

MIDDLETON ASSOCIATES INCORPORATED
1702 W. COLLEGE AVE., SUITE E
NORMAL, IL 61761-2793
PHONE 309/452-1271 FAX 309/454-8049

SPECIFICATIONS FOR LABOR AND MATERIALS

FOR

COLENE HOOSE ELEMENTARY BEST PROGRAM ADDITION
600 GRANDVIEW DR., NORMAL, IL 61761

FOR

MCLEAN COUNTY UNIT DISTRICT NO. 5
1809 HOVEY AVENUE
NORMAL, ILLINOIS 61761-4339

PROJECT NUMBER: 23412117

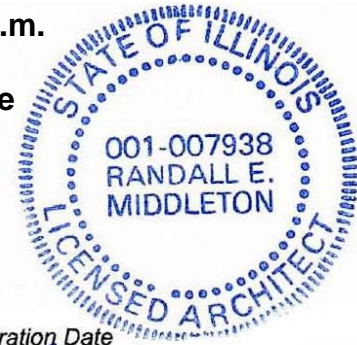
ISSUE DATE: Wednesday, June 13, 2018

PRE-BID MEETING: Monday, June 25, 2018 – 9:00 a.m. Prevailing Time -
- Inclement weather not withstanding
Colene Hoose Elementary School
600 Grandview Dr., Normal, IL 61761
Meet at the main entrance

BID DATE: Friday, July 6, 2018, at 11:00 a.m.

BID DELIVERED TO: Unit 5 Maintenance Warehouse
1999 Eagle Road
Normal, IL 61761

SPECIFICATION BOOKLET NO. _____



Expiration Date
11/30/2018


[Seal and Signature]

DIVISION 0 – BIDDING & CONTRACT REQUIREMENTS

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Colene Hoose Elementary BEST Program Addition
600 Grandview Dr., Normal, IL
A/E Project No.: 23412117

FOR: McLean County Unit District No. 5
District Office: 1809 Hovey Ave., Normal, IL 61761-4339
Maintenance Warehouse: 1999 Eagle Rd., Normal, IL 61761

SUPERINTENDENT OF SCHOOLS: Dr. Mark Daniel

ARCHITECT/ENGINEER: Middleton Associates, Incorporated
1702 W. College Avenue, Suite E
Normal, IL 61761-2793
middleton@middlettonassociates.net

ISSUE DATE: June 13, 2018

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DOCUMENT LIABILITY

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END 00020

DIVISION 0 – BIDDING & CONTRACT REQUIREMENTS
Section 00030 – Invitation for Bids

This notice shall be published not less than ten (10) days prior to the Bid date.

Sealed proposals will be received by: McLean County Unit District No. 5 for Colene Hoose Elementary BEST Program Addition, A/E Project No. 23412117.

Time of Bid Submission: Friday, July 6, 2018 at 11:00 a.m. Bids will be opened following due time.

Location of Bid Submission: McLean County Unit District No. 5 Warehouse, Attn: Doug Johnson, 1999 Eagle Rd., Normal, Illinois 61761.

Proposals shall be delivered to the above location prior to 11:00 a.m. Proposals shall be clearly identified on the outside of the envelope as "Sealed Proposal" and must show the project title.

Terms of the proposal:

- Bid Security is required, 5% Bid Bond or Certified Check payable to McLean County Unit District No. 5.
- Owner protective bonds will be required in the amount of 100% of the Contract value after Board acceptance.
- Illinois Prevailing Wage Act P.A. 86-799 and HB 188 applies to this contract.
- 720 ILCS 5/ Illinois Criminal Code of 2012 is applicable to this project.
- The Board of Education has the right to reject or accept any or all parts of all bids submitted and to waive any irregularities in the bidding and to accept the bid considered in the best interest of the School District.

A Pre-Bid Meeting is scheduled for 9:00 a.m., Monday, June 25, 2018 at Colene Hoose Elementary School. Meet at the main entrance.

Interested parties may check out Plans and Specifications at the Architect's office, Middleton Associates, Inc. There is a refundable deposit of \$40.00 per set, or download: www.middletonassociates.net, click on "Contractors."

END 00030

DIVISION 0 – BIDDING & CONTRACT REQUIREMENTS

Section 00040 – Instructions for Bidders

1. GENERAL

1.1. LOCATION OF THE PROJECT:

- A. **Colene Hoose Elementary School, 600 Grandview Dr., Normal, IL 61761**

1.2. OBTAINING DRAWINGS & SPECIFICATIONS

- A. Drawings and Specifications may be obtained from the Architect, Middleton Associates Incorporated, 1702 W. College Ave., Suite E, Normal, IL 61761-2793, Telephone 309/452-1271, FAX 309/454-8049
E-Mail: www.middleton@middletonassociates.net

- B. There is a refundable deposit of \$40.00 per set.

- C. All sets of Bid Documents, except those held by the low bidder, are to be returned to the Architect/Engineer in good usable condition within ten (10) days following bid opening. Failure to do so shall be grounds for forfeiture of the otherwise refundable deposit. Drawings and Specifications may be examined at the office of the Owner or Architect without charge.

1.3. INTERPRETATION OF DOCUMENTS (See AIA General Conditions Section 00050 and Supplementary General Conditions Section 00800).

- A. Anyone having a doubt concerning the meaning of the Contract Documents, or any other questions, may submit a request for interpretation from the Architect/Engineer. All pre-bid interpretation shall be requested FIVE (5) DAYS prior to the bid due date. Response, other than minor clarification, will be in the form of Addenda and will be mailed to each Bidder.

- B. It shall be the Architect/Engineer's responsibility to clarify conflicts in requirements as may be reported to the Architect/Engineer. After bid due date, the Architect/Engineer shall determine the course to be followed for said clarification with no cost change to the Owner.

- C. All work in these documents shall be as described, including any and all trade subcontractors of the contractor's determination and designation with no cost increase to the Owner.

1.4. INTENT, ERRORS AND OMISSIONS

- A. Any known conflict between requirements of various portions of the Contract Documents shall be reported to the Architect/Engineer prior bid due date and shall fall under the authority of Interpretation of Documents.

- B. The Drawings are descriptive and directive in concept and are not intended to exhaust all detail situations required to complete the work. The procedures detailed shall establish the general character of solutions

needed for typical, non-typical, and peculiar situations at the job site.

- C. It is the intent of the documents that specified work and equipment be installed in a proper and finished manner, fully operational, at a minimum of generally accepted standards for good quality commercial construction. All necessary materials, labor, controls, accessories, brackets, fasteners, sealants, etc., to properly install and complete the work shall be provided unless specifically noted otherwise.
- D. Each Contractor and Subcontractor shall coordinate and cooperate with the other Contractors to provide proper installation. Verify dimensions, services, installation conditions, obstacles to the work and modifications necessary to complete the work and coordinate the fit, finish and scheduling of the work.

1.5. DOCUMENT INTENT: PROJECT COMPLETION, HIGH LEVEL FIT AND FINISH FULLY FUNCTIONAL, USER READY

- A. It is the intent that all items of work included in the project are to be completely finished and all necessary associated components and accessories for proper completion are to be included in the work.
- B. Drawings are schematic in nature; every single element needed is not necessarily labeled, dimensioned or positioned. Unless specifically exempted, the Contractor shall provide as follows:
 - 1. Good quality fit, finish and workmanship at a level of competency and quality equal to or exceeding commercial construction in the area.
 - a. Sealants, caulks, flashings, transitions, closures and components to assure infiltration and weather tight result and finished appearance inside and out.
 - b. Sealants, flashings, closures at building connections.
 - c. Upper and lower flashings, in new construction and whenever possible, to shed water outward.
 - 2. All components and assemblies to assure proper installation and performance of manufactured equipment, per manufacturer's or industry association standards as a minimum.
 - a. Mechanical equipment, plumbing, piping, ventilation, valves back checks, connections etc.
 - b. Mechanical and electrical coordination, coordination of installation locations, hidden where possible, routed through the construction in the most expedient but concealed manner,
 - c. Minor relocation of piping, equipment, installations shall be provided without cost change within 10' either way or reasonable pathways of similar distance.
 - d. All other equipment, kitchen, doors, hardware, windows and any other operable equipment

- e. Service access, filters replacement, and repairs; always allow for reasonable repair and maintenance access.

1.6. BIDDING REQUIREMENTS

- A. See Paragraph 1.20: Scheduling.
- B. Any Contractor Proposal may include Document 00307 Product Substitutions Form / Voluntary Alternates Form. Basic materials have been selected as noted in these Specification Sections and on the Drawings in order to reduce or eliminate any schedule / ordering delays. Any Contractor may propose substitute materials or voluntary alternates to the basic specified materials on this form. If any Contractor desires to offer substitutions or voluntary alternates, include this form with your Bid.

1.7. ADDENDA

- A. Addenda may be issued before the bid opening date to clarify or modify the Contract Documents.
- B. Said addenda shall become a part of the Contract documents and supersede any conflicting specifications or clarify intent of same.

1.8. BID SECURITY

- A. The Bidder shall furnish, along with his proposal, a bid bond or certified check in the amount of five percent (5%) of the bid proposal including all additive alternates. The above instrument shall be made payable to the Owner and shall serve as a guarantee that the Contractor will enter into the Contract with the Owner as per his bid, should the job be awarded to him.
- B. Should said Contractor refuse or fail to enter into a Contract with Owner per his bid for the work included in these Contract Documents within forty-five (45) days following bid due date, said bid guarantee shall become collectible, in full, by the Owner in payment for damages. See 00040/1.12 "RETURN OF BID SECURITY."

- 1.9. WITHDRAWAL OF BIDS. Bids may be withdrawn by the Owner or Corp. Officer of Contractor prior to the bid due date and time, after which time no bids may be withdrawn for a period of forty-five (45) days unless a Bidder has been released by the Owner's action.

1.10. PROPOSAL FORMS

- A. Each bidder shall submit his proposal, in duplicate, on proposal form provided. All applicable blank spaces on forms shall be filled out fully; numbers shall be stated both in writing and in figures; signatures shall be live in longhand. Completed forms shall be without delineation, alteration or erasure.
- B. Proposals shall not contain any recapitulation of the work and no oral proposals or modifications are invited for consideration. The Proposal &

Contract Form automatically becomes the Contract upon the acceptance and signature of the Owner. See Paragraph 1.15 "COMMENCEMENT OF CONSTRUCTION."

- C. Substitutions of material other than that specified may be included on the proposal. See related Specification Sections for more information on Substitutions.

1.11. SIGNING OF BIDS

- A. All proposals shall be signed (live signatures, no copies of signatures accepted) by persons fully and duly authorized to sign bids.
- B. Any bid signed by a person other than as set forth above shall enclose with his bid proposal evidence of Power of Attorney.

1.12. AWARD OR REJECTION OF BIDS

- A. Although it is the intention of the Owner to accept the lowest qualified bid the Owner specifically reserves the right to waive all formalities and/or informalities, to reject any and all bids and/or accept the bid that, in the Owner's judgment, will be in the Owner's best interest.
- B. Contractor will note: All alternates that are applicable, or as may become applicable by addendum, must be bid.

1.13. RETURN OF BID SECURITY

- A. After bids have been read along with alternates and/or substitutions as applicable and a successful Bidder has been approved by Owner, a Letter of Intent will be sent to the successful bidder and bid security may be returned to the unsuccessful bidders:
 - 1. Except the deposits of the two (2) bidders in line may be retained until Owner/Contractor agreements have been consummated.
 - 2. The Owner has released them.
 - 3. The Bid has expired.
- B. Following the signing of the Contracts and receipt of bonds, remaining bid security will be returned. If the successful Bidder fails to accept the Contract and submit acceptable bonds, same will be grounds for forfeiture of his bid security.

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

- A. Periodic Change Orders that may occur to the Contract shall be included in each respective bond.
- B. Bonds shall cover the entire Contract without regard to the Contractor's assignment of work to Subcontractors or Suppliers.

1.15. COMMENCEMENT OF CONSTRUCTION

- A. Contractor shall not commence work until the agreement has been executed by both Owner and Contractor and Insurance Certificate and Owner's Protective Bonds have been accepted by the Owner and the Architect. However, work shall commence promptly upon the Owner and Architect's acceptance of Insurance certification and applicable bonds. Commence progress and work completion shall be coordinated with the Owner's programmed use of the buildings.
1. **All insurance certificates shall specifically list McLean County Unit District No. 5 and the Architect, Middleton Associates Incorporated and their consultants and sub-consultants to the work, as added insureds or named insureds.**
 2. **Start date: Construction must begin as soon as possible after contract signatures are completed. Work may begin no later than 8:00 a.m. July 16, 2018.**
 - a. Negotiations to begin construction before Bond & insurance certificates might occur.
- B. **The McLean County Unit School District No. 5 must occupy all spaces of the currently existing building of Colene Hoose Elementary School including the modifications to Room 50 for the start of the 2018-2018 School Year on or before August 14, 2018. There is no alternative to completion occurring by December 31, 2018.**
- C. **Material for this construction project must be ordered ASAP after contract signatures are complete and Bonds and Insurance are completed.**
- D. Progress at job site shall be continuous once work has commenced.
1. See Drawing Sheet A-1.0. There is a description of the work that **must** be done by August 14, 2018. This is a very aggressive schedule for the first phase of this project.
 - a. In order to achieve this schedule all General Contractors must include in the Base Bid, working 48 hour weeks starting July 16, 2018: and concluding on August 14, 2018.
 - b. The New Addition and related work must be completed by December 31, 2018. See Sheet A-1.0.

1.16. EXAMINATION OF SITE AND CONTRACT DOCUMENTS

- A. Bidder shall carefully examine bidding documents and inspect the sites to obtain first-hand knowledge of existing conditions.
- B. **A Pre-Bid Meeting is scheduled for 9:00 a.m., Monday, June 25, 2018 61761. Meet at the Main Entrance of Colene Hoose.**

- C. Each Bidder, by submitting his bid, represents that he has so examined the bidding documents and inspected the site and premises, that he understands the provisions of the bidding documents, and that he has familiarized himself with the local conditions under which the work is to be performed. Bidders will not be given extra payment or contract time for conditions, which could have been determined by such examination.

1.17. BIDDER QUALIFICATIONS

- A. Competency and responsibility of the Bidder, and of their proposed subcontractors, will be considered prior to award and may include:
 - 1. A detailed statement regarding the business, technical organization and plant facilities for the work that is contemplated.
 - 2. Evidence of successful experience of personnel and previously completed construction projects.
 - a. Contractor and personnel, five years or more commercial construction experience, including recent projects or similar or greater value, similarity of types of work, technical content, and complexity.
 - b. Evidence that such projects have been aggressively pursued to conclusion without delay, frivolous claims for additional costs, or work requiring abnormal or extensive corrections.
- B. The Owner may reject a bidder, if an updated financial statement prepared by a CPA not in the Contractor's payroll (bearing the CPA's live signature) shows the net worth of a Contractor to be less than 25% of the Contractor's bid including elected alternates for this work. Said statement, if required by the Owner, shall be furnished and paid for by the Bidder.
 - 1. Evidence of unpaid bills, unresolved liens, outstanding claims by the Dept. of Labor for wage, benefits or workman compensation violations or failure to provide accurate payroll information may be used to determine responsibility of Contractor prior to award.

1.18. LIST OF SUBCONTRACTORS

- A. **AT THE TIME OF BIDDING** the Contractor shall submit to the Architect/Engineer, a list of the names of the subcontractors and suppliers and other persons or organization as outlined in specification page 00300-4, subject to the approval of the Owner.
- B. After the Contractor's list of subcontractors and material suppliers has been submitted, no further changes shall be made without specific written authority and approval of the Architect/Engineer.

1.19. CONTRACT AWARD

- A. The Owner will make an award based on the selection of the lowest cost responsible bidder. After award is approved by the Board of Education, the contract timeline is as follows:
1. The Architect will fill in the Contract Form of Agreement (specification section 00301-2). The Architect will obtain the signature of the person designated by the Board of Education.
 2. The Architect will send two (2) Forms of Agreement, and the Contractor shall sign both, keep one (1) for their file, send one (1) back to Architect. This shall happen within seven (7) calendar days of the date of award.
 3. When the Contractor has signed both copies of the Form of Agreement, the project starts.
 4. The Contractor shall immediately obtain Proof of Insurance, Labor and Materials, Payment and Performance Bonds. All of the above to be completed fifteen (15) days after award.
 5. Master Cost Breakdown (CVS), thirty (30) days after award.
 6. Proposed Schedule and timeline: Contractor to present at Pre-Construction meeting, fifteen (15) days after award.
 7. Contractor to send Shop Drawings and Catalog Cuts/Samples or bring same to Pre-Construction meeting.
- B. Failure or refusal to provide the preceding Contract information in a timely manner may be cause for cancellation of the award or termination of the agreement if signed and the Owner will be entitled to compensation under the terms of the Bid Security for failure to execute contract terms in good faith.

1.20. SCHEDULING

- A. The orderly and rapid execution of the required work is of paramount importance.
- B. Calming Rooms 50A, 50B, & 50C: the window removal and infill in Rooms 48, 49, 50, and 52; and the construction of Corridor 50 must be completed by August 14, 2018. The construction of the addition and site work must be substantially completed by December 31, 2018.
- C. Contractors' Master Schedule
1. The Contractor shall prepare and maintain a Master Schedule, including the work of all sub contractors.
 2. Prior to preparation of the Master Schedule, all Subcontractors shall coordinate scheduling needs with the General Contractor.
 3. Upon preparation of a detailed schedule, same shall be reviewed by the Architect and the Owner. Once accepted, it shall become the basis for determining the on time progress of the work.
 4. **Contractor's Master Schedule shall be submitted by June 22, 2018.**

D. Completion of the Contract

1. Provide manpower crews, overtime double shift, and equipment as needed to maintain the schedule. The Owner will not authorize additional payment for overtime or additional manpower needed to maintain, achieve, or make up time to meet the schedule. The General Contractor shall notify the Architect and the Owner promptly of any deficiency in performance, which is unacceptably impacting the schedule or delaying progress, and provide a plan of action to regain performance to meet the schedule.
2. The Subcontractor(s) shall immediately notify the General Contractor, in the event any trade area Contractor's progress is impeding their ability to maintain the schedule.
3. The General Contractor shall immediately provide notification of this report to the Architect and the Owner and shall include a plan of action to regain schedule.
4. Contractors shall work 48 hour work week through August 14,2018.
5. If the General Contractor determines that more than 48 hours per week is needed at any time after project has started, contact Architect immediately.

E. Schedule

1. Submittals shall be prepared immediately following award.
2. Material acquisition may begin immediately following Award.
3. Upon return of review submittals, schedule material and equipment for timely delivery.
 1. Materials and equipment delivered on site or suitably stored with proof of insurance may be submitted for payment, subject to inspection.
 2. The Owner requests that equipment and materials to do the work be on site or readily available for delivery prior to the start of operations.

1.21. ALLOWANCE

A. **The General Roofing Contractor shall include in his bid an allowance of \$24,000 for additional time and material for Change Order work as directed and approved IN WRITING by the Owner and A/E. \$24,000 to be added.**

1. This is primarily for suspected rotted wood along roof / fascia area and for possible wet insulation on the roof.
2. Unused portion of allowance will be returned to owner at time of Final Payment request via Change Order.

