, expendable equipment and transportation services necessary to complete in a workmanlike manner the subdivision of work stated above in accordance with the bidding documents for the following sums:

Base Bid:	
Allowance:	\$7,500.00
Total Base Bid with Allowance:	

Base Bid with Allowance:

 Dollars(\$_____)

Write amount in both alpha and numeric, in case of discrepancy the lesser amount shown will govern.

Alternate #1:

 Dollars(\$_____)

Write amount in both alpha and numeric, in case of discrepancy the lesser amount shown will govern.

We have included herewith, the Security Deposit as required by the Instructions to Bidders.

PART 2 ACCEPTANCE

This offer shall be open to acceptance and is irrevocable for thirty (30) days from the Bid closing date.

If the bid is accepted by the Owner within the time period stated above, we will:

- A. Execute the Agreement within ten (10) days of receipt of Notice of Award.
- B. Furnish the required bonds within ten (10) days of receipt of Notice of Award in the form described in the Instruction to Bidders.
- C. Furnish the required Certificate of Insurance within ten (10) days of receipt of Notice of Award in the form and amounts described in the Instruction to Bidders.
- D. Commence work as established by the written Notice to Proceed.

If this Bid is accepted within the time stated, and we fail to commence the Work or we fail to provide the required Bonds(s), the Security Deposit shall be forfeited as damages to the Owner by reason of our failures.

In the event our Bid is not accepted within the time stated above, the required security deposit shall be returned to the undersigned, in accordance with the provisions of the Instructions to Bidders; unless a mutually satisfactory arrangement is made for its retention and validity for an extended period of time.

PART 3 CONTRACT TIME

If the Bid is accepted, we will:

- A. Complete the work in manner consistent to meet the requirements of the schedule (_____) consecutive calendar days from the date established as the Date of Commencement in the Notice to Proceed.
- B. Contractor has examined the Schedule included in these documents and takes no exception, or records the following exceptions:

PART 4 CONTRACTOR'S FEES FOR CHANGES IN THE WORK

Lump Sum of Time and Materials Changes: We the undersigned bidder agree that the following percentages for overhead and profit shall be added to job costs for the

net amount of work added to or deleted from the contract by written lump sum or time and material change orders recommended by the Engineer and approved by the Owner:

Add to net extra for job costs for additional work performed by:

Our own forces 12%

Our subcontractor 5% (including assigned subcontractors)

Note: Insurance, bond, and taxes are considered as job cost items and are not included in the percentages listed above.

PART 5 ADDENDA

The following Addenda have been received. The modifications to the Bid Documents noted therein have been considered and all costs thereto are included in the Bid Sum.

Addendum # _____ Dated _____

Addendum # _____ Dated _____

Addendum # _____ Dated _____

PART 6 SUBCONTRACTORS

- A. The following work will be performed (or provided) by the Subcontractors we have indicated below:

	<u>Name of Subcontractor</u>	<u>Work Performed</u>
1.	_____	_____
2.	_____	_____
3.	_____	_____
4.	_____	_____

- B. We understand, and hereby agree, that we are obligated to use the indicated subcontractors, unless prior written permission to change has been obtained from the Owner.

PART 7 RELATED WORK EXPERIENCE

List a minimum of three jobs of similar type and scope performed in the last five years:

1. Client: _____
Building: _____
Phone: _____
Contact Name: _____
Dollar Amount: _____

2. Client: _____
Building: _____
Phone: _____
Contact Name: _____
Dollar Amount: _____

3. Client: _____
Building: _____
Phone: _____
Contact Name: _____
Dollar Amount: _____

PART 8 BID FORM ADDITION

Apprenticeship and Training Certification

In accordance with the Illinois Procurement Code, the Bidder certifies that the work to be performed by it and/or its subcontractors shall, at the time of such bid opening and at the time of the performance of work pursuant to the terms of this Contract, shall have participated in the approved apprenticeship and training programs as provided for above. The bidder shall list, in the space below, the official name of the program sponsor holding the certificate of registration or all types of work or crafts in which the bidder is a participant and that will be performed by the bidder and its sub-contractor's employees. Work that will be sub-contracted shall be indicated to be subcontracted work as provided for herein. **Failure to list required information may result in disqualification of bid.**

PART 9 CONTRACTOR EVALUATION

Upon completion of the project, a Construction Contractor Performance Evaluation form will be completed by the A/E and the JJC Project Coordinator. The contractor will be evaluated in the following categories:

- Professionally Administered and Supervised Work
- Business Practices
- Overall Performance
- Workmanship
- Timeliness
- Project Management

PART 10 BID FORM SIGNATURES(S)

The Corporate Seal of:

(Bidder – please print the full name of your Proprietorship, Partnership, or Corporation)

Was hereunto affixed in the presence of:

(Authorized signing officer)	(Title)
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(Seal)

(Authorized signing officer)	(Title)
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If the bid is a joint venture or partnership, add additional forms of execution for each member of the joint venture in the appropriate form or forms as above.

END OF SECTION