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

1.22. PROGRESS PAYMENTS

- A. Pay Requests must be approved by the Architect / Engineer and the District Maintenance Supervisor, Doug Johnson. Submit all Pay Requests to the Architect, five (5) business days before the end of each month. Pay Requests will be accepted once per month. Note: See McLean County Unit School District #5 Board of Education meeting schedule at: <https://www.unit5.org/domain/79>. Pay Applications must be received in our office 8 business days prior to the Board Meetings to be processed at the Board Meeting.
- B. Payment will be made within thirty (30) days following approval.
- C. In accordance with the terms of the Contract periodic partial progress payments may be made monthly to the Contractor for: 90% of the value of the labor, materials, and/or equipment incorporated in the construction. Payment will be for installed materials only.
- D. After Contract award and before commencement of work, the Contractor shall submit a complete master cost breakdown. Said cost breakdown shall be used by the Owner only for the purpose of checking and certifying requests for payment.
- E. Pay requests shall indicate amounts completed of all items listed from the master breakdown.
- F. Submit notarized Contractor's affidavits with each pay request showing that total owed on Contract by Owner (after subject request has been paid to Contractor) is more than the amount to become due the Contractor for material, subcontractors and labor.
 - 1. 10% of each request will be retained by Owner until work has been satisfactorily completed. After 75% of the Contract has been satisfactorily completed retainage reduction will be considered.
- G. All the applications for payment shall be made in two (2) copies with all copies bearing live seals and signatures, notarized and complete and accurately filled in.
 - 1. See AIA General Conditions, Paragraph 9.3.1, 9.3.2 and 9.3.3.
 - 2. Applications for payment shall be submitted to Architect/Engineer on AIA G-702A Forms.
 - 3. EACH SUCCESSIVE PAY REQUEST SHALL BE ACCOMPANIED BY PARTIAL WAIVERS OF LIEN, DOLLAR FOR DOLLAR MATCHING THE PRECEDING PAY REQUEST.
 - 4. Attach one (1) copy of Contractor's Payroll with Pay Request in accord with Dept. of Labor requirements. Include Payroll for the major Subcontractors and upon request any minor or intermittent on-site Subcontractor.

1.23. CHANGE ORDERS

- A. Changes to the scope of work may occur after Contract Award. Contractor may initiate a Change Order by send an RFI to the Architect. The Architect and Owner may initiate a Change Order by verbal or written inquiry to the Contractor.
- B. When a change to the scope must occur the following procedure shall apply:
 - 1. The Change Order may be indicated as a fixed price or time and material. In all cases a written summation of work to be done shall be submitted to the Architect or written by the Architect. In all case the Contractor shall be provided a signed Letter to Proceed before accruing any expenses toward the Change Order.
 - 2. The Architect will try to provide the Letter to Proceed within twenty-four (24) hours of the time of origination of the request.
- C. Cost of Change Orders
 - 1. Cost of Change Orders shall be broken down into Labor, Material and Mark-up.
 - 2. The mark-up will include a percentage of the cost of Labor and Material and shall include everything (bonds, insurance, project management, overhead and profit, etc.). Mark-up allowed is:
 - a. Prime Contractor on own labor and materials – maximum 15%.
 - b. Subcontractor on own labor and material – maximum 15%.
 - c. Prime Contractor on labor and material of Subcontractor – maximum 7.5%.
 - d. Change Orders may be by T & M with above add-on.

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

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

1.25. MATERIALS SPECIFIED AND QUALITY OF WORK

- A. Materials shall be as specified or approved equal.
 - 1. Due to the previously completed renovations at other District Schools Elementary Schools the products and materials used therein are the basis for the Specification Sections to follow. Substitutions may be proposed on Specification Section 00307 Products Substitutions Form.
- B. "Approved equal" and "or equal" shall mean that the Contractor shall be required to receive the Owner's approval (via the Architect) on any substitute materials seven (7) days prior to the bid due date.

- C. Requests for substitution approval shall be submitted to the Architect/Engineer seven (7) calendar days before Bid Date.
 - 1. Prior to considering substitutions, the Owner (via the Architect/Engineer) may require submission of samples, descriptive, technical and catalog data and lab reports of tests.
 - 2. Said submittals shall be presented to Architect/ Engineer.
 - 3. Approved substitutions can then be put on Bid Form.
- D. Substitute materials may be submitted after seven (7) day period indicated above by using the Product Substitution Form 00307.

1.26. TOBACCO AND ALCOHOL FOR CONSUMPTION PRODUCTS

- A. Smoking, chewing, etc. shall not be permitted anywhere on school property by State Statute.
- B. Alcoholic beverages are not allowed on school property.
 - 1. Working under the influence of anything containing alcohol or any prescription or non-prescription drug is not allowed on the job site.
- C. Violators may be removed from the job sites subject to conditional return privileges in the future.

1.27. SEXUAL HARASSMENT POLICY

- A. The Owner will not tolerate sexual harassment in any form. Sexual harassment is defined, for the purpose of this policy, as "unsolicited, deliberate or repeated sexually derogatory statements, gestures or physical contact, which cause discomfort or humiliation. Sexual harassment may involve pressure from a person of either sex against a person of the opposite sex or same sex . . ."
 - 1. Should evidence that a Contractor, or a Contractor's employee, has harassed a student or other individuals, the harasser shall be removed from the job site.

1.28. EMPLOYEE-STUDENT RELATIONSHIPS

- A. Except in an emergency situation involving safety, intermingling of the Contractors' employees and the school faculty, staff and students is be avoided. Contractor or Subcontractor personnel violating this requirement shall be removed from employment at this site. The Contractor Superintendent shall monitor this to the best of his ability. Contractor employees experiencing problems with students or faculty shall report same to their Project Superintendent, who shall promptly report the problem to an authorized representative of the Owner and the Architect/Engineer.
 - 1. Avoid profanity and inappropriate subject matter in conversation as students and staff may be within audible range and walls or ceiling spaces may allow sound transmission.

2. Verbal or physical action interpreted as sexual in nature or as sexual harassment will be grounds for removal of the employee. Further legal action remains the option of the persons affected.
3. In all aspects of this provision, the Contractor's employees as adults have the greater responsibility and should not respond to inappropriate student behavior.

1.29. BACKGROUND INVESTIGATION AND SEX OFFENDERS ON SCHOOL GROUNDS

- A. Illinois Criminal Background checks are applicable to this Contract. The Contractor or subcontractor shall only send construction workers to the site that have successfully passed an Illinois Criminal Background check, per 105 ILCS 5/10-21.9 and 105 ILCS 5/14-7.02
- B. The Contractor shall provide:
 1. Prior to start of work; maintain a list available to the Owner of all the employees who will be or are anticipated will be employed on site. This list shall be updated when new persons not originally listed will be working on site. This list shall also include names of personnel employed by subcontractors.
 - a. Contractor insures that all persons have had background check paperwork initiated and sent to: Ann Fair, Unit 5 Maintenance Office, 1999 Eagle Road, Normal, IL 61761: Tel: 309-557-4100 or Fax: 309-557-4537.
 2. Persons temporarily on site such as truck drivers or employees making deliveries do not need to be listed, but the Owner reserves the right to request a background check.
 3. Provide an affidavit to the Owner that the Contractor or his subcontractor has performed an ISP background check by name on all personnel on site.
 4. Copies of employee lists and affidavits shall be promptly provided to the owner upon request.
- C. The Contractor shall not knowingly employ on school grounds any person who has not signed or will not sign an authorization for a criminal background check.
- D. The Owner reserves the right to run fingerprint background checks on any or all employees on site, randomly or specifically, and the cost of this check will be borne by the Owner. Upon request, provide information, which will not be shared, as needed to complete checks. This may include SSN, home addresses, fingerprint, address, etc. and any alias or former names used.
- E. The Contractor shall assume the responsibility to notify all on site employees or potential employees of this provision, and of the consequences of this provision.

1.30. SUBSTANCE ABUSE PREVENTION ACT ON PUBLIC WORKS PROJECTS

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

1.31. PROJECT ACCESS: The Contractor shall be aware that the Town of Normal, respectively, has authority over various approach roads for site access and the Contractor is responsible to observe load limits and arrange for any exceptions to load restrictions that may be required for this project. Arrangements for road cleanup, barricades and surface patches and repairs shall comply with city requirements.

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

- A. During the Performance of this Contract, the Contractor agrees as follows:
 - 1. The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, age or national origin. The Contractor will take affirmative action to ensure that all applicants are considered and that employees are treated, during employment, without regard to their race, color, religion, sex, age or national origin."

1.33. SALES TAX

- A. Materials supplied to a public school district are exempt from state sales taxes.
 - 1. Sales tax exemption number for Unit District No. 5 is: E9994-9091-07.
- B. The Contractor shall determine the extent of exemption and shall comply with the regulations established by the Illinois Department of Revenue and allow for this in his proposal.

1.34. BUILDING PERMITS

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

1.35. **PREVAILING WAGE:** The Contractor shall pay and shall require his subcontractors to pay the prevailing hourly wages for the type of work performed in the job locality as is determined by the Illinois Department of Labor pursuant to the Illinois Prevailing Wage (820 ILCS 130/.01 et. seq.) see section 00045. **Provide Certified Payroll data per Dept. of Labor and HB 188.**

1.36. **ILLINOIS STEEL PROCUREMENT ACT 30 ILCS 565/1**
The Contractor is to be aware that a point of origin certification to show compliance with 30 ILCS 565/1 may be requested for any steel fabricated item and shall demonstrate compliance with the law.

A. Exemptions:

1. Products costing less than \$500
2. Products not produced in the United States in sufficient quantity to meet schedules
3. Products purchased or produced in the United States would increase purchase cost by more than 10%

CONTRACT CHECKLIST

1.37. Proposal:

- A. Proposal Form properly filled out and signed, (live signatures)
- B. Bid Bond/Bid Security for 5% of base bid amount (live signatures)
- C. Return of documents within ten (10) working days after bid due date

1.38. Letter of Intent:

- A. Proposal & Contract Form prepared by the Architect
- B. Labor and Material Payment Bond, two copies (15 days after Award)
- C. Performance Bond, two copies (15 days after Award)
- D. Insurance Certificates, liability and hold harmless, 2 copies (7 days after Award) *
- E. Master Cost Breakdown (7 days after Award)
- F. Bar Graph Progress Schedule, copies as required (7 days after Award)
- G. Supplier List, 2 copies (7 days after Award)
- H. Subcontractors List, 2 copies (7 days after Award)

1.39. Periodic Application for Payment:

- A. Submit per the monthly scheduling, to be determined
- B. Application and Certificate for Payment, 3 copies (AIA G702A)
- C. Contractor's Affidavit, 2 copies (AIA G706)
- D. Breakdown Estimate, 3 copies
- E. Partial Waivers of Lien, 2 copies
- F. Partial Waiver of Lien from Subcontractors/Suppliers, 2 copies
- G. Updated Progress Schedule, resubmit with each pay request
- H. Contractor's payroll information per HB 188.
- I. Insurance Certificate covering materials stored off site, 2 copies

1.40. Final Application for Payment:

- A. Letter to Architect that deficiency work is complete
- B. Final Lien Waiver from the Contractor, 2 copies
- C. Final Lien Waivers from Subcontractors/Suppliers, 2 copies
- D. Final Affidavit showing \$0.00 due to Subcontractors and \$0.00 due to Suppliers, 2 copies
- E. Final Payment Approval Letter from Bonding Co., 2 copies
- F. Certification of all guarantees, 2 copies
- G. Final Application & Certificate for Payment, 3 copies (AIA G702A)
- H. Additional certifications as may be requested, 2 copies
- I. Operating manuals & instructions, 3 copies-indexed and bound

*THE OWNER AND THE ARCHITECT/ENGINEER MUST BE NAMED ADDED INSURED AND MUST BE SO LISTED ON THE CERTIFICATE OF INSURANCE.

END 00040

DIVISION 0 - BIDDING & CONTRACT REQUIREMENTS
Section 00045 – Prevailing Wage

1. GENERAL

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

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

END 00045

DIVISION 0 - BIDDING & CONTRACT REQUIREMENTS

Section 00050 - General Conditions of the Contract

1. GENERAL

- 1.1. The General Conditions of these Contract Documents are included herein by reference: AIA Document A201, 1997 Edition.
- 1.2. Copies are available for inspection and review from the Architect and will be made available upon request. Copies that are checked out of the Architect's office shall be recorded as an attachment to the documents and shall be subject to return in usable condition along with the Drawings and Specifications Booklets.
- 1.3. See Section 00800 Supplementary General Conditions.

END 00050

DIVISION 0 – BIDDING & CONTRACT REQUIREMENTS
Section 00300 – Proposal Form

1. GENERAL

1.1. WORK INCLUDES

- A. All work included on the Drawings and Specifications for Project No. 23412117 – Colene Hoose Elementary BEST Program Addition.
- B. Contractor submit bid on the following pages: 00300-2 and 00300-3.

1.2. **Add \$24,000 to Base Bid as an allowance for unforeseen conditions.**

- A. **Unused portion of allowance will be returned to Owner at the conclusion of the work, via Change Order.**

00300 PROCUREMENT FORMS

Section 00300 -Proposal Form

Bid form may be copied, original signatures are required

PROJECT TITLE: McLean County Unit District No. 5, Colene Hoose Elementary BEST Program Addition

DATE OF PROPOSAL: Friday, July 6, 2018 TIME: 11:00 a.m. Prevailing

LOCATION OF BID: McLean County Unit District No. 5 Warehouse
Attn: Doug Johnson
1999 Eagle Rd.
Normal, Illinois 61761

NAME OF FIRM: _____

PROPOSAL FOR: All work single contract

A/E PROJECT NO. 23412117

THE BID ACKNOWLEDGES THE FOLLOWING ADDENDA:
Failure to acknowledge may cause bid rejection

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

EACH BID SHALL INCLUDE:

- A. The bid forms and certifications completed and signed, (this form may be copied.)
B. Bid security (bid bond) (standard industry forms may be employed)
C. BIDS SHALL INCLUDE \$24,000.00 ALLOWANCE - See 00040 (1.21 Allowance)
D. Include in Bid 48 hrs. work time from Start through August 14, 2018 to complete the required work prior to August 15, 2018. Regular work hours August 15, 2018 through December 31, 2018. See 00040 Paragraph 1.20 Scheduling.

BASE BID: McLean County Unit District No. 5
Colene Hoose Elementary BEST Program Addition

The bidder agrees to perform all base bid work, inclusive of all trades for the sum of:

_____ Dollars
BASE BID WRITTEN AMOUNT

\$ _____
Base Bid Numerical Amount

ALTERNATE BID(S) Alternate 1 is proposed for this work.

ALTERNATE 1. Wall Padding Rooms 50A, 50B & 50C

General Contractor: If you receive a bid from both companies specified, please list both prices on this Bid Form.

No. 1 ADD/DEDUCT \$ _____ from _____
No. 2 ADD/DEDUCT \$ _____ from _____

VOLUNTARY ALTERNATES OR SUBSTITUTIONS

Did you offer or include voluntary alternates or product substitution on form provided.

YES _____ NO _____

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

THE BIDDER AGREES TO:

1. Hold this bid open for twenty (10) calendar days after bid opening date.
2. Enter into and execute a contract with McLean County Unit District No. 5 if awarded this contract.
3. Comply with the contract and bidding documents with respect to bid security, all bonds, insurance, work requirements, schedule and Bonus / Penalty Clause
4. Comply with the Contract Documents with respect to scheduling as described in the documents, noted on drawings.

THE BIDDER MAKES THE FOLLOWING REPRESENTATIONS AND CERTIFICATIONS:

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

CONTRACTOR:

Firm Name: _____

Address: _____

Telephone: _____

FAX: _____

Email: _____

Date: _____

SIGNATURE:

Title: _____

For Corporations Only

SUBCONTRACTOR: Proposed for work on this project.

HVAC: _____

PLUMBING: _____

ELECTRICAL: _____

CONCRETE: _____

MASONRY: _____

END 00300

00 4000 PROCUREMENT FORMS
Section 00 4010 - Voluntary Alternate and Substitution Form

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

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

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

SUBSTITUTIONS

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

VOLUNTARY ALTERNATE

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

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

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

Provide detailed information promptly upon request.

END 00 4010

DIVISION 00 – PROCUREMENT REQUIREMENTS
Section 00 70 00 – General and Supplementary Conditions

1. GENERAL

1.1. GENERAL CONDITIONS

- A. The conditions outlined in this and following paragraphs are to supplement and complement the conditions found in the articles of the AIA Document A201, 2007 Edition.
 - 1. Included in these Specifications by reference is AIA Document A201 General Conditions.
- B. AIA Document A201, 2007 Edition, can be purchased directly on line from a variety of vendors including the AIA and are available in electronic format as well as printed.
 - 1. AIA A201 2007 version can be reviewed at the Architects office without charge.
- C. To the page one of the AIA A201 General conditions Document:
 - 1. Project: Colene Hoose Elementary BEST Program Addition
 - 2. The Owner: McLean County Unit District No. 5, 1809 Hovey Ave., Normal, IL 61761
 - 3. The Architect: Middleton Associates Incorporated, 1702 W. College Ave., Suite E, Normal, IL 61761

1.2. SIGNING OF DOCUMENTS AND INSTRUMENTS OF THE CONTRACT

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

2. SUPPLEMENTARY GENERAL CONDITIONS

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

- A. The following sections represent modifications or additions to the AIA A201 -2007 Document.
- B. TO ARTICLE 2/OWNER
 - 1. Add Subparagraph 2.2.2.1 Easements off site required by the Contractor to execute the work, such as space for storage, access, scaffolding, lane enclosure, etc., shall be arranged for by the Contractor and included in the contract amount.

C. TO ARTICLE 3 CONTRACTOR

1. To Subparagraph 3.3.1, delete the last two (2) sentences listed under 3.3.1 in their entirety.
2. To Subparagraph 3.3.1 insert: If the Contractor determines that such means, methods, techniques, sequences or proceedings may not be safe, or may not be appropriate to the equipment and task as becomes apparent, then said Contractor shall have included in his proposal amount allowance to complete this work per a revised plan for which he can assume responsibility and shall notify the Owner and Architect before proceeding. In no case do the Owner and Architect take responsibility for directing Contractor Operations.
3. To Subparagraph 3.12
 - a. Add 3.12.6.1 Submittals unmarked will not be reviewed at the Architect's option. Said unmarked submittals may be returned to the Contractor for re-submittal and the time loss shall not extend the time of completion of the project.
 - b. Add 3.12.6.2 Submittals reviewed by the A/E and returned or held as a record copy presume the Contractor responsibilities in paragraph 3.12.6 have been included whether noted or not.

D. TO ARTICLE 5 SUBCONTRACTORS

1. To Subparagraph 5.2
 - a. Add 5.2.5 The assignment of work or a portion of the work by the Contractor to Subcontractor(s) is the election of the Contractor and in no way changes or reduces the Contractor's obligations under the Contract to properly complete the work and/or provide clear title to the work, including the work by said Subcontractor(s).

E. TO ARTICLE 7 CHANGES IN THE WORK

1. To Subparagraph 7.1.2
 - a. Add 7.1.2.1 The Contractor and/or his Subcontractor shall not proceed with any work, directive or change for which he intends to claim extra cost without providing written notice to the Architect.
 - b. Add 7.1.2.2 The Architect and Owner shall provide response to claims for additional cost within a reasonable time period upon receipt of notice or quote.
 - c. Add 7.1.2.3 Work for which an agreement cannot be reached prior to implementation can proceed as time and material work with all parties to agree on what is additional

work over that which should have been included to complete the work as originally intended.

2. To Subparagraph 7.2.2

- a. Add 7.2.2.1 Change Order quotes shall be based on an approved quote or estimate which shall be based on labor and material cost, actual or estimated as prior agreed upon, and:
- b. Add 7.2.2.2 Overhead and profit may be charged proportional to this category of work on the Contractor's CSV or not to exceed the greater of:
 - 1) Eighteen percent (18%) for the Contractor's own work forces
 - 2) Ten percent (10%) Subcontractor plus ten percent (10%) Contractor, for twenty percent (20%) total for work completed under a Subcontractor arrangement.
 - 3) These allowances shall include all off site and indirect costs, including insurance, project management, bonds and profit.

F. TO ARTICLE 9 PAYMENT AND COMPLETION

1. To Subparagraph 9.6.1

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

G. TO ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

1. To Subparagraph 10.2.1

- a. Add 10.2.1.4 The Contractor shall be responsible to provide and maintain on site MSDS Sheets for all required materials to be brought on site.
 - 1) These sheets shall be readily available upon request to the owner on remodeling renovation projects which are Owner occupied.
 - 2) Comply with VOC regulations.
 - 3) Comply with IEPA regulations.

2. To Subparagraph 10.2.3
 - a. Add 10.2.3.1 Provide for the general safety of public and Owners employees, such safety provision shall be adjusted as appropriate to the age and volume of public anticipated in the project vicinity.
 - b. Add 10.2.3.1 Provide for traffic safety as appropriate to the operations; cooperate with the governing authorities on road activities, lane closures, excavations, surface cleaning etc.

H. TO ARTICLE 11 INSURANCE & BONDS

1. To Subparagraph 11.1.2
 - a. Add 11.1.2.1 Minimum Limits of Liability for preceding coverage are:
 - 1) Workers Compensation - Statutory Limit
 - 2) Applicable Federal (*such as Longshoreman's*) Statutory limits.
 - 3) Liability Insurance may be written as Comprehensive General Liability policy form or Commercial General Liability policy form with the following coverages:
 - a) Bodily Injury - \$1,000,000 each occurrence, \$2,000,000 aggregate
 - b) Property Damage - \$1,000,000 each occurrence, \$5,000,000 aggregate.
 - c) Property Damage – Broad Form - \$1,000,000 each occurrence, \$2,000,000 aggregate.
 - d) Personal injury (*with employment clause deleted*) \$1,000,000 aggregate.
 - e) Products and completed operations \$1,000,000 to be maintained one year following final completion.
 - f) Business Automobile Liability, (*including owned and non-owned and hired vehicles*)
 - g) Bodily Injury and Property damage \$1,000,000 each person, \$1,000,000 each occurrence.
 - 4) Umbrella Insurance \$10,000,000 over primary insurance limits.
 - 5) \$10,000 Retention for self insured hazards each occurrence
 - 6) In the event that a claim is filed or a settlement reached whether related to this project or not which compromises the aggregate limits of liability then the Owner and Architect shall be notified and

arrangements shall be made to provide additional insurance as needed to keep aggregate limits in force for the remainder of the Contract.

2. To Subparagraph 11.1.4
 - a. Add 11.1.4.1 The Owner, Architect, and Consulting Engineers including their employees and representatives shall be included as Additional Insureds or Named Insureds on the insurance and shall be shown as such on the Certificate.
3. To Article 11
 - a. Add 11.1.5 Contractor's insurance shall be maintained in force through basic warranty and guarantee periods, not less than one (1) year following Final Completion.
4. To 11.3. Property Insurance
 - a. Add 11.3.1.1 The Owner's property and vandalism insurance has \$1,000 deductible. The Contractor shall insure and thus pay the costs not covered by the Owner's deductibles.
 - b. Add 11.3.1.2 The Owner's Builder's Risk will cover only normally included Owner risks, on site, Owner's interest only, excluding tools and property of the Contractor and improperly stored or unsecured materials.
5. To Paragraph 11.4.1 add the following Subparagraphs:
 - a. Add 11.4.1.1 The Contractor shall furnish Performance and Labor and Material Payment Bonds covering the faithful performance by the Contractor of the work specified in accordance with the plans and specifications and according to the time and terms and Conditions of the Contract, and also that the Contractor shall properly pay all debts incurred in the prosecution of the work, including those for labor and materials furnished and including labor obligations as interpreted by the Illinois Department of Labor and/or the courts.
 - b. Add 11.4.1.2 The cost of each bond shall be included in the Contract Sum plus any changes to the Contract Sum. The Contractor shall include in all bonds provisions as will guarantee faithful performance of the prevailing wage provisions of the Contract if applicable.
 - c. Add 11.4.1.3 Bonds shall be written by surety, approved by Owner, with a minimum rating of B or better, Financial Class V, or higher, in A.M. Best's Insurance Guide, current edition. The company must also be licensed in the State of Illinois.

- d. Add 11.4.1.4 The Contractor shall require the attorney-in-fact who executes the bonds on behalf of the surety to affix thereto a certified and current copy of power-of-attorney.
- e. Add 11.4.1.5 The Contractor shall deliver the required bonds to the Owner not later than fifteen (15) days following the date the agreement is executed.

I. TO ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

1. To Subparagraph 12.2.2.1 After Substantial Completion:

- a. Add 12.2.2.1.1 Latent Defects, for a period of 10 years after Substantial Completion, upon demand by the Owner, the Contractor shall promptly repair or replace, including associated work repairs and cleanup necessary, defective or non-conforming work resulting from or constituting latent defects, fraud, fraudulent concealment or gross negligence.
- b. Add 12.2.2.1.2 Seasonal equipment such as temperature controls and building systems subject to seasonal loads such as heating equipment and air conditioning, shall be warranted to perform as intended for two years. Exception would be equipment damaged by incorrect operation or maintenance procedures, specifically covered in training, but improperly implemented by the Owner.

- a. Add 12.2.2.1.3 Prompt Repair. Upon notice from the Owner or Architect of defects or nonconforming work, the Contractor shall promptly visit the site in the company of the Owner's representative to determine the extent of all defects or nonconforming work. The Contractor shall provide all labor, material and equipment to promptly repair or replace the defective or nonconforming work. The repair shall include all adjacent work not necessarily provided by the Contractor, but damaged as a result of correcting or remedying such defects or non-conforming work. If the Contractor does not promptly pursue correction, the Owner may repair or replace such work and charge the cost to the Contractor. Work which is repaired or replaced by the Contractor shall be inspected and shall be warranted by the Contractor in accordance with this Article.

- b. Add 12.2.2.1.4 The warranties set forth herein are in addition to all warranties or guarantees expressed or implied by operation of law, statute or ordinance.

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

3. To Subparagraph 12.2.5
 - a. Add 12.2.5.1 Extended Warranties and Commercial Warranties. The Contractor shall deliver all commercial and extended warranties received from manufacturers to the A/E prior to Final Payment. Extended warranties and guarantees will be as described under the various trade work sections of these documents, and may be the responsibility of third parties to the contract such as dealers or manufacturer's from whom such extended coverage is specified or as advertised such as a commercial limited warranty of performance or service. Such extended warranties may or may not include labor unless specified, or in the case of commercially advertised warranties as offered by the party selling the product or equipment.
 - b. 12.2.5.2 Prompt Repair. Upon notice from the Owner or Architect of such defects or nonconforming work, the Contractor shall promptly visit the site in the company of the Owner's representative to determine the extent of all defects or nonconforming work. The Contractor shall provide all labor, material and equipment to promptly repair or replace the defective or nonconforming work. The repair shall include all adjacent work not necessarily provided by the Contractor, but damaged as a result of such defects or non-conforming work or as a result of remedying them. If the Contractor does not promptly repair or replace defective or non-conforming work, the Owner may repair or replace such work and charge the cost thereof to the Contractor. Work which is repaired or replaced by the Contractor shall be inspected and shall be warranted by the Contractor in accordance with this Article. The warranties set forth herein are in addition to all warranties or guarantees expressed or implied by operation of law, statute or ordinance.

B. TO ARTICLE 13 MISCELLANEOUS PROVISIONS

1. To Subparagraph 13.1
 - a. Add 13.1.1 Location of the project is Illinois.
 - b. Add 13.1.2 The Contractor shall, to the best of his knowledge and capability, perform all work encompassed by the documents, in compliance with the Environmental Barriers Act (Ill. Rev. Stat. 1985, ch. 111-1/2, pars. 3711 et seq. as amended), the Illinois Accessibility Code, 71 Illinois Administrative Code 400; The Uniform Federal Accessibilities Standards (UFAS); Section 504 of the Rehabilitation Act of 1973, and the Americans with Disabilities Act of 1990 (effective January 26, 1992) known as ADA requirements. This obligation shall apply to the contractual work described as the project and the conduct of work processes initiated to accomplish the work.

- c. Add 13.1.3 All parties to this Contract are subject to the rules and regulations of the Illinois Department of Human Rights and the statutory requirements thereof, including the requirement that every party to a public contract shall have adopted written sexual harassment policies (PA 87-1257).
 - d. Add 13.1.4 It shall be mandatory that the Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, national origin or ancestry, age, marital status, physical or mental disabilities.
 - e. Add 13.1.5 Illinois Department of Labor requirements. It shall be mandatory upon the Contractor to whom the Contract is awarded and upon any Subcontractors thereof to be in compliance with applicable wage and reporting regulations. This project is a Prevailing Wage Public Works contract.
2. To Subparagraph 13.3.
- a. Add 13.3.1 Notice served by facsimile (fax) to facsimile number used during bidding and construction shall be official written notice.
 - b. Add 13.3.2 Notice served by electronic means (email) to the electronic address used during bidding and construction shall be official written notice.
 - c. Add 13.3.3 The Bidder shall notify the Architect and/or the Owner at any time of changes in the facsimile or electronic contact addresses that will reach the contractor. Failure to so notify is the Contractors responsibility.

C. TO ARTICLE 15 CLAIMS AND DISPUTES

- 1. To Subparagraph 15.3.1 Delete the word 'SHALL' and Insert the word 'MAY'.
 - a. Add 15.3.1.1 Mediation may be employed to resolve disputes if agreed to by both parties to the Contract.
- 2. To Subparagraph 15.4.1 Delete the word Shall and insert the word 'MAY'.
 - a. Add15.4.1.1 Arbitration may be employed to resolve disputes if agreed to by both parties to the Contract.

End 00800

DIVISION 0 - BIDDING & CONTRACT REQUIREMENTS
Section 00860 - Drawings Index

1. GENERAL

1.1. SCHEDULE OF DRAWINGS -- Colene Hoose Elementary BEST Program Addition, PROJECT NO. 23412117.

<u>SHEET</u>	<u>TITLE</u>
T-1.0	TITLE SHEET – JOB INFORMATION – JOB LOCATION
C-1.0	DEMO / SITE DEMO PLAN
C-1.1	BUS LANE TOPO PLAN AND DETAILS
D-1.0	DEMO PLAN
S-1.0	STRUCTURAL PLAN, DETAIL AND SCHEDULES
S-1.1	STRUCTURAL DETAILS AND SCHEDULES
A-1.0	FLOOR PLAN
A-2.0	ELEVATIONS
A-3.0	SECTIONS
A-7.0	REFLECTED CEILING PLAN
R-1.0	ROOF PLAN AND DETAILS
M-1.1	PARTIAL HVAC DEMO FLOOR PLAN
M-1.2	PARTIAL HVAC RENOVATION FLOOR PLAN
M-1.3	PARTIAL HVAC PIPING RENOVATION FLOOR PLAN
M-2.1	PARTIAL PLUMBING DEMO FLOOR PLAN
M-2.2	PARTIAL PLUMBING RENOVATION FLOOR PLAN
M-3.1	SINGLE PIPE LOOP – SCHEMATIC DIAGRAM
M-3.2	HVAC DETAILS
M-4.1	HVAC SCHEDULES
E-1.1	PARTIAL LIGHTING DEMO FLOOR PLAN
E-1.2	PARTIAL LIGHTING RENOVATION FLOOR PLAN
E-2.1	PARTIAL POWER DEMO FLOOR PLAN
E-2.2	PARTIAL POWER RENOVATION FLOOR PLAN
E-3.1	ELECTRIC SCHEDULE

END 00860

DIVISION 1 – GENERAL REQUIREMENTS
Section 01010 – Project Summary

DIVISION 0 and DIVISION 1 are hereby made a part of each division and section of the project specifications as related items specified elsewhere.

1. GENERAL

1.1. REQUIREMENTS INCLUDE

- A. Base Bid – Colene Hoose Elementary BEST Program Addition, Project No. 23412117
 - 1. Remodel the present Room 50 into a Corridor, three Calming Rooms, and one Mechanical Closet. Provide appropriate demolition.
 - 2. Remove existing windows in Rooms 48, 49, 50 and 52 to reinstall in classrooms 54, 55, 56, and 57.
 - 3. Provide Material and Labor to construct Rooms 51, 52.2, 53, 54, 55, 56, 57, 58 and Corridor 58.1 and 58.2.
 - 4. New Calming Rooms (3) and new Restroom, and new Commons Room shall have floor drain. Slope to drain not required.

1.2. PRODUCTS FURNISHED BY OTHERS: All products, components, spaces, and equipment furnished by the Owner or by other Contractors are a part of this total project. so that work involving placing Classroom furnishings can be completed.

- A. Contractor's Incidental Duties
 - 1. Designate specific delivery date for each product in approved construction schedule. **After July 30, 2018, material must be stored in trailers on site.**
 - 2. Promptly inspect delivered products, report damaged or defective items.
 - 3. Handle at site, including unloading, uncrating, and storage.
 - 4. Protect material from exposure to elements and damage.
 - 5. Repair or replace items damaged as result of Contractor's operations.
 - 6. Install, connect and finish products in system assembly ready to function, including incidental related work.

1.3. WORK SEQUENCE

- A. See Section 01031.
- B. Coordinate the work schedule with the District Maintenance Supervisor, Doug Johnson, 309/275-1153.

1.4. CONTRACTOR USE OF PREMISES

- A. Confine operations at site to areas permitted by:

1. Law
 2. Contract
 3. The Owner's Representative, per 1.3.B. above.
- B. Do not unreasonably encumber site with materials or equipment. Do not block the Owner's pedestrian traffic patterns except as prior arranged with the Owner's approval.
- C. Do not load structure, or components thereof, with weight that will endanger or damage structure.
- D. Assume full responsibility for protection and safekeeping of products stored on premises.
- E. Move and relocate as necessary all stored products or equipment that interferes with operations of the Owner.
- F. Obtain and pay for use of additional off site storage or work area needed for operations.
- G. Limited use of site for work and storage
1. All vehicular on site activity shall have been prearranged and approved by the Owner.
- H. Cooperate with the Owner's use of the premises and other Contractors providing work on site under separate Contracts with the Owner.

1.5. CONTINUOUS OCCUPANCY BY OWNER

- A. Owner will occupy areas for general maintenance during construction.
- B. Contractors shall provide
1. Access by Owner's personnel and pupils when applicable.
 2. Operation of Mechanical and Electrical systems with a minimum of down time. **Turn off Bard HVAC Units in rooms being worked on and put Visqueen and tape over grilles to prevent dust migration.**
 3. Operation of exhaust systems with a minimum of down time.
 4. Adequate security of the premises in which work is in progress.
- C. Upon (after) the work being completed and accepted by Owner, the Owner shall provide:
1. Custodial services
 2. Security
 3. General custodial maintenance

1.6. ASBESTOS

- A. The contractor shall perform his own examination of the buildings of

concern on the project prior to bidding and be responsible for the determination of the existence or nonexistence of suspect asbestos in a state that is likely to be interrupted or become hazardous to the health of the Contractor, his employees, his subcontractors and their employees.

1. ACM is believed to be limited to flooring material. Rooms with 9" X 9" floor tile are ACM; this includes the floors in Rooms 48, 49, 50 and 52. Room 50 will have ACM floor removed by July 12, 2018.
2. It is not likely that floor tile will need to be removed to execute this work.

B. The Contractor may deem it advisable to contact the Office of Superintendent of Schools and request access to the Asbestos Management Survey applicable to the building pursuant to Section 855.30 (including updated amendments thereto) of AN ACT KNOWN AS THE ASBESTOS ABATEMENT ACT: P.A. 83-1325, approved and eff. Sept. 5, 1984, amended by P.A. 84-0951, approved and eff. Sept. 20, 1985, and amended by P.A. 84-1096, approved eff. Dec. 9, 1985, amended by P.A. 84-1245, approved and eff. July 29, 1986, amended by P.A. 84-1346, and approved and eff. Sept. 10, 1986, inclusive of such amendments and regulations applicable since 1986.

1. Upon determination prior to bidding, or after bidding discovery by the Contractor that an asbestos hazardous condition does exist in the path of execution of the work of his Contract, he shall so notify the Owner immediately.
2. Pursuant to Item 1.6.B.1 above, the Owner (McLean County Unit District No. 5, Normal, IL) may implement the following action:
 - a. Eliminating that portion of the work by revision and change order to these documents.
 - b. Institute removal or acceptance encapsulation.
3. Wherein concealed asbestos is discovered, the Contractor shall notify the Owner of the existence of said apparent asbestos which may require analysis for hazardous determination. This notification shall be IN WRITING at no cost to the Owner. Should analysis indicate that hazardous substance does prevail, the procedure shall be set forth under Item 1.6.B.2. above.

1.7. COORDINATION AND COOPERATION

- A. It is the intent and purpose of the Owner to cooperate with the Contractor to the extent feasible under existing applicable laws and regulations and the Owner and the Contractor alike shall not construe this portion of the documents, that is, Section Paragraph 1.6.A, and B to the disadvantage of the other.
- B. Should the bidding Contractor not understand the foregoing, he shall notify the Architect/Engineer for clarification prior to bidding in accordance with Section 00040, Paragraph 1.3., 1.4., and 1.15.

- C. This Contractor shall cooperate with other Contractors and their Subcontractors working on site duly employed by the Owner to perform service related and unrelated to work outlined by these Documents.
 - 1. Interior renovation work will be underway in other parts of this building. Contractor for that work is SCI General Contractors, phone 309/473-3926.

1.8. FITTING AND FINISHING THE WORK

- A. Contractor shall verify all field conditions, dimensions, elevations that relate to the work and properly accommodate these in the work as appropriate to the intended result within the Contract amount.
 - 1. In place construction, obstacles and site conditions and elements which can be seen and reasonably inferred.
 - 2. New construction, obstacles and conditions that can be seen or are to occur in the completion of the work.
 - 3. Allow to fit structural elements and all equipment as occur or will occur during the implementation of the Contract.
 - 4. Make adjustments as needed to fit and properly complete the work. This includes coordination of work by all trades.
- B. Contractor and his Subcontractors shall coordinate, accommodate, adjust and fit as appropriate all work to achieve the intended finished intent to normal commercial industry standards.
 - 1. Provide finishing elements, trim, sealants, scribes, receivers and accessories necessary and normal to the installations proposed and as recommended by manufacturers for proper use of products.
 - 2. All construction (all trades) to be weather and infiltration tight. Include appropriate weather seals, infiltration barriers, sealants, non-corrosive flashings and sealants to properly complete the intent of the project.

END 01010

DIVISION 1 - GENERAL REQUIREMENTS
Section 01030 - Alternates

1. GENERAL

1.1. DESCRIPTION

- A. The alternates are to provide the Owner with optional systems and comparative material prices for determining the most advantageous construction package.
- B. Work included in alternates shall be commensurate with and in compliance with all the applicable project specifications and conditions and shall include all necessary related project adjustments and additional labor and/or material as may become apparent to complete the alternative work. No additional charge will be considered after bidding for the purposes of making additional construction or adjustments in order to accomplish alternative work which has been included in the Contract.
- C. All Base Bid requirements and material specifications not specifically mentioned or deleted by the alternate shall remain as originally set forth.
- D. All Contract Document requirements shall apply to alternates.
- E. Incidental Work: All necessary adjustment in the work shall be made to accommodate accepted alternates without cost change in and above the alternate cost.

1.2. ALTERNATE BIDS

- A. Provide Alternate Bid for work described in Section 11190 as Alternate Bid, due to the 30 day cure time.

END 01030

1. GENERAL

1.1. DESCRIPTION OF DRAWINGS AND LAYOUT

- A. Drawing data is intended to be reasonably accurate, however, strict accuracy in detail is not guaranteed. The Contractor must verify all of the conditions, measurements, dimensions, rough-in requirements, piping, conduit, wiring, duct work requirements and coordination necessary for each item or piece of equipment in the Contract Documents. Verification is the Contractor's responsibility and shall be completed prior to the fabrication or installation processes. All corrections necessary to provide properly installed, finished and operable system, in accordance with the intent of the Documents, shall be made at no cost beyond the contract agreement.
- B. All measurements and conditions must be verified by actual observation at the building and the Contractor shall be responsible for all of his work fitting into place in a satisfactory and workmanlike manner in every aspect and detail subject to the approval of the Architect. The Contractor shall provide layout work and verification measurement at his own cost.
- C. Before starting his work the Contractor shall examine all Contract Area Drawings and Specifications and if any discrepancies occur, he shall report same to the Architect and obtain instructions for interpretation of the work. The Contractor shall perform all layout work pursuant to site, building, grades and levels, and furnish such engineering services as he may require to execute the intent of the work included.
- D. The Drawings are instructive and diagrammatic and shall be followed as closely as actual construction will permit. All changes from Drawings necessary to make the work of the Contractor conform to the documents shall be done at no added cost charge to the Owner above the amount shown on the Owner/Contractor Agreement, unless unforeseen conditions are discovered.

1.2. CONSTRUCTION OPERATIONS

- A. Care shall be taken that completed structures are not overloaded during Contractor operations and the Contractor shall promptly remove all materials, which, in his opinion, may overload any part of the work. It shall not be the Owner or Architect/Engineer's responsibility to observe and check construction processes and temporary loading conditions that this Contractor may implement as director of his operations.
- B. Structural design, unless noted otherwise, is designed to accommodate design loads, per code, after all bracing and construction is in place.
 - 1. Temporary bracing and shoring for erection loads is the responsibility of the Contractor.

2. Bracing and shoring for loading prior to the installation of lateral support and diaphragm assemblies is the responsibility of the Contractor.
- C. All structural damage done by overloading the system shall be repaired by the Contractor overloading the system.
- D. The Architect/Engineer shall have no authority over the means, methods and procedures of the work and shall make no determination pursuant thereto nor render opinions concerning same.
 1. The Architect's Field Representative does not have authority to render opinions on structural questions.
- E. The Architect/Engineer and members of his staff shall have no authority over safety conditions related to the work and shall provide no observation of same, and make no comment regarding same.
 1. The contractor shall designate an employee of the contractor as the person in charge of and responsible for safety procedures on site.

1.3. PROTECTION OF WORK AND BUILDING

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

1.4. MOVING OF MATERIAL

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

1.5. SHORING, BRACING, AND BARRICADES

- A. The Contractor shall provide, construct and finally remove all temporary shoring, bracing, underpinning, scaffolding, needling, barricades, etc. as required by local restrictions and as necessary for general safety to protect all property and persons from damage or injury. The Contractor shall determine the need for these items and shall be fully responsible for the performance or failure of them and shall make good damages caused by failure or absence of same.
- B. Specific temporary shoring, supports, etc., called for elsewhere in the Documents shall be considered a minimum but shall not override Contractor's responsibility to provide adequate shoring, if actual construction conditions and processes so dictate.

1.6. MATERIALS, WORKMANSHIP, AND LABOR

- A. All installed materials and equipment shall be new and shall be installed and completed in a first class, workmanlike manner.
- B. The Architect reserves the right to direct the removal and the replacement of any item which, in his opinion, does not present a proper, orderly or reasonably neat installation. Such removal and replacement shall be done promptly when directed by the Architect or the Owner. All installations will be subject to the Architect and Owner's inspections, tests, and approval at all times from commencement of the work to Final Acceptance of the completed Contract.
- C. Work needing correction or replacement that is not corrected with reasonable promptness shall be subject to written notice thereof by the Architect. The Contractor by virtue of having tendered his bid for the work, agrees that progress payments by the Owner may be held (no payment made) until said faults have been corrected.

1.7. CLEANING UP

- A. All surfaces shall be cleaned of any paint, plaster, mortar, gook and other stains. Care shall be taken that no surface is scratched, marred or damaged in cleaning.
- B. Damaged, marred or scratched surfaces of any type shall be made right, sanded smooth (to bright metal for metal surfaces) and primed and painted as directed or replaced if necessary to provide a final installation acceptable to the Architect.

1.8. OPENINGS IN CONSTRUCTION

- A. Openings required for construction work shall be provided by the Contractor, complete with all necessary reinforcing, lintels, trim, finishing, etc. as shall become applicable including openings required for electrical and mechanical work.
- B. Concrete slabs, joists, concrete floors, finished floors, walls and structural elements, and other structural items shall not be cut or disturbed, except as approved by the Architect IN WRITING. The Contractor shall be held responsible for and correct any such damage that he may cause.
- C. Pipes passing through floors or partitions shall have sufficient clearance around pipes to prevent damage to the adjacent finish from expansion and contraction. All sleeves, flanges and forms, etc., shall be furnished by the Contractor requiring the opening.
 - 1. A Contractor or Subcontractor penetrating a wall, floor or ceiling surface shall provide sleeves, flanges and trim to provide a finished installation.

1.9. SUPPORTS

- A. The Contractor shall provide all concrete, steel bases and anchorage except as herein specified otherwise: vibration-absorbing foundation bases, hangers, platforms, anchor bolts, etc. for all equipment which he furnishes. These foundations shall be as specified under their respective headings or shown on the drawings and/or as recommended by Equipment Manufacturer.
- B. Materials and installation requirements for curbs and pads shall be commensurate with the need. Concrete shall be 4,000 PSI minimum strength, installed at a slump not exceeding six inches (6"). Concrete shall not be retempered sixty (60) minutes after that time at which water was first added to the mix. Air entrainment additives shall be employed to provide a seven percent (7%) by volume air content at time of placement.

1.10. PROTECTION OF WORK

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

1.11. MOVING OF MATERIALS

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

1.12. ELECTRICAL SERVICES TO EQUIPMENT

- A. Unless otherwise specified (see 01010 Summary of Work) the Contractor shall furnish and install electrical feeders of proper size, and furnish, install and complete all power wiring and the control wiring for each motor, electrified signage and/or piece of equipment affected by the Contract.
- B. All such electrical procedures (temporary and permanent) shall comply with the National Electric Code, whether temporary or permanent.
- C. The Contractor shall extend or install temporary electrical service for his use during construction or he shall provide his own portable generator at his own expense. Wherein the Owner's electrical services are used, extended or tapped, the current consumed shall be at the Owner's expense provided same is metered through the Owner's meter.

1.13. SEALANTS

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

- B. Sealants shall be provided in locations as directed by the Architect, where equipment components or fixtures fit to surrounds, and when cracks between equipment and surrounds are undesirable or excessive. Provide sealants in all interior locations, as necessary to properly trim out.
- C. Sealants shall be installed and tooled in strict accordance with the Sealant Manufacturer's recommendations for joint preparation, using foam rope backer bars, etc. Sealant shall be installed by the respective Contractor providing the item requiring sealant installation.
- D. See the Sealant Specification Section 07900 or consult the Architect for the type of sealant materials to be employed.

1.14. PAINTING

- A. All exposed surfaces or equipment reworked and installations leaving damaged or unfinished surfaces shall be painted or have a corrosion resistant factory-applied coating or finish.
 - 1. Aluminum and stainless steel shall not require painting.
- B. Field paint unfinished equipment and surfaces for corrosion protection and visual appearance, except where clearly stated to the contrary on the Drawings.
- C. The Contractor shall paint specific components indicated in the contract documents.
 - 1. See drawing notes and these specifications Section 09900.

1.15. ALIGNMENT

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

END 01040

1. GENERAL

1.1. REQUIREMENTS INCLUDE

- A. The Contractor shall coordinate work assigned under his Contract with the work of each and every other Contractor, Assigned Contractor and their Subcontractors as Contracted by the Owner to complete work related to the project or adjacent projects on the same site.
- B. The Contractor shall enforce predetermined on site lines of authority and communication and attend coordination meetings if required by:
 - 1. Contractor and Subcontractors
 - 2. Architect/Engineer
 - 3. Consultants
 - 4. Owner
 - 5. Town of Normal
 - 6. Regional Superintendent of Schools

1.2. RELATED WORK

- A. Specified elsewhere

- 1. DIVISION 0 – BIDDING & CONTRACT REQUIREMENTS

1.3. JOB CONDITIONS

- A. Construction Schedules – see Section 01310.
 - 1. Develop and maintain project schedules.
 - 2. Monitor schedules as work progresses.
 - 3. Identify potential variance between schedules and probable completion dates.
 - a. Report to Architect/Engineer adjustments in schedule to meet completion targets.
 - b. Provide summary reports of each monitoring.
 - c. Document all changes in schedule.
 - 4. Verify that product deliveries are adequate to maintain the project schedule.
 - 5. Report conditions that will adversely affect critical items on schedule to Architect/Engineer with recommendations for corrective action.
 - 6. Monitor operations that may cause damage to in place construction or equipment.
- B. Temporary Utilities
 - 1. Verify that adequate services are provided to comply with requirements of work and climatic conditions.

2. Verify proper operation and maintenance of temporary utility extensions.
 3. Administer traffic and parking controls.
- C. Payments: Coordinate and send monthly pay request to Architect/Engineer's office.
- D. Changes Requested
1. If the need arises, and the Architect and the Owner concur, submit change requests to the Architect/ Engineer with recommendation.
 2. Enforce adherence and coordinate all modifications in Contract Documents.
 3. Assist Architect/Engineer in negotiating proposals for change by furnishing complete and accurate cost of change breakdown.
- E. Permits and Fees
1. Obtain approvals from all authorities having jurisdiction.
 2. Permits shall be obtained, however, pursuant fees shall be waived except where a service is to be furnished by the government entity.
- F. Inspections by Contractor
1. Inspect work to assure that work is performed in accord with Contract requirements.
 2. Reject or stop portions of the work that are not in accord with Contract requirements.
- G. Interpretations of the Contract
1. Consult with Architect/Engineer to obtain interpretations.
 2. Assist in resolution of questions that may arise.
- H. Administer coordination and processing of shop drawings, product data, samples and maintenance brochures.
- I. The Contractor shall monitor his work, dispose of boxes and waste and keep the premises clean and safe during the progress of work and at completion of the Contract.
- J. Substantial Completion
1. Upon completion of any group of Classrooms, a Substantial Completion letter will be issued for that portion of the work.
 2. Upon Architect/Engineer's certification of date of the substantial completion, coordinate the correction and final completion of this work.

K. Final Completion

1. When Contractor determines work is complete, submit written notice to the Architect/Engineer that work is ready for final inspection.
2. Secure and transmit to the Architect/Engineer the required closeout submittals, including, but not limited to,
 - a. Final Waiver of Lien post-dated final pay request date.
 - b. Contractor's Affidavit declaring no financial obligation for materials and labor shall fall due pursuant to the project.
 - c. Submitting of a letter from the Bonding Company stating approval of final payment by the Owner to the Contractor.

1.4. CONTRACTOR'S PAYMENT PROCEDURE

- A. Payment to the Contractor will be made bi-monthly in accordance with the progress of the work and the terms of the Contract Documents.
- B. The amount of payment to be made will be determined by progress of the work and value of materials properly stored and shall be acceptable in the Architect/Engineer's opinion.
 1. A 10% retainage on the amount earned and/or materials stored shall be standard procedure.
 2. See Section 00040/1.19 "PROGRESS PAYMENTS" for exceptions to the 10% standard retainage.
- C. Prior to commencement of the work Contractor must comply with requirements of the Contract Documents and submit the following to the Architect/Engineer for approval:
 1. The Construction Schedule in bar-graph chart, including schedule of submittals for shop drawings and samples. See Section 01340.
 2. Schedule of project values in detailed breakdown format. See Section 01370.
 3. The Construction Schedule must be updated periodically throughout the duration of the construction phase. See Section 01310.
- D. Stored Materials: Approval of existence and approved storage procedures of on-site stored materials by the Architect/Engineer must be obtained by the Contractor prior to payment requests.
 1. All material stored off site must be clearly tagged and labeled as to the Owner, Project Name and the Project Number and must be available for inspection by the Architect/Engineer and/or the Owner's representative upon reasonable notice. The Contractor shall be responsible for security of on site stored materials and equipment.

2. When material is stored off site, pay application for same must be accompanied by a certificate of insurance for the material stored off site: materials, quantity, dollar value and location being named therein.
- E. Typed Submittals for Payment: Pursuant to progress payments, the Contractor shall prepare and assemble for submittal to the Architect/Engineer, typed copies of the payment request materials which consist of the following:
1. Application and Certificate for Payment/AIA Form G702A in two (2) copies.
 2. Contractor's Waivers of Lien for current request and Waivers of Lien from Subcontractors and from Material Suppliers for previous pay request in two copies.
 3. Contractor's Affidavit and Sworn Statement (2 copies).
 4. Stored Material List (2 copies)
 5. See 00040/1.24 Schedule of Submittals
- F. Contractor's Lien Waivers
1. Partial Lien Waivers
 - a. With second payment request and each succeeding request, the Contractor shall submit to the Architect/Engineer partial lien waivers from himself, each Subcontractor and each Supplier showing that the amount paid to date to each is at least equivalent to the amount billed and paid the previous request.
 - b. Lien waivers shall accompany the first payment request, if payment amount exceeds 50% of the total Contract or subcontract sum.
 2. Final Lien Waivers - The Contractor's final pay request shall include:
 - a. The full amount of his Contract, including all change orders thereto.
 - b. Final lien waivers from all Subcontractors and all Suppliers for which final lien waivers have not previously been submitted.
 3. See also Section 01700 - PROJECT CLOSEOUT.

1.5. ARCHITECT/ENGINEER – PAY REQUEST REVIEW

- A. The Contractor shall carefully review all of the material to be transmitted to the Architect for accuracy and completeness. Failure to include all items, or errors in any item, may cause a delay in payment until all the deficiencies and errors are rectified.
- B. Upon receipt of the Contractor's application, the Architect/ Engineer shall review the submittals for completeness against the on site progress and stored materials list before forwarding payment request to the Owner.

END 01041

DIVISION 1 – GENERAL REQUIREMENTS
Section 01045 - Cutting & Patching

1. GENERAL

1.1. WORK INCLUDED

- A. Execute cutting, filling or patching of work, required to:
 - 1. Make several parts fit properly.
 - 2. Uncover work to provide for installation of ill-timed work.
 - 3. Remove and replace work not conforming to Contract requirements.
 - 4. Remove existing construction as needed.
 - a. Where cabinets are removed to install new heat pumps, the Owner will replace exposed un-tiled floor.
 - 5. Install specified work in existing construction.
 - a. Provide appropriate transition to existing material.
 - 6. Install lintels in masonry opening cut by mechanical trades including masonry work.
- B. In addition to Contract requirements, upon written instruction of Architect/Engineer:
 - 1. Uncover work to provide for observation of covered work.
 - 2. Remove samples of installed materials for testing when required.
 - 3. Remove work to provide for alteration of existing work.
- C. Do not endanger structural work by cutting or altering structural elements.
- D. Where the Contractor hauls material or drives trucks or equipment over sidewalks, pavement, streets or curbs, he shall protect same from damage and where such surfaces have been damaged, he shall neatly cut out, remove and replace same. Where the Contractor damages or defaces streets, sidewalks or curbs, he shall, as a part of his Contract, re-lay all such surfaces at the same thickness and manner as the original pavement, sidewalk or curb and in a manner that will be approved and accepted by the Owner, Architect/Engineer and governing authority.
- E. The Contractor shall provide such cutting and patching as shall be needed to complete the Contract to make the various and several parts and/or components fit together.

1.2. RELATED WORK

- A. Specified elsewhere
 - 1. Section 01120 – Remodeling Project Procedures

2. 02072 – Minor Demolition for Remodeling
3. 05400 – Cold Formed Metal Framing

1.3. SUBMITTALS

- A. Prior to cutting which affects structural safety to building submit WRITTEN NOTICE to the Architect/Engineer requesting consent to proceed with cutting, including:
 1. Project identification.
 2. Description of affected work.
 3. Necessity for cutting.
 4. Effect on other work and structural integrity of project.
 5. Description of proposed work. Designate:
 - a. Scope of cutting and patching.
 - b. Contractor and trades to execute the work.
 - c. Products proposed to be used.
 - d. Extent of refinishing.
 6. Alternatives to cutting and patching.
 7. Designation of party responsible for cost of cutting and patching.
- B. Prior to cutting and patching to implement change order work in contract scope, done on instruction of Architect/Engineer, submit cost estimate to the Architect/Engineer.
- C. Should conditions of work or schedule indicate change in materials or methods, submit recommendation to Architect/Engineer including:
 1. Condition indicating change.
 2. Recommendation for alternative materials or methods.
 3. Submittals as required for substitutions.

1.4. PAYMENT OF EXTRA EXPENSE

- A. Costs caused by ill-timed work, defective work or work not conforming to Contract Documents, including costs for additional services of the Architect/Engineer, shall be borne by the Contractor.
- B. Work done on instruction of the Architect/Engineer (by change order) other than defective or nonconforming work shall be paid for by Owner pursuant to prior written agreement via Change Order.
- C. Unforeseen conditions when exposed may be considered as an extra expense and if so will be paid by Owner.

2. PRODUCTS

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

3. EXECUTION

3.1. PREPARATION PRIOR TO CUTTING

A. Prior to cutting

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

3.2. PERFORMANCE

- A. Execute fitting and adjustment of products to provide finished installation to comply with specified tolerances, finishes, etc.
- B. Execute cutting and demolition by methods that will prevent damage to other work, and will provide proper surfaces to receive installation of repairs and new work.
- C. Execute excavating and backfilling by methods that will prevent damage to other work and will prevent settlement.
- D. Restore work that has been cut or removed; install new products to provide completed work in accord with Contract Documents.
- E. Refinish entire surfaces as necessary to provide an even finish.
 1. Continuous surfaces: To nearest intersection(s).
 2. Assembly: Entire refinishing.

END 01045

DIVISION 1 – GENERAL REQUIREMENTS
Section 01051 - Grades, Lines & Levels

1. GENERAL

1.1. WORK INCLUDES

- A. The Contractor will lay out the work within the building and on the site.
- B. The Contractor will establish all working lines, levels, elevations and measurements.
- C. Each Contractor shall lay out his own work, including lines, levels, grades, slopes and shall coordinate with other trades.

1.2. RELATED WORK

- A. Specified elsewhere
 - 1. DIVISION 0 - BIDDING & CONTRACT REQUIREMENTS
 - 2. DIVISION 1 - GENERAL REQUIREMENTS

1.3. QUALITY ASSURANCE

- A. Layout Personnel
 - 1. Layout personnel shall be experienced in layout work of similar complexity.

1.4. SUBMITTALS: See Section 01340 Submittals.

1.5. CONTRACTOR RESPONSIBILITIES

- A. Each Contractor shall
 - 1. Lay out construction work for his trade area.
 - 2. Establish all working lines, levels, elevations and measurements for the work.
 - 3. Employ qualified personnel to perform the work.
- B. Each Contractor shall provide qualified personnel to perform layout work for specific system and equipment installations, as necessary.
- C. Each Contractor shall contact all utilities to spot locate all applicable utilities and verify the correctness of the locations indicated on the Drawings.
 - 1. The toll-free telephone number for the Joint Utilities Location Information for Excavators (J.U.L.I.E.) is 800/892-0123.
 - 2. Call other utilities, if information is not provided by this source, i.e., water department, street department, telecable, etc.

1.6. ARCHITECT/ENGINEER RESPONSIBILITIES

A. The Architect/Engineer shall furnish

1. General data and instruction.
 - a. Improvements as applicable.
2. Information as to available service and utility lines, both public and private.
 - a. Branch distribution on site lines are not all recorded and therefore the location and depth of some are not known.
3. General work location from fixed points not affected by the Construction.
4. Benchmark location and elevation where applicable.

END 01051

DIVISION 1 - GENERAL REQUIREMENTS
Section 01055 - Anchorage & Fastenings

1. GENERAL

1.1. DESCRIPTION

- A. Provide adequate anchorage and fastenings throughout the work commensurate with the installation conditions.
- B. Anchorage systems shown on the Drawings or specified herein shall be considered a minimum based on theoretical design conditions. The actual field conditions may require additional fastenings to properly accomplish the work.
- C. NOTICE:
 - 1. THESE DOCUMENTS DO NOT PERMIT THE INSTALLATION OF PLASTIC ANCHORS UNLESS SPECIFICALLY ASSIGNED.
 - 2. THE DOCUMENTS REQUIRE THAT IMPACT ANCHORAGE (DRIVEN NAILS AND PNEUMATICALLY DRIVEN ANCHORS) NOT BE INSTALLED ABOVE GROUND FLOOR LEVEL.

1.2. SUBMITTALS

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

1.3. QUALITY CONTROL

- A. All anchorage, fastenings and support systems are the Contractor's responsibility.
- B. All devices, components and associated parts shall be made secure against in-service failure. In no installation shall the fastenings, anchorage and support system be less than what is specifically called for on the Drawings or set forth in the Specifications.
- C. In no case, however, shall the fastenings, anchorage and support systems be less than the Product Manufacturer's recommendations pursuant to the stability of finished assembly or component thereof.
- D. The Contractor shall replace, rework, or reinforce or otherwise correct the fastenings that do not perform adequately.
- E. In general, fastening sizes and spaces are set forth on the Drawings. Wherein same are not, the Architect shall make a determination.

2. PRODUCTS

2.1. MATERIALS

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

- B. Generally, screws shall be appropriately selected for the service condition to minimize corrosion, galvanic action or loosening. This includes wood screws, sheet metal screws and machine screws.
 - 1. Interior or exterior protected areas: cadmium plated screws.
 - 2. Exterior weathering conditions: stainless steel, aluminum, or brass screws. See specific designation on Drawings.
 - 3. Head type shall typically be flat head except as detailed, for conditions such as sheet metal or for equipment mounting.
 - 4. Stop bead washers, surface and/or countersunk, shall be provided wherever practical and as specifically called out.
 - 5. See Drawings for specific overriding designations materials and spacing limitations.

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

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

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

2.2. ASSOCIATED MATERIAL REQUIREMENTS

- A. Washers shall be provided at all locations where practical.
- B. Washers shall be of like material to the fasteners selected.
- C. Use self-sealing neoprene washers at all applications required to be environment-proof.
- D. Use self-sealing neoprene washers wherever galvanic action is possible under normal circumstances. Isolate between unlike fastened material with minimum 20 mil PVC material or similar.
- E. Select appropriately pre-finished, plated, or use base material for the visual

exposure condition where fasteners are exposed to view.

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

2.3. PRODUCT SELECTION

- A. Fastener materials shall be as specified previously. The most appropriate selection shall be made from the table below. The fasteners listed are not interchangeable, unless so approved by the Architect/Engineer.
 - 1. FASTENER RECEIVING MATERIAL: APPROPRIATE FASTENER
 - 2. Wood framing: cement coated nails, galvanized nails, screws, lag bolts, thru bolts.
 - 3. Metal framing: self-tapping flat head or pan head screws.
 - 4. Steel: thru bolts, pneumatic driven fasteners, where detailed or where prior approval is made.
 - 5. Sheet metal: sheet metal screws, thru bolts.
 - 6. Masonry: embedded anchor bolts, pneumatic driven fasteners where approved, metallic expansion anchors, metallic wedge anchors, or toggle bolts.
 - 7. Concrete: embedded anchor bolts, pneumatic driven fasteners where approved, metallic expansion anchors, or metallic wedge anchors.

2.4. SPECIAL ANCHORAGE & FASTENERS

- A. Self Tapping Cap Screw - Pre-Tap Drill. See Section 07600/2.2.
 - 1. CF #14 X required length, "B" carbon structural tap seal screws.
 - 2. Counter bore wood to receive head and washer to flush.

3. EXECUTION

3.1. INSTALLATION

- A. The anchor receiving construction material shall be substantial and have the capability to withstand the in-service stress demand placed upon it.
- B. Fastener size shall be appropriate for the intended service. Verify all conditions in the field and increase the anchorage as needed.
- C. Anchorage patterns shall be appropriate to resist wiggling or prying loose during service. Use a uniform anchorage pattern for all exposed-to-view conditions; offset from centers as needed for maximum strength. A minimum of two (2) anchors shall be provided in each segment length or piece of material.
- D. Replace any fasteners which are crooked or do not properly engage the base material.

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

END 01055

DIVISION 1 - GENERAL REQUIREMENTS
Section 01060 - Codes & Standards

1. GENERAL

1.1. LAWS AND ORDINANCES

- A. In the execution of the work, the Contractor shall comply with Federal Laws, State Laws, Local Ordinances and regulations, rules, and requirements of the Illinois State Board of Education.
- B. The Contractor shall make any alteration, change or addition required by the authorities having jurisdiction, as a part of his Contract and without additional cost to the Owner.

1.2. STANDARDS

- A. The fabrication and installation of all materials and all equipment furnished and installed by the Contractor shall be in accordance with standards of the industry standard technical society, organization or body.

ACI	American Concrete Institute
ADA	Americans with Disabilities Act
AGA	American Gas Association, Incorporated
AIA	American Institute of Architects
AMCA	Air Moving and Conditioning Association
ASHRAE	American Society of Heating, Refrigeration, and Air Conditioning Engineers
ASPE	American Society of Plumbing Engineers
AWWA	American Water Works Association
EPA	State of Illinois Environmental Protection Agency
FIA	Factory Insurance Association
FM	Factory Mutual
IBC	International Building Code
IBR	Institute of Boiler and Radiator Manufacturers
IMC	International Mechanical Code
MCA	Mechanical Contractors Association
NBFU	National Bureau of Fire Underwriters

NEC National Electric Code

NEMA National Electric Manufacturers' Association

NEPA National Fire Protection Association

OSHA Occupational Safety and Health Act

UL Underwriters Laboratories, Incorporated

Illinois Rules & Regulations for Fire Prevention & Safety

Local Utility Company Regulations

Owner's Insurance Requirements

State of Illinois Department of Public Safety

State of Illinois and Local Department of Public Health

State of Illinois and Local Plumbing Codes

State of Illinois Sanitary Board

State of Illinois Part 185, Part 175 and Part 180 Health Life Safety Code

State & Federal Accessibility Regulation

- B. Reference to standards shall mean and intend the latest edition of such specifications adopted and published at the time of invitation to submit proposals.

END 01060

DIVISION 1 – GENERAL REQUIREMENTS
Section 01120 – Remodeling Project Procedures

1. GENERAL

1.1. REQUIREMENTS INCLUDE

A. Contractor

1. Coordinate work of all crafts including that of subcontractors and his crafts as applicable.
2. Schedule elements of demolition, remodeling and renovation work to expedite completion.
3. In addition to demolition specified in Sections 02072, and that shown on Drawings, cut, move or remove existing construction to provide access or to allow remodeling and new work to proceed. Include:
 - a. Removal of or temporarily supporting conduit and wiring.
 - b. Removal of unsuitable or extraneous materials and non-functioning components not marked for salvage, such as abandoned electrical and mechanical components.
 - c. Cleaning of surfaces. Remove surface finishes to install new work and finishes.
4. Patch, repair and refinish existing items to remain, to the specified condition for each material, with a neat transition to adjacent new construction.
 - a. Insure that remodeling work is done before painting.

1.2. RELATED REQUIREMENTS

A. Specified elsewhere

1. 01010 - Project Summary
2. 01045 - Cutting & Patching
3. 01510 - Temporary Utilities
4. 01540 - Security
5. 01561 - Construction Cleaning
6. 02072 - Minor Demolition for Remodeling
7. DIVISION 22 – Plumbing
8. DIVISION 23 – Heating, Ventilation, and Air Conditioning (HVAC)
9. DIVISION 26 – Electrical
10. DIVISION 28 – Electronic Safety and Security

1.3. SEQUENCE AND SCHEDULES: Schedule work in sequences within times specified in 00040 and 01010.

1.4. ALTERATIONS, CUTTING AND PROTECTION

- A. Assign moving, removal, cutting and patching work to crafts qualified to perform the work in a manner to cause least damage to each type of work,

and provide means of restoring surfaces to appearance of new work.

- B. Perform cutting and removal work to minimize removals, and in a manner to avoid damage to adjacent work.
 - 1. Cut finish surfaces such as masonry, blocking, soffit, fascia or metals by methods to terminate surfaces in a straight line at a natural point of division.
- C. Perform cutting and patching in accordance with Section 01045.
- D. Protect from damage existing finishes, equipment and adjacent work that is scheduled to remain.
- E. Protect existing and new work from weather and temperature extremes. Provide weather protection, waterproofing, heat and humidity control to prevent damage to remaining existing work and to new work.

1.5. EXISTING CONDITIONS

- A. Asbestos containing materials (ACM) are assumed to be limited to any 9" X 9" floor tile found in some rooms. Plaster ceilings have been tested and found to be free of ACM.

2. PRODUCTS

2.1. SALVAGED MATERIALS

- A. The Owner
 - 1. Will remove items of value to the District prior to July 12, 2018
- B. The Contractor shall
 - 1. Do not use salvaged or used material in project for in-place construction except as indicated on the Drawings.

2.2. MATERIALS FOR PATCHING, EXTENDING AND MATCHING

- A. Ensure that work is complete:
 - 1. Provide same materials or types of construction as that in existing structure, to patch, extend or match existing work.
 - a. Contract Documents may not define products or standards of workmanship present in existing construction.
 - b. Consult the Drawing Details and/or consult the Architect/Engineer.
 - 2. Presence of a product, finish or type of construction requires that patching, extending or matching be performed to make work complete and consistent to identical or better quality standards.

3. All installations and reinstallations shall be operational ready and in conformance with all facets of Federal and State regulations governing Illinois schools.

3. EXECUTION

3.1. REMOVE EXISTING CONSTRUCTION

A. Temporary Removals.

1. When called for on the drawings, remove and reinstall equipment or finish material to allow the installation of the specified system or material.

B. Remove and dispose of waste and by-products of the construction project.

3.2. PERFORMANCE

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

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

3.3. UTILITIES

A. Take all reasonable precautions against damage to utilities.

B. The Contractor shall confirm locations of all existing utilities in the work areas before commencing any of his work.

C. Verification should be made with electrical, telephone, cable, water, sewer, gas, and any other utility normally servicing the area. Before commencing any excavation call the Joint Utilities Location Information for Excavators (J.U.L.I.E.) toll free number 1-800-892-0123; call the City Sanitary Department; call the Cable Service Company; and call the City Street Department, all as applicable.

D. Whenever inadvertent damage or breaks occur in an existing gas, water, sewer, steam conduit, telephone, electrical main or service, the Contractor responsible shall immediately notify proper officials of utility interruptions.

E. The Contractor shall render all possible assistance in restoring the services cut by him and shall assume all costs, charges or claims connected with the interruptions and repair of the same.

3.4. DAMAGED SURFACES

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

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

3.5. TRANSITION FROM EXISTING TO NEW WORK

- A. When new work abuts or finishes flush with existing work, make a smooth transition. Patched work shall match existing adjacent work in texture and appearance as closely as possible.
 1. When finished surfaces are cut in such a way that a smooth transition with new work is not possible, terminate existing surface in a neat manner along a straight line at a natural line of division, and provide trim appropriate to finished surface.
 2. Refinished cut surfaces must be weathertight comparable to the warranty period.

3.6. CLEANING

- A. Perform construction cleaning as specified in Section 01561.

END 01120

1. GENERAL

1.1. REQUIREMENTS

A. Work Includes:

1. Submittals of project construction schedules for work within seven (7) business days after Notice of Award.
2. Revision of schedules monthly. Said schedule shall accompany each Pay Request, updated to reflect current conditions.

1.2. RELATED WORK

A. Specified elsewhere

1. 01010 - Summary of Work
2. 01041 - Project Coordination
3. 01340 - Submittals
4. 01370 - Schedule of Values

1.3. JOB CONDITIONS

A. The orderly and rapid execution of the required work is of paramount importance.

B. The renovation of Room 50 and the removal and closing of the windows in Rooms 48, 49, & 52 need to be completed by August 14, 2018. This includes the construction of the new Corridor, and the three Calming Rooms including the electrical, plumbing and HVAC work. The work on Restroom 51, the Storage Room 52.1, Corridor 53, the four classrooms, and the common room need to be done by December 31, 2018.

1. **The General Contractor will require his crews and Sub-Contractors' crews to work 48 hours per week from July 12 through August 14, 2018.**

1.4. SUBMITTALS

A. Content of Schedules:

1. Indicate complete sequence of construction by activity.
 - a. Shop drawings, product data and samples: In accordance with Section 01340.
 - b. Decision dates for the selection of finishes.
 - c. Product procurement date, fabrication of each element of the construction work.

- d. Dates for beginning and completion of each element of the construction work.
2. Indicate cumulative percentage of work completed as of the day of Contractor's submittal of monthly pay request.
3. Furnish separate schedule, showing submittals, review items, procurement schedules and delivery dates, as required.
4. Define critical portions of entire schedule.

2. PRODUCTS (N/A)

3. EXECUTION

3.1. PROJECT PROGRESS

- A. Submit initial schedules within seven (7) business days after date of Notice of Award.
 1. Architect/Engineer will review schedules and return the reviewed copy within two (2) business days. Allow time for shipping and handling both ways.
 2. If required, resubmit within five (5) business days after return of the reviewed copy with corrections or a letter explaining why changes cannot be implemented.
 3. Submit number of copies required by Contractor, plus two (2) copies to be retained by Architect/Engineer. If additional copies are required, furnish same at no additional cost.
- B. Updating monthly by indicating:
 1. Progress of each activity since previous submission.
 2. Projected completion dates for all activities.
 3. Activities modified since previous submission.
- C. Adjust work and material schedules to meet time deadlines.

END 01310

1. GENERAL

1.1. DESCRIPTION

A. Prior to commencing the work, the Contractor shall verify the submittal procedure to assure compliance with the submittal requirements.

B. Required Submittals

1. Shop Drawings, Submittals, and Submittal Brochures

- a. Submit four (4) copies minimum unless notes otherwise in a particular section.
- b. Architect and/or Owner will retain two (2) copies.
- c. Contractor will receive remaining copies for his use.
- d. Shop drawings and material schedules shall be accompanied by catalog cuts or fliers giving full data, description, function, and capacity of item or component thus submitted. Catalogs and fliers shall be clearly and precisely marked as to submittal content. The Architect/Engineer's office will provide no sorting to assure the submittals compliance with documents.

2. Samples

- a. When samples are requested submit two (2) minimum.
- b. All samples will be retained unless otherwise noted in the Specifications.

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

- a. Name of person under Contractor employment at the job site in charge of safety.
- b. Name of project on site Superintendent of the work.
- c. Submit three (3) bound, indexed copies minimum.
- d. THE SHOP DRAWINGS RETAINED BY THE OWNER AND ARCHITECT ARE NOT AVAILABLE FOR PREPARING THESE MANUALS. If additional copies are required for this, the Contractor shall make allowance and submit additional sets.

4. The Contractor, if requested by the owner, within thirty-one (31) business days of Notice of Award, submit in accord with 00040/1.17.

C. IDENTIFICATION OF SUBMITTALS

1. The Contractor shall clearly mark each submittal of the Shop Drawings, Catalog Cuts, Pamphlet, or Specification Sheet for

identification and record, for example:

- a. DATE: As submitted
- b. BUILDING: Project Name
- c. LOCATION: City
- d. TYPE OF EQUIPMENT: (Example - Heating/Ventilating)
- e. UNIT: (Example - #1)
- f. SUBMITTED BY: Contractor's Name

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

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

D. AS-BUILT DRAWINGS AND OPERATION MANUALS

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

2. The Contractor shall submit three (3) copies of bound equipment Operation Manuals.

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

E. REVIEW OF SUBMITTALS

1. Submittals will be reviewed by the Architect and/or the Owner and will be checked for Contract compliance and the basic fabrication methods.

2. The Contractor must verify all the dimensions, field conditions, field clearances, and rough-in requirements with adaptations as necessary.

- a. Architect/Engineer review of a submittal shall not relieve the Contractor of specification compliance unless same is specifically brought to the attention of the Architect and/or Owner IN A LETTER FORM attached to the submittal data and subsequently approved by the Architect/Engineer IN WRITING.
- b. An omission on the shop drawings followed by a review oversight thereof by the Architect/Engineer shall not be construed as the calling of specific attention thereto.

END 01340

1. GENERAL

1.1. DESCRIPTION

A. Related work specified elsewhere:

1. 01010 - Summary of Work
2. 01041 - Project Coordination
3. 01310 - Construction Schedules

B. Contractor shall provide:

1. Submittals of Master Cost Breakdown to Architect/Engineer at least fifteen days prior to submitting first Application and Certificate for Payment.
2. Data to substantiate Master Cost Breakdown values if requested by Architect/Engineer.
3. Submittal of quantities of designated materials where applicable.
4. Listing of quantities for materials specified under unit prices.
5. The Master Cost Breakdown shall serve as the only basis for the applications for payment.

C. The Master Cost Breakdown shall serve as the only basis for the applications for payment.

D. NOTE: PAYMENT FOR MATERIALS STORED ON OR OFF SITE WILL BE LIMITED TO THOSE MATERIALS LISTED IN THE MASTER COST BREAKDOWN.

1. If Contractor requests payment for materials stored off the site, such materials must be insured and the Contractor must submit a Certificate of Insurance (identifying the location of the stored material and the stated value thereof) with the pay request.
2. Said certificate shall insure the Owner's investment and identify the location of stored materials.

1.2. FORMAT OF SUBMITTALS

A. Submit Master Cost Breakdown. (Contractor may use AIA Schedule of Value Form, i.e., continuation page from AIA Application and Certificate for Payment Form G702).

B. Use the Table of Contents in these Specifications for the order of listing costs of all work. Verify all costs of the work.

C. Identify each line item with the same number and title listed in the Table of Contents of these Specifications.

1.3. PREPARATION

- A. Itemize separate line item cost for each of the following cost items assignable to the entire project:
 - 1. Overhead and Profit.
 - 2. Bonds.
 - 3. Insurance.
 - 4. General Conditions and Operations.

- B. Itemize separate line item cost for work required by each section of specifications. Identify work of:
 - 1. Contractor's own labor cost and material cost (separate line).
 - 2. Each Subcontractor labor and material cost (separate line).
 - 3. Each major Supplier of products or equipment.

- C. Make sum of total costs of all items listed in the Schedule of Values equal to total Contract sum.

1.4. REVIEW AND RESUBMITTAL

- A. After review by the Architect/Engineer, revise and resubmit the Master Cost Breakdown, should same be required.

- B. Resubmit revised cost breakdowns in the same manner.

1.5. UPDATE

- A. Update the Master Cost Breakdown when:
 - 1. Directed by the Architect/Engineer - monthly.
 - 2. Change of Subcontractor or Supplier occurs.
 - 3. Change of product or equipment occurs.
 - 4. List change orders by number should same become applicable to the Contract.

END 01370

1. GENERAL

1.1. DESCRIPTION

A. Related work specified elsewhere

1. All work provided under the Contract Documents shall be inspected by the Contractor for conformance with the documents prior to the Architect's inspection.
2. All in place work shall be subject to inspection by the Architect/Engineer and the Owner for conformance with the requirements and standards set forth in the Contract Documents and first quality general construction standards.

1.2. WORK BY THE CONTRACTOR INCLUDES

A. The Contractor's superintendent of the project shall inspect all work performed by the Contractor, his employees, Subcontractors and the Installing Suppliers before same is submitted to the Architect/Engineer as work performed.

1. Inspect for proper installation.
2. Inspect for proper materials.
3. Inspect for workmanship.

1.3. WORK BY THE ARCHITECT/ENGINEER INCLUDES

A. The Architect/Engineer shall have access to the work at all times and shall make inspection of work in place, construction components and allow or disallow in accordance with these Specifications and the accompanying Drawings.

1.4. PROCEDURES AND REPORTS

A. The Architect/Engineer, after making inspections, may report same to Contractor separately or jointly, verbally or in writing, as related to the Contract Documents in general and related to certain requirements specifically.

B. Notice shall be given the Contractor of unsatisfactory materials, handling, and storing of project materials, in place installation, workmanship, and documents compliance conduct on the job site property.

C. The Contractor shall correct or replace same as applicable to the inspection report.

1.5. QUALITY ASSURANCE

A. The Architect/Engineer or appointed special inspector for certain

processes:

1. Will make intermittent inspections at the job site and notify the Contractor of deficiencies as and when observed.
 - a. Notifications to the Contractor will be written (if not agreed upon and/or promptly corrected following verbal notification) wherein the deficiency shall or may become covered up by continuation of progress, wherein the deficiency does not comply with the required procedures.
2. Will be available to the Contractor upon call for inspections which may come to the attention of the Contractor at times not corresponding with intermittent inspections by the Architect/Engineer.
 - a. The Architect/Engineer will endeavor to respond to the Contractor's call with due promptness and no later than four (4) hours.
3. Will disallow payment for uncorrected work on the upcoming submittal by the Contractor for periodic progress payment.

B. The Contractor

1. Shall correct all work associated with the inspections made by the Architect/Engineer promptly or present an approved schedule for same.
2. Shall, wherein redeliveries of materials and components are involved:
 - a. Promptly respond IN WRITING to the deficiency notice.
 - b. Issue a schedule of correction, if applicable.
 - c. Make right damages effected to work of other contractors involved, as applicable.
3. Shall notify the Architect/Engineer of the schedule for the following day by day operations at the job site:
4. Contractor shall notify Architect/Engineer twenty-four (24) hours in advance of commencement of operations.

1.6. OWNER

- A. Owner Representatives shall have access to the work at all times.

END 01420

DIVISION 1 – GENERAL REQUIREMENTS
Section 01510 – Temporary Utilities

1. GENERAL

1.1. REQUIREMENTS INCLUDE

- A. Contractor shall provide and maintain specified temporary utilities.
- B. Contractor may extend services from Owner's existing sources.
 - 1. Tap on and extension of services shall be implemented and paid for by the Contractor requiring utility.
- C. Contractor shall furnish (included in his Base Bid):
 - 1. The cost of all utilities required by him which:
 - a. Are in excess of existing available at the building and are necessary for the completion of his work.
 - b. Exceed the capacity of existing or permanent systems and are necessary for the completion of his work.
 - 2. Hoses and fittings from temporary standpipes or water service connection to his work.
 - 3. Drinking water for his own forces.
 - 4. Extension cords, extension lights and lamps from approved temporary power centers to his work.
 - 5. Ventilation for his storage spaces containing volatile or hazardous materials.
 - 6. Security for materials and equipment.
 - 7. Temporary toilet facilities. Toilets in the buildings may be used by contractor's work force providing that these rooms be kept reasonably clean.

1.2. RELATED REQUIREMENTS

- A. Furnished by Owner
 - 1. Authorization of existing facilities for temporary use.
 - a. Electrical power service.
 - b. Lighting extended by drop cords from existing sources.
 - c. Water service extended from existing outlets by the Contractor.
 - 2. Owner will pay all costs of consumables used for construction purposes for utilities it furnishes.
 - 3. The Contractor requiring Owner-furnished services shall provide and pay for extension or modification of services to perform the work.

1.3. DESCRIPTION OF UTILITY SYSTEMS

A. Electrical system:

1. Power is supplied to the site by Ameren IP.
2. The Contractor is advised to contact Ameren IP to get temporary protection at electrical service entrance (over and adjacent to) the construction area. Phone 800/755-5000, as printed in the area phone book, further contact number may be provided by Owner.
3. The Contractor shall provide and maintain extensions of existing electric power system for construction needs throughout construction period.

B. Natural Gas

1. Provided by Nicor Gas Company (verify with Owner).

C. Water Service:

1. Water provided by the Town of Normal.
2. For construction purposes: The Contractor shall provide and maintain temporary water service connection throughout construction period. Continually running water during construction operations is not allowed.
 - a. For temporary fire control.
 - b. For material preparation and mixing.
 - c. For cleaning operation.
3. The Contractor provides drinking water for his own employees.

1.4. REQUIREMENTS OR REGULATORY AGENCIES

- #### A. Compliance with specified codes and regulations (latest editions in effect as of the date of bidding documents) is the responsibility of the Contractor. See 01060.

1.5. USE OF OWNER'S EXISTING SYSTEMS - RULES AND REGULATIONS

- #### A. Owner's mechanical systems shall remain in service throughout the construction except for prearranged temporary shutdowns.
- #### B. Make all arrangements with the Owner's Representative for use of electrical power for hand tools, temporary lighting, toilets and use of water. Temporary connections shall not interfere with or starve the ordinary use of the building or for ongoing maintenance and service activities therein.
- #### C. Limitations
1. Keep work areas enclosed to avoid energy waste.
 2. Keep away from any areas as directed by Owner/Representative.

- D. Modify temporary utility systems if requested by the Architect/ Engineer or the Owner.
- E. Upon completion of work, or when directed by Architect/Engineer, restore existing systems to original condition or specified conditions.

END 01510

DIVISION 1 – GENERAL REQUIREMENTS

Section 01530 - Barriers

1. GENERAL

1.1. WORK INCLUDES

A. The Contractor shall:

1. Provide and maintain suitable metal fabric type barrier to keep unauthorized personnel away from equipment and devices and protect the work, stored materials, existing facilities and utilities, trees and plants from construction operations.
 - a. The existing 6' high metal fabric fence is shown on the site plan. During construction keep as much of this fence in place and expand the fence to the east as needed.
2. Remove when no longer needed, at completion of work or as directed to facilitate the Owner's regular use of this building and site.
3. Contractor shall replace any and all damage to buildings and grounds including plantings, walks, drives, trees, sod, and utilities and lights to pre-construction or better condition.
4. The Contractor shall handle demolition and new materials in a safe manner limiting and controlling the spread of debris and dust. Removed material shall not be dropped free fall in the open air.
5. Do not leave construction aids, where accessible to passers-by or intruders in place overnight unattended.

1.2. RELATED REQUIREMENTS

A. Specified elsewhere

1. 01010 - Project Summary

2. PRODUCTS

2.1. MATERIALS

- A. Temporary barrier materials may be new or used, suitable for purpose.
- B. Do not violate specified codes.

2.2. BARRIERS

- A. Use a metal fabric with metal posts at 8' to 10' o.c. See site plan. Modify location of fence as noted.

3. EXECUTION

3.1. INSTALLATION

- A. Install to a neat and uniform appearance, structurally adequate for purposes.
- B. Maintain barriers during entire construction period.
 - 1. Remove when site grading is done – reinstall after.
- C. Relocate barriers as construction progresses.
 - 1. Barrier to remain in position shown on site plan when construction is finished.

3.2. TREE AND PLANT PROTECTION

- A. Preserve and protect existing trees and plants at site and those adjacent to site.
- B. Replace or repair, trees and plants which are damaged or destroyed due to construction operations.

3.3. UTILITIES

- A. Take all reasonable precautions against damage to utilities.
- B. The Contractor shall confirm locations of all existing utilities in the work areas before commencing any of his work.
- C. Verification should be made with electrical, telephone, cable, water, sewer, gas, and any other utility normally servicing the area. Before commencing any excavation call the Joint Utilities Location Information for Excavators (J.U.L.I.E.) toll free number 1-800-892-0123; call the City Sanitary Department; call the Telecable Service Company; and call the City Street Department, all as applicable.
- D. Whenever inadvertent damage or breaks occur in an existing gas, water, sewer, steam conduit, telephone, electrical main or service, the Contractor responsible shall immediately notify proper officials of utility interruptions.
 - 1. Apparently, the existing high pressure gas line is under the 1967 addition as shown and should not be an issue in this project. The Architect has discussed the location of the pipe with NICOR. Call J.U.L.I.E.
- E. The Contractor shall render all possible assistance in restoring the services cut by him and shall assume all costs, charges or claims connected with the interruptions and repair of the same.

3.4. REMOVAL

- A. Completely remove barriers when construction has progressed to the point that they are no longer needed, and when approved by the Architect/Engineer.
- B. Clean and repair damage caused by installation, fill and grade site areas to indicated elevations and slopes, and clean the area.

END 01530

1. GENERAL

1.1. WORK INCLUDES

- A. The Contractor shall
 - 1. Protect work, stored materials and construction equipment from theft and vandalism.
 - 2. Protect premises and project from entry by unauthorized persons.
 - 3. Cooperate with the Owner's maintenance personnel and protect the Owner's operations at the job site from theft, vandalism or damage from entry by unauthorized persons.
- B. The Contractor shall be responsible for the security of his materials and tools. The Contractor shall exercise reasonable security precautions at all times that the project is left unattended.
- C. The Contractors shall cooperate in maintaining the construction security by closing and locking all openings whenever the work is not manned and at the close of each day's work.

1.2. RELATED REQUIREMENTS

- A. Specified elsewhere
 - 1. 01010 - Project Summary
 - 2. 01530 - Barriers

1.3. MAINTENANCE OF SECURITY

- A. Initiate security program in compliance with Owner's system prior to mobilization.
- B. Maintain security program throughout construction period until substantial completion.
- C. Cooperate with the Owner to maintain security.
- D. Comply with Owner regulations for safety and security.

END 01540

DIVISION 1 – GENERAL REQUIREMENTS
Section 01550 – Access Roads & Parking Areas

1. GENERAL

1.1. REQUIREMENTS INCLUDE

A. Contractor

1. Maintain equipment and materials vehicular delivery access to buildings.
2. Provide access to temporary construction facilities, storage and work areas for use by persons and equipment involved in project construction and for use by emergency vehicles.
3. Lay out and install grade and C6 Fill for Bus Lane to be used as construction access and parking. See site plan.

1.2. RELATED REQUIREMENTS

A. Specified elsewhere

1. 01010 - Project Summary

1.3. ON SITE ROADS AND PARKING AREAS

A. Contractor shall utilize existing roads, drives, walks and to provide access to construction work, storage and other areas required for execution of the Contract.

1. Location: The Contractor shall consult with the Owner's building administrator and comply with all regulations and limitations imposed thereby.
2. The Contractor arranges for parking facilities: Adequate to provide for employees and subcontractor employees.
3. The Contractor shall make his own arrangements concerning street traffic interference and barricade requirements.

B. Provide access for emergency vehicles.

C. Keep fire hydrants and water control valves free from obstruction and accessible for use.

1.4. EXISTING CONDITIONS

A. City improvements

1. Obtain city permission to operate equipment of excessive width or weight on public right-of-way.

B. Owner site improvements include paved parking areas, concrete sidewalk landscaping and play equipment.

1. Discuss with Owner planned equipment and material delivery

routes to minimize damage.

2. PRODUCTS (Not Applicable)

3. EXECUTION

3.1. MAINTENANCE

- A. Maintain roads, walks and parking areas (where use of same has been allowed by the Owner) in a sound, safe and clean condition.
- B. Repair or replace all surfaces damaged during construction work progress.
 - 1. Contractor repair pavements, landscaping, or lawn areas damaged during construction.
 - 2. Contractor document any damage to pavement, landscaping or lawns that exist prior to construction operations.
 - a. This may be accomplished by photographs or in conference at the site with A/E and Owner.

END 01550

DIVISION 1 – GENERAL REQUIREMENTS
Section 01561 – Construction Cleaning

1. GENERAL

- 1.1. WORK INCLUDES. Each Contractor shall provide cleaning and disposal of waste materials, debris and rubbish during construction.
- 1.2. RELATED REQUIREMENTS
 - A. Specified elsewhere
 - 1. All Specification Sections.

2. PRODUCTS

- 2.1. EQUIPMENT
 - A. Each Contractor shall provide covered containers for deposit of waste materials, debris and rubbish.
 - B. Use of Owner's refuse disposal containers shall not be allowed.

3. EXECUTION

- 3.1. CLEANING BY CONTRACTOR
 - A. Maintain areas under Contractor's control free of waste materials, debris and rubbish.
 - B. Remove debris and rubbish from plenums, attics, crawlspaces and other closed spaces prior to closing the space.
 - C. Periodically clean interior areas to provide suitable conditions for work.
 - 1. Daily
 - D. Broom clean interior areas prior to start of surface finishing. Continue cleaning on an as needed basis.
 - 1. Periodically
 - E. Control cleaning operations so that dust and other particulates will not adhere to wet or newly-coated surfaces.
- 3.2. DISPOSAL
 - A. Provide a container for on site debris.
 - 1. Remove promptly when full
 - 2. Each Contractor to provide his own container.
 - 3. Cooperation on shared containers is encouraged but subject to

- negotiation by the various Prime Contractors relative to cost.
4. Do not use another Contractor's container without prior arrangement.
 - a. Charges accumulated for this must be cleared prior to closeout.
 - b. Violations of this requirement must be promptly noted for consideration of charges. On documented charges presented after the container is removed cannot be honored.

3.3. FINAL CLEANING

- A. Employ experienced workmen or professional cleaners for final cleaning. Final cleaning of building surfaces shall be performed by the Contractor following 3.1.H pickup listed above.
- B. The Contractor shall remove grease, dust, dirt, stains, labels, fingerprints, protective coverings and other foreign materials from all sight-exposed interior and exterior finished surfaces; polish surfaces so designated to specified finish, as applicable to his own work.
- C. In preparation for substantial completion or occupancy, CONDUCT FINAL INSPECTION of sight-exposed surfaces, and of concealed spaces to ensure performance. See 01700.
- D. Contractor shall repair, patch, and touch up marred surfaces to specified finish to match adjacent surfaces, as applicable to his own work.
- E. Soft broom clean all exposed concrete surfaces. Other paved areas with soft or stiff broom as directed. Rake clean all other unpaved grounds. This final cleaning procedure shall be performed by the Contractor following 3.1.H pickup listed above.
- F. Sweep and mop clean all resilient, epoxy, acrylic and cementitious flooring. This final cleaning procedure shall be performed by the Contractor following 3.1.H pickup listed above.
- G. Maintain finally cleaned areas until project, or designated portion thereof, is accepted by the Owner. The Contractor shall clean up all areas where remedial work has initiated the need for cleaning.

END 01561

1. GENERAL

1.1. DESCRIPTION

- A. Related requirements specified elsewhere
 - 1. 00040 - Instructions for Bidders
 - 2. 00300 - Proposal Form
 - 3. 00301 – Award & Contract Form
 - 4. 01041 - Project Coordination
 - 5. 01340 - Submittals
 - 6. 01370 - Schedule of Values

1.2. SPECIFIED PRODUCTS

- A. All bids shall be based on providing products exactly as specified or equal as prior approved.
- B. Products specified only by reference or performance standards, shall be met or exceeded by the standards of any manufacturer's material and subject to the Architect/Engineer's approval.
- C. Products specified by naming several products or manufacturers shall be selected from any product and manufacturer named.

1.3. SUBSTITUTIONS, BIDDER/CONTRACTOR OPTIONS

- A. PRIOR TO BID OPENING - The Architect/Engineer will consider requests to amend the bidding documents to add products not specified, provided such requests are received in adequate time prior to bid opening date.
- B. WITH BID - Substitutions will be considered with the bids.
 - 1. Bid all Base Bid specified material; then bid Substitution Form - Document 00307.
- C. AFTER AWARD OF CONTRACT - No substitutions will be considered after Notice of Award, except under one or more of the following conditions:
 - 1. Substitution is required for compliance with final interpretations of code requirements or insurance regulations.
 - 2. Unavailability of specified products, through no fault of the Contractor.
 - 3. Subsequent information discloses inability of specified product to perform properly or to fit in designated space.
 - 4. Manufacturer/fabricator refusal to certify or guarantee performance of specified product as required. This does not alter the requirement.
 - 5. When a substitution would be substantially to the Owner's best interest.

1.4. SUBSTITUTION REQUIREMENTS

- A. Submit one (1) copy of each request for substitution. Include in each request for substitution:
1. Complete data substantiating compliance of proposed substitution with Contract Documents.
 2. For products:
 - a. Product identification, including Manufacturer's name and address.
 - b. Manufacturer's literature.
 - 1) Product description.
 - 2) Performance and test data.
 - 3) Reference standards.
 - c. Samples, if applicable.
 - d. Name and address of similar projects on which product was used and date of installation.
 3. For construction methods substitution:
 - a. Detailed description of proposed methods.
 4. Itemized comparison of proposed substitution with product or method specified, including accurate and true cost data on proposed substitution in comparison with product or methods specified.
 5. Data relating to changes in construction schedule.
 6. Identify:
 - a. List other contracts affected, if applicable.
 - b. List changes or coordination required.
- B. In making requests for substitution, bidder/contractor represents:
1. He has personally investigated proposed product or method and determined that it is equal or superior in all respects to that specified.
 2. He will provide the same guarantee for substitutions as for product or method specified.
 3. He will coordinate installation of accepted substitutions into work, making all such changes as may be required for work to be complete in all respects.
 4. He will provide complete cost data including all related costs under his contract (and other Prime Contract's, as applicable) whose work may also be affected by the substitution in product or method.
 5. He will assume full responsibility for all additional costs and expenses to the Owner, Architect/Engineer (and other contractors employed on the same project, as applicable).

6. The Contractor agrees that it is the Contractor's sole responsibility to stand any costs, which may be attributable to an allowed substitution which may surface as construction proceeds toward finalization.

C. Substitution will not be considered if:

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

END 01630

DIVISION 1 - GENERAL REQUIREMENTS
Section 01700 - Project Closeout

1. GENERAL

1.1. WORK INCLUDES

- A. Project Closeout procedures cannot be initiated until the steps on the following checklist have been taken:

FINAL APPLICATION FOR PAYMENT CHECKLIST

- _____ 1. Letter to A/E that deficiency work is complete
- _____ 2. Final Lien Waiver from the Contractor (2 copies)
- _____ 3. Final Lien Waivers from Subcontractor/Suppliers (2 copies)
- _____ 4. Final Affidavit showing \$0.00 due to Subcontractors and \$0.00 due to Suppliers (2 copies)
- _____ 5. Bonding Company Final Payment Approval Letter (2 copies)
- _____ 6. Certification of all guarantees beyond standard 1-year (2 copies)
- _____ 7. Contractor's Final Pay Request (3 copies)
- _____ 8. Additional warranty certifications as may be requested (2 copies)
- _____ 9. Operating manuals and instructions, neatly bound (3 copies)
- _____ 10. Manufacturer's Product Warranty Certification
- _____ 11. Care and Maintenance Instructions
- _____ 12. All employee wage reports not previously submitted.

- B. All the above documents submitted must bear live signatures.
- C. Signatures on all documents submitted shall be by an official within the company's legal organization designated to represent the company in legal transactions.
- D. The Contractor's signature shall be the same signature as appears on the Owner/Contractor Agreement. See 00300 - Proposal & Agreement.

END 01700

DIVISION 1 – GENERAL REQUIREMENTS
Section 01720 – Project Record Documents

1. GENERAL

1.1. REQUIREMENTS INCLUDE

A. Each Contractor

1. At the project site, shall maintain one (1) copy of:
 - a. Contract Drawings
 - b. Project Manual
 - c. Interpretations and supplemental instructions
 - d. Addenda
 - e. Reviewed, approved shop drawings and product data
 - f. Other modifications to Contract
 - g. Field test records
 - h. All schedules
2. Working and record documents shall be kept on the job site.
3. File documents in format in accord with Project Manual Table of Contents.
4. Maintain documents in clean, dry, legible condition.
5. Do not use record documents for field construction purposes.
6. Make documents available at all times for inspection by the Architect/Engineer and the Owner.

- B. Turn over to Architect at completion of work before or with Final Pay Request.

END 01720

DIVISION 1 – GENERAL REQUIREMENTS
Section 01730 – Operating & Maintenance Data

1. GENERAL

1.1. REQUIREMENTS INCLUDE

- A. It shall be the Contractor's responsibility to compile product data and related information appropriate for Owner's maintenance and operation of products and equipment provided under the Contract.
- B. The Contractor shall be responsible to instruct Owner's personnel in the operation and maintenance of products, equipment and systems, including HVAC, Electrical, Plumbing, and Security.

1.2. RELATED REQUIREMENTS

- A. Specified elsewhere
 - 1. 01340 - Submittals
 - 2. 01700 - Project Closeout
 - 3. 01720 - Project Record Documents
 - 4. 01740 - Warranties & Bonds

1.3. SUBMITTALS

- A. Manufacturer's standard product or equipment data of same type and form furnished to manufacturer's maintenance personnel. Provide sturdy manilla or Kraft envelope, properly labeled, of sufficient size to contain all submittals.

1.4. MANUAL CONTENT

- A. Product Data
 - 1. Include only sheets pertinent to specific product
 - 2. Annotate each sheet to:
 - a. Clearly identify specific product or part installed
 - b. Clearly identify data applicable to installation
 - c. Delete references to inapplicable installation
- B. Drawings / Shop Drawings
 - 1. Coordinate Drawings with information in Product Record Documents to assure correct illustration of completed installation.
- C. Copy of each warranty, bond and service contract issued
 - 1. Provide information sheet for Owner's personnel with:

- a. Proper procedures in event of failure
- b. Instances which might affect validity of warranties or bonds

1.5. MANUAL FOR CONSTRUCTION MATERIALS AND FINISHES

A. Provide the Owner, via the A/E, with two (2) copies of complete manual in final form.

1. Inclusive of products, applied materials and finishes:

a. Reviewed Shop Drawings

- 1) Reviewed Shop Drawings shall be neatly folded to approximately 8-1/2" X 11" size and inserted individually into Mylar No. 213 sheet protectors (Chicago Desk Pad Co.) punched and inserted into the manual binder.

b. Manufacturer's data, giving full information on products.

- 1) For catalog number, size, composition
- 2) For color and texture designations
- 3) For reordering special manufactured products

c. Instructions for care and maintenance

- 1) Manufacturer's recommendations for types of cleaning agents and methods
- 2) Cautions against cleaning agents and methods detrimental to the product.
- 3) Recommended cleaning and maintenance schedule

2. Inclusive of moisture protection and weather exposed products.

a. Manufacturer's data, giving full product information

- 1) Applicable standards
- 2) Chemical composition
- 3) Installation details

b. Instructions for inspection, maintenance and repair

3. The above does not relieve the Contractors of their responsibility of making service calls due to any defects which may develop during the guarantee period as stated in the "Guarantee" paragraph.

END 01730

DIVISION 1 - GENERAL REQUIREMENTS
Section 01740 - Guarantees, Warranties & Bonds

1. GENERAL

1.1. WORK INCLUDES

- A. Provide all guarantees, warranties and bonds, as specified.

1.2. RELATED WORK

- A. Specified elsewhere

1. All work.

- B. Submittals: The Contractor shall process, acquire and submit the Guarantees, Warranties and Bonds as specified below:

1. Bid Bond.
2. Labor & Material Payment and Performance Bonds, following award.
3. Guarantees: Submit on Contractor's letterhead a one-year material and labor guarantee for all work except for special warranties.
4. Contractor shall submit a letter of certification on Contractor's letterhead that no products containing ACM or PCB's were used in the completed work.

1.3. WARRANTY

- A. The Contractor warranty that all work provided under the Contract will be in conformance with the Contract and free from defects in workmanship, materials and equipment for a period of one (1) year or such longer period as may be specified in the Contract documents. Warranty time periods shall commence with the date of Owner acceptance of the Certificate of Substantial Completion or the whole or any part of the project. The warranty time period for any incomplete or uncorrected work at the time of Substantial Completion shall commence with the date of Final Completion.

- B. The Contractor shall deliver all commercial warranties received from the manufacturer to the Architect/Engineer prior to Final Completion, but this shall not reduce the Contractor's obligations under this Article.

- C. Special Warranties

07530 – EPDM 90 mil roofing

Manufacturer - Roof Installation – Twenty (30) years

07600 – Sheet Metal Flashing & Trim

Contractor - Two (2) years

07900 – Sealants & Caulks

Manufacturer - Materials - Ten (10) years

Manufacturer or Contractor - Installation - Five (5) years

08700 – Door Hardware

Manufacturer – Extended Warranty for parts, unit replacement, rebuilding shop labor excluding field installation:

1. Latch / Lockset – five (5) years
2. Exit Devices – five (5) years
3. Closers – five (5) years

15786 – Water Source Heat Pumps Warranty

1. Motor Compressor -- five (5) years

11190 – Surface Padding System

1. Contractor – one (1) year
2. Manufacturer – three (3) years

END 01740

1. GENERAL

1.1. REQUIREMENTS INCLUDE

A. Base Bid:

1. Remove existing cabinets, casework, door & frame, windows, wall surfaces, ceilings, rubber wall base and any other items as shown on the Drawings, or necessary to continue the work in Room 50
2. The exterior windows in Rooms 48, 49, 50, & 52 shall be carefully removed to be reused in Rooms 54-57.
3. The Contractor shall protect the Bard HVAC Units as noted on the Drawings. The Bard heat pumps in Rooms 48, 49, 50, & 52 will remain in present locations but will be modified for supply air and fresh air.
4. Exterior playground improvement existing on the East side shall be removed as indicated. Contractor dispose of the playground material.

1.2. RELATED WORK

A. Specified elsewhere

1. 01010 - Project Summary

1.3. EXISTING CONDITIONS

- A. This project involves demolition of existing finishing materials. No structural demolition is required.
- B. The Owner will move existing movable furnishings away from work areas (outside classroom / office glazed walls).

2. PRODUCTS

2.1. MATERIALS

- A. All damaged material shall be repaired or replaced with new materials of the same quality as the existing materials and installation when they were new.

3. EXECUTION

3.1. PREPARATION

- A. Protect all floor, wall and ceiling finishes in work area.
 1. Corridor, Rooms 48, 49 and 52.

3.2. PERFORMANCE OF THE WORK

- A. Immediately remove demolished and waste materials from work area and clean debris so it does not spread into adjacent areas.
- B. Remove or protect materials to be reinstalled or retained in manner to prevent damage.
- C. Do not burn or bury materials on site.

END 02072

1 GENERAL

1.1. DESCRIPTION

- A. Provide all labor and materials for all excavation, grading, fill and backfill work of every kind needed to complete the general construction work in accordance with the Contract Documents.
- B. General Contractor shall locate and lay out bus lanes and sidewalks.
 - 1. The Architect will hire Ramsey Geotechnical Engineering, LLC to evaluate fill materials under the Bus Lane.
- C. Each Contractor shall contact J.U.L.I.E. (1-800-892-0123) and verify with non-member utilities all underground services, shall mark same and maintain marking during construction.
 - 1. Mark information on Contract Record Drawings.

1.2. QUALITY CONTROL

- A. Contractor shall include in his contract testing by an independent testing agency all granular backfill work.
 - 1. Testing agency shall certify compaction is satisfactory for proposed construction purposes.
 - 2. Send reports and certification of compaction directly to the Architect and Owner.
- B. Owner may schedule additional independent testing at his option.

1.3. RELATED WORK

- A. Specified elsewhere:
 - 1. 01040 Field Engineering
 - 2. 01051 Grades, Lines & Levels

2 PRODUCTS

2.1. MATERIALS

- A. Earth fill or backfill
 - 1. Earth fill or backfill shall be natural earth, native to the general area of construction, free of debris, large rocks, unnatural materials of any type, and any other material that may impair long-term stability or performance of the earth.

- a. Earth fill will be evaluated for compacting by Ramsey Geotechnical Engineering, LLC.
- B. Top soil
- 1. Topsoil shall be natural earth, native to the general area of construction, which is suitable to support vegetation without excessive use of fertilizers or other soil treatment.
 - 2. This material shall be clean friable earth, free of sand, gravel, clay, debris or any materials that might impair the workability of the soil and/or its ability to sustain vegetation.
- C. Gravel and granular fill
- 1. Gravel fill and backfill may be pit run or crushed pit run gravel in compliance with Grade CA 4 through CA 11, Class C or D or equal, ten percent (10%) clay maximum.
 - a. No aggregate larger than two inches (2") will be accepted.
 - 2. Sand shall be natural bank sand in compliance with FA 1 through FA 7 or CA 16 through CA 19, Class C or equal, ten percent (10%) clay maximum.
 - 3. Fill under proposed Bus Lane will be evaluated by Ramsey Geotechnical Engineering, LLC.
 - a. Compaction shall be to 85% Proctor.

3 EXECUTION

3.1. SITE PREPARATION

- A. Remove all the surface grass and roots to a level of 5" below surface.
- B. Protect trees and other site improvements from damage.
- C. Establish working grades and lay out building and site requirements such that earth stockpiles will not interfere with construction processes or proper site drainage.
- D. Strip the vegetation and six inches (6") of topsoil from all areas subject to final grade changes. This earth shall be stockpiled for use as topsoil in the final grading operations.
- E. Complete base grading necessary in the work, stacking clay separately from the topsoil. Fill and compacted fill work necessary to achieve base grading may be completed at a time during the construction work coordinate with all trades to allow timely and efficient progress.

3.2. FILL AND BACKFILL

- A. Surplus earth stripped from the south area may be used as fill in the northeast area.
 - 1. Do not use stripped 6-inch layer of vegetation for fill under the slab.
- B. Compact dry earth fill material before adding final four inches (4") of granular fill.
 - 1. Compact earth fill to 85% Proctor.
- C. Top soil vegetation fill may be employed in lawn and yard areas.

3.3. ENGINEERED FILL

- A. Throughout the structural slab area of the building, compacted granular fill is required. This includes the 14 supports of the demolished playground which must be filled with gravel and compacted.
 - 1. Immediately under the 7-inch Bus Lane slab there shall be placed four inches (4") of granular fill.
 - 2. Clay soil may be used to bring Bus Lane base up to 11" of final finish surface
- B. Fill shall be per these specifications and shall be compacted to 85% Standard Proctor before slab construction. Checked by Ramsey Geotechnical Engineering, LLC for compaction.

3.4. SURPLUS EARTH AND SITE DEBRIS

- A. Surplus earth from excavation and site preparation shall be:
 - 1. Clean earth, use for grading, stockpile remainder.
 - 2. Earth with rubble or construction debris, remove from site.
 - 3. Separate topsoil and clay or fill earth.

3.5. GRADING

- A. The Contractor shall execute the finish grade, the top six inches (6") of which shall consist of topsoil. The Contractor shall grade to uniform level and slope away from building for drainage.
- B. All grading shall be as indicated on the Drawings. Existing drainage patterns to adjacent property shall be maintained. No areas shall pond or retain water unless specifically identified on the Drawings.
- C. Repair all areas which settle and erode within the first year of Owner occupancy.

3.6. SEED - BY CONTRACTOR

- A. Apply seed, fertilizer and straw as indicated in Section 02100. Be careful to avoid getting fertilizer on concrete slab.
- B. Apply seed, fertilizer and straw **either by October 1, 2018 or after April 15, 2019.**

3.7. WARRANTY

- A. During the one (1) year warranty period, re-grade any areas subject to settlement or erosion and reseed or sod as appropriate. Reseed or sod any areas of lawn which do not survive the first growing season excluding the following:
 - 1. Areas subject to excessive traffic.

END 02200

1. GENERAL

1.1. WORK INCLUDED

- A. The General Contractor shall provide a chain link fence including all accessory and hardware items necessary to complete the fencing assembly. The system shall be a six-foot (6') fence with full height fabric.
- B. The fence shall not be installed until the construction processes have advanced to a stage at which assembling the fence will not impeded project progress or subject to construction damage.

1.2. RELATED WORK

- A. Specified elsewhere:
 - 1. DIVISION 0 - Procurement Requirements
 - 2. DIVISION 1 - Administrative Requirements

1.3. SUBMITTALS

- A. Provide Shop Drawings accurately describing the fencing components and layout.

1.4. QUALITY ASSURANCE

- A. All products shall comply with the standards set forth by the Chain Link Manufacturer's Institute.

2. PRODUCTS

2.1. MATERIALS

- A. Fabric: The fabric will be 9 gauge aluminized steel woven fabric in a two inch (2") mesh with knuckled selvages X 6'-0" high.
- B. Line Posts: Line posts shall be hot dip galvanized posts, 1.9" outside diameter, Schedule 40.
- C. Terminal Posts: Terminal and gatepost shall be galvanized, 2.375" outside diameter, Schedule 40.
- D. Rails and Braces: The rails and braces shall be Type I, 1.66", galvanized pipe or equal. Provide top rail all around. Brace at corner posts, gates, and 100' intervals.
- E. Post Tops: Posts shall be capped.
- F. Tension Wire: Tension wire shall be twisted and aluminized steel, 7 gauge

wire continuous along the bottom.

- G. Tees, Clips and Accessories: Tees, clips and accessories shall be as needed for the assembly, galvanized or aluminized as is standard with the Manufacturer's system. Secure fabric at top and bottom at intervals not exceeding 15" along all posts, rails and tension wires.
- H. Barbed Wire: Barbed wire is not required.
- I. Gates: 1.9" minimum, welded construction with diagonal brace. Gates shall be provided with heavy duty hinges and latching mechanism with padlock hole. Provide also strike plate in pavement.

3. EXECUTION

3.1. WORKMANSHIP

- A. Work shall be first class. The fabric shall be tightly stretched and secured. Posts shall be vertical in alignment, properly spaced, and all components rigidly assembled. Gate shall operate smoothly without binding or sagging. Any of the work deemed not acceptable by the Architect/Engineer shall be replaced.
 - 1. Wire shall generally follow grade in a uniform smooth flowing line
 - 2. Avoid abrupt changes in line
 - 3. Hold fabric 1½" to 3" above grade to allow mowing and trimming.
- B. Posts shall be set with concrete in eight-inch (8") holes with a minimum depth of forty-two inches (42"). Hole sides shall be uniform. Form and pour with smooth sides. DO NOT LET TOP OF CONCRETE BULGE OUT TO FORM A FROST LEDGE.
 - 1. Hold below finish paving surfaces for Bituminous
 - 2. Core or PVC sleeve concrete slabs
- C. The line posts shall set at 10'-0" on center maximum. Provide an additional brace rail and tie at each corner and gate.
- D. Where slabs or mechanical equipment pads occur, the posts shall be set into the concrete such that concrete extends out past fence line three inches (3").

END 02311

1. GENERAL

1.1. DESCRIPTION

- A. General Contractor shall furnish all of the labor and materials necessary to complete all concrete work of every description called for in the Documents, including forming, finishing, placement, preparatory work, reinforcing, stripping, rubbing, curing and sealing.
- B. Construction joints, score joints and slab panels shall be selected to optimize concrete strength and performance and minimize shrinkage, cracking or other undesirable performance characteristics.

1.2. QUALITY ASSURANCE

- A. All materials and mixes shall comply with applicable ASTM Specifications. All requirements of the American Concrete Institute Building Code Requirements for Reinforced Concrete (ACI 318-71); as applicable to the forming, placement and handling of concrete materials shall be followed.
- B. Admixtures shall be employed in accordance with Manufacturer recommendations. The compatibility of admixtures to achieve proper results shall be verified by the Ready-Mix Supplier. **NO INCOMPATIBLE ADMIXTURES SHALL BE EMPLOYED.** The Architect/Engineer shall approve any alternative mix design proposed.

C. TOLERANCES

- 1. Footings: True to top grade, 1/4" high to 1" low; true to width - 0" and + 4" maximum; true to bottom grade 0" high, 4" low.
- 2. Slabs: True to grade and plane, maximum variance 1/8" in 10', 1/4" overall; slope uniformly to drains over areas identified on the Drawings; no ponding of water shall occur at any location on slabs, unless so specified.
- 3. All Other Work: Not exposed to view, 1/2"; exposed to view work 1/16" in 2' and 1/4" overall.
- 4. Steel Placement: All work 3/8" plus or minus from specified position.
 - a. Never closer than 3" to unformed earth exposure.
 - b. Never closer than 2" to formed face earth exposure.

1.3. SUBMITTALS

- A. Identify the Concrete Supplier.
- B. Submit a description of the mix to be employed, identifying the quantities and types of all materials and admixture to be employed in the mix.
- C. Submit reinforcing steel shop drawings for all prefabricated steel work.

1.4. TESTING

- A. The Owner shall be responsible for securing and paying for all testing as requested by the inspector at the job. Tests may be requested on the average of every fifty (50) cubic yards of work and on each day of pouring, whichever is the greater frequency.
 - 1. Tests may include cylinder casts, slump test and air meter.

2. PRODUCTS

2.1. MATERIALS

- A. Cement - to comply with ASTM C-150, Type I Portland Cement.
- B. READY MIX - to comply with ASTM C-94.
- C. AGGREGATES - to comply with ASTM C-33, maximum size aggregate to pass 1-1/2" ring for footings, 1" ring for other work.
- D. WATER REDUCING ADMIXTURE - without chloride ions to comply with ASTM C-494, Type A. Use Type D retarding at temperatures exceeding 90 degrees F.
- E. AIR ENTRAINMENT ADMIXTURE - to comply with ASTM C-260, "Air Mix", MB-VR, Darex".
- F. ANTI-SPALLING COMPOUND - to be combination product, minimum 50% linseed oil, meeting ASTM D-260 and maximum 50% mineral spirits, meeting ASTM D 235.
- G. WATER - shall be clean, potable water, free of dissolved salts or detrimental substances at a minimum temperature 50 degrees F.
- H. BONDING ADMIXTURE - for rubbing and repairs shall be "Daraweld-C", "Elmers", or "Flex-Con".
- I. REINFORCING STEEL - to comply with ASTM A615, Grade 60 deformed bars.
 - 1. Epoxy coated reinforcing where noted
 - a. #4 bar 16" vertical pin bars at footing to foundation wall
- J. WELDED WIRE FABRIC - to comply with ASTM A185, Grade 60 minimum.
- K. EXPANSION JOINT MATERIAL - minimum ASTM A185, Grade 60.
 - 1. Two (2) part/top 1/2" removable to allow S-4 sealant installation.
- L. JOINT FILLERS - asphalt impregnated, 1/4" interior, 1/2" for exterior and as noted on Drawings and in Specifications.

- 1. See sealant specification for joint sealants over fillers.
- M. VAPOR BARRIER - shall be .010" polyethylene film Visqueen or equal.
- N. CURING-SEALING COMPOUND - to comply with ASTM C-309 and to be compatible with finish treatments, adhesive and floor coverings.
- O. ANTIFREEZE ADMIXTURES WILL NOT BE ALLOWED.
- P. CONCRETE - shall be designed to conform to the following in-place minimum standards:

Seven (7) day strength	2500 psi.
Twenty-eight (28) day strength, footings	3500 psi.
Twenty-eight (28) day strength, all other work.....	4000 psi
Cement content foundations - minimum per cu. yd. .	5-1/2
bags	
Cement content per cubic yard, slabs.....	6-1/2
bags	
Air content by volume	5% to 8%

Concrete shall contain water reducing admixture and air entrainment admixture, as recommended.

Exterior walls and pavement to be IDOT Type X and shall include 6% - 8% air entrainment chemical.

- Q. POLYPROPYLENE FIBER REINFORCING
 - 1. Material shall be incorporated in the mix at 1.5 lbs. per cu. yd. concrete, slabs only.
 - 2. Manufactured by Fibermesh, Inc., or equal, 4019 Industry Dr., Chattanooga, TN 37416.

3. EXECUTION

3.1. ENVIRONMENT AND JOB CONDITIONS

- 1. Concrete shall not be poured at an air temperature below 40 degrees F. or above 100 degrees F.
- 2. The concrete, as specified, shall not be poured at temperatures below 40 degrees F. and shall be provided a means of maintaining not less than 70 degrees F. for five (5) days or 50 degrees F. for seven (7) days.
- 3. NO USE OF CHLORIDES OR ANTIFREEZE WILL BE ALLOWED.
- 4. When WRITTEN APPROVAL is issued, pouring of concrete at below 40 degrees F. may be allowed.
- 5. When so approved, and when outside temperatures are between 25 degrees F. and 40 degrees F., Type III cement shall be used or an additional one (1) sack per cubic yard of cement shall be used and placed materials shall be maintained at 60 degrees F. for three (3) days or 45 degrees F. for four (4) days and concrete shall have a temperature of 70 degrees F. to 80 degrees F. at the time of

placement. Additional requirements may apply, depending upon the applicable circumstances.

- 6. NO CONCRETE SHALL BE PLACED OVER A FROSTED BASE, ON FROSTED FORMS, OR WITH FROSTED REINFORCING, ALL SURFACES SHALL BE ABOVE FREEZING IN TEMPERATURE.
- 7. All concrete shall be protected from direct sun, direct wind and adverse weather for two (2) days after placement, regardless of air temperature.

3.2. FORMING

- A. Construct forms accurately to the shapes; and dimensions set forth and adequately brace, secure and tie forms to maintain line and level during pouring operation. Form bracing shall be of a type to allow adjustment thereof.
- B. Any failure of the forms to properly maintain position or properly perform in any manner shall be the responsibility of the Contractor.
- C. Forms shall be designed and installed in a manner which will not be injurious to the concrete when removed. Forms shall remain in place until the concrete is hardened, two (2) days minimum.
- D. Bank forming is allowed for footings only.

3.3. REINFORCING

- A. Size and locate reinforcement as called for in the Documents and accurately position and secure reinforcement to prevent shifting during pouring. Reinforcing steel shall be continuous around corners and through points of thickness variation.
- B. All reinforcing steel shall be kept covered and protected from deterioration at all times. Reinforcing steel shall be free of rust, scales, pints, form oil or bond reducing surface condition prior to pouring.
- C. Bars larger than #4 shall be shop fabricated to shape. Field heating for bending is not permitted.
- D. All splices shall be 36-bar diameters minimum. Welded wire fabric shall be lapped one (1) wire spacing (two (2) parallel cross wires).
- E. All steel shall be positioned to provide concrete clear cover as noted for the following conditions:

Earth, banked formed	.....	3"
Earth, formed	.....	2"
Exterior weathering	.....	1-1/2"
Interior	.....	1"
Interior, fire rated	.....	1-1/2"
Slab steel	.....	3/4"

- F. Form oils employed shall be non-staining and shall not leave a residue that will be detrimental to sealants, mastics or finished which may be applied to the surface.
- G. All slabs four inches (4"+) or greater shall be reinforced with 6" X 6"/#10 & #10 WWF.
 - 1. Bus lane shall be 7" thick and contain WWF.
- H. All elevated slabs on steel deck to be reinforced 6 X 6 10/10 mesh.
- I. All other slabs to be polypropylene fiber reinforced 1.5 lb. / cu. yd.

3.4. FOOTINGS

- A. All of the footing trenches shall be clean cut and full in measurement. Fill or backfill under footings shall not be permitted on the job. All footings shall rest on solid undisturbed earth unless specifically set forth otherwise.
- B. No loose materials (dirt knocked in during excavation or forming), debris of any type, muck or water shall be present within the footing trench at the time of concrete pour.
- C. All concrete shall be thoroughly mixed to achieve a uniform consistency of cement, fine aggregate and coarse aggregate without lumps or segregation at the point of placement. The water content shall be controlled by the Supplier to assure a workable mix at the point of placement.

3.5. PLACEMENT AND HANDLING

- A. Concrete shall be deposited in place in a manner to minimize segregation of aggregates. It shall be accurately deposited in the forms in a manner which will not allow significant horizontal flow of the concrete.
- B. Forms shall be uniformly filled the full length of the pour in approximately 3' lifts maximum.
- C. All concrete, except slabs, shall be compacted by means of a vibrator (slabs optional). The vibrator shall not be used to convey the concrete. Where a vibrator is employed in a vertical pour, it shall be used in a manner which does not disturb previous lifts and cause injury thereto.
- D. All of the interior slabs on grade shall be poured on 6 mil polyethylene vapor barrier. Lap joints and tape, or roll joints and staple.
- E. Concrete shall be placed in a continuous operation until the pour is completed. Construction joints not called for on the Drawings shall be approved by the Architect.

3.6. CONSTRUCTION JOINTS, EXPANSION, CONTRACTION, BOND BREAKERS

- A. Provide expansion joints, bond breakers and thermal breaks as detailed on the drawings.

- B. Exterior slabs shall have 1/2" asphalt impregnated expansion joints along all building walls, curbs and at approximately twenty-foot (20') center to center.
 - 1. Material shall be two (2) piece with top removable to provide for sealant S-4.
 - a. See Section 07600.
 - b. See Drawings for special locations.
- C. Exterior sidewalks shall have uniformly spaced score joints not to exceed 5'-0" o.c.
- D. Where practical, slab pours shall be made in approximately square sections. In no case, should the proportion of length to width on a slab pour exceed 3 to 1 without a joint.
 - 1. "Green" cut scores will be allowed on large pours.
 - 2. Joints and cut scores shall be planned to be unobtrusive, extend off inside corners.
 - 3. Fill joints after 90 days prior to floor installation. Select filler appropriate to floor cover.
- E. All construction joints in walls subject to weathering or earth shall have 1/2" X 1" reglet, provided with Styrofoam rope and be sealed with appropriate sealant.
- F. Joints shall occur where detailed or where approved by the Architect. Do not provide construction joints at locations other than those detailed, unless approved. Additional reinforcing may be required at non-detailed construction joints and shall be installed as directed at no additional charge to the Owner.

3.7. SLABS

- A. True to grade, full thickness.
 - 1. Checked any time prior to completion: slabs shall be within assigned level, 1/8" in 4', 1/4" in 10', 3/8" max. across entire floor.
 - 2. Ponding of water shall be limited to small areas, in compliance with above and not over 1/4" ponded depth.
 - 3. Floor drains shall always be below slab perimeter unless calls out otherwise.
 - a. Floor drains in Rooms 50A, 50B, 50C, 53 and 58 shall be level or 1/4" below floor surface.
 - b. Sump around drain, approximately 1/8" per foot in 4' X 4' area.
 - c. Slope toward drains full rooms or marked areas 1/16" per foot.
 - d. Sump at open site drains 1/4" to 3/8" per foot 2' X 2' area.

4. Floors sloped to drains should not pond water.
 - a. Grind if necessary to achieve drainage.
5. Level areas beyond drains should not be lower than rim surrounding the sloped floor area. In some cases shaping the sump creates an artificial rim effect; this shall be avoided.

3.8. STAIRS

- A. Exterior stairs, trowel in aluminum oxide shake on non-slip aggregate.
- B. Interior stairs, cast in 4" abrasive non-slip stair nose, 4" X 1/4" X full width single piece.

3.9. FINISHING

- A. Concrete footings and foundation footings shall be given float finish unless specifically set forth otherwise on the Drawings or herein these Specifications.
- B. All slabs, stairs and horizontal surfaces shall be troweled to a very dense, hard, smooth surface.
- C. Walls subject to backfill shall have voids filled, ties removed, lattice removed and be suitable to coating with damproofing.
- D. The walls above grade, not subject to view, utility and mechanical areas, shall have forms removed, voids filled, and ties removed.
 1. Polish walls above grade with limestone block using 50-50 cement and sand plus 2.1.H. bonding admixture.
- E. Walls in basement areas subject to view shall be filled, shall have ties removed and shall receive a medium rubbed surface of 50/50 sand to cement plus 2.1.H. bonding admixture.
- F. Trowel in abrasive, non-slip grit on stair treads and landing surfaces.
- G. Sidewalks shall be steel troweled and light broom finished.
- H. NO MISTING OR ADDITION OF WATER TO THE SURFACE FOR FINISHING OPERATIONS WILL BE PERMITTED. All concrete shall be poured at a workable slump and at a rate that will allow proper finishing with the manpower provided.

3.10. CURING

- A. All work shall be properly cured.
- B. All slabs shall receive a coat of Curing-Sealing Compound immediately following finishing. Sealer applied as curing does not count as seal coat to be applied at conclusion of job.

- C. Keep all freshly poured concrete protected for a period of seven (7) days with forms in place or mist frequently to prevent drying out. Maintain at 50 degrees F. during this period.
- D. Avoid loading or causing impact loading on new concrete for seven (7) days.
- E. Apply anti-spalling compound on all new exterior concrete slabs in October of the year of Owner occupancy. Apply no sooner than twenty-one (21) days following placement on all exterior slabs placed later than October when Owner occupancy is scheduled during that winter or spring season.

3.11. SEALING FLOORS

- A. All floors shall receive the following cure and seal treatment.
 - 1. All concrete
 - a. Cure and seal at time of pour ASTM C309
 - 2. Quarry tile floors
 - a. No additional cure or seal coats.
 - 3. Gym floor
 - a. One (1) liberal coat after clean up prior to application of the wood floor and at least five (5) days after pouring ASTM C309 acrylic tape.
 - 4. Tile and carpeted areas
 - a. One (1) very thin coat after clean up and prior to application of floor finishes.
 - 5. Sealed floors
 - a. Thoroughly clean up of spots, stains and repair of abrasions
 - b. Muriatic acid wash
 - c. Two (2) coats (to uniform sheen) or of a clear urethane type floor sealer suitable for wet locations
 - d. Strictly follow the Manufacturer's recommendations. If recommendations include an epoxy type prime coat, then that will eliminate one (1) coat of urethane finish as schedule above.
 - 6. Anti-spalling protection.
 - a. Apply anti-spalling compound on all new exterior concrete slabs in **October the year of Owner occupancy**. Apply no sooner than twenty-one (21) days following placement on all exterior slabs placed later than October when Owner occupancy is scheduled during that winter or spring season.

1. W.R. Meadows Lin-Seal Anti-Spalling compound.
2. Or, approved equal.

3.12. CEMENT GROUT AT COLUMN AND BEAM BEARING

A. Material

1. Non-shrink cement and washed sand/one (1) to two (2) part mix.
 - a. Compacted in place.
 - b. Reinforced where indicated on the Drawings.

END 03300

1. GENERAL

1.1. WORK INCLUDES

A. Base Bid

1. General Contractor shall furnish all labor and materials and complete all masonry work, of every nature, called for on the accompanying drawings or specified herein these Specifications. All masonry work consists of Concrete Masonry Units and Common Brick.
2. General Contractor shall leave or cut all of the openings in masonry construction required for work by the other Contractors and/or Subcontractors.
 - a. Provide and install lintels of proper size over all openings needed. (See Schedule in Drawings).
 - b. Where said lintel sizes are not established due to unforeseen condition, sizes shall be determined in conference with the Architect.
 - c. Install sleeves in the walls as provided by the various Contractors and Subcontractors at locations as required.
 - d. Make all repairs needed at masonry openings, etc., after other Contractors and Subcontractors have completed their work.

B. All joints shall be struck evenly and regularly and in a manner and style to match existing.

1. All head bed joints shall be cut clean at their intersections.

C. Where sealants or flashings are to be employed, joints shall be raked to proper dimensions. Sealants employed shall be as per sealant specifications.

1.2. RELATED WORK

A. Specified elsewhere

1. Section 03300 – Concrete
2. Section 07190 – Water Repellent Coatings
3. Section 07200 – Insulation (weepers and base block mesh)

1.3. QUALITY ASSURANCE

A. All work to be performed by experienced craftsmen.

B. All work and material to meet published standards of the Brick Institute of America.

1.4. EXISTING CONDITIONS

- A. This work will join an existing masonry wing wall built in 1967.

2. PRODUCTS

2.1. MASONRY UNITS

- A. Manufacturer: Obtain masonry units from one manufacturer, of uniform texture and color for each kind specified, for each continuous area and visually related areas.
- B. Standard Concrete Masonry Units (CMU/Concrete Block):
 - 1. Accepted Manufacturers:
 - a. Roanoke Concrete Products
 - b. Illinois Concrete Products
 - c. Cheetah Building Products
 - 2. Size: Manufacturer's standard units with nominal face dimensions of 16" long x 8" high (15 5/8" x 7 5/8" actual). CMU visible to the eye shall have the 16" x 8" face divided in to 3 panels with 2 3/8" grooves. See Drawing Detail.

2.2. FACE BRICK

- A. ASTM C216 Grade SW, type FBS, standard size brick, match existing.
- B. Brick selected is: HEBRON BRICK; color Champaign for accent panels and Maple for primary; texture – Rugg Vertical scratch texture.
 - 1. For pricing call Dennis Brummitt, Illinois Brick Company, 800 S. Ninth St., Springfield, IL Office: Telephone: 217-398-4300, cell: 217-621-7524.

2.3. MORTAR

- A. Portland Cement: ASTM C-150, Type I or IA.
- B. Aggregate for Setting Mortar:
 - 1. For all work: FA1 - Masonry sand.
- C. Water: Clean, free from deleterious amounts of acid, alkalies and organic materials.
- D. Lime: Hydrated Type S - ASTM C 207.
- E. Proportioning

1. One (1) part cement one (1) part lime, three (3) to four (4) parts masonry sand.
2. Admixtures shall not be used in mortar unless approved IN WRITING by the Architect/Engineer.
3. Use of accelerator or anti-freeze additives will not be allowed.
4. Min. mortar mix to equal Type N.

2.4. MASONRY REINFORCEMENT

- A. Exterior wall reinforcement double wythe, hot dip galvanized eye and pintle ladder style, 16" eye spacing, 9-gauge X 9-gauge cross ties and 9-gauge eyes. Insulation to span outer wythe of brick to inner wythe of CMU.
 1. Durawll, D/A 360
 2. Hohmann and Bernard, LOX-ALL
 3. Masonry Reinforcing Corp., Series 800
 4. Or equal
- B. Windbreak and wall to wall anchorage
 1. Wherein the Drawings indicate new exterior masonry wall abutting existing masonry walls, provide the following system:
 - a. 4" X 4" X ¼" windbreak steel angle full height of intersection walls/leg bolt to (E) wall – 3/8" dia. X 4" at approximately 2'-8" spacing.
 - b. Provide corrugated anchors / wall to wall at 8" spacing / each wythe.
 - c. Provide rope and sealant bead stuck smooth / full height at exposed wall intersections.

2.5. CAVITY WALL INSULATION

- A. All exterior masonry wall shall have 8" CMU inner wythe, 2" cavity and 4" outer wythe.
- B. Insulation shall be 2" polyisocyanurate with foil face.
 1. Insulation shall meet ASTM 1289-03 type 1. Apply product with foil face.

2.6. FLASHING

- A. Provide YORK 304 self-adhering and self-sealing stainless steel SILL flashing.
- B. Provide YORK copperseal 2 oz. copper sheet coated with modified asphalt for all window head and joint flashing.

3. EXECUTION

3.1. INSTALLATION

A. Mortar mix

1. Thoroughly mix mortar ingredients in quantities needed for immediate use.
2. Do not use antifreeze compounds to lower the freezing point of mortar.
3. Use mortar within two (2) hours of mixing at temperatures over 80 degrees F., and two and one-half (2-1/2) hours at temperatures between 80 degrees and 50 degrees F. Under 50 degrees use within three (3) hours.
4. Retemper mortar within two (2) hours of mixing to replace water lost by evaporation. Do not retemper after two (2) hours of mixing.

B. Placement

1. All masonry walls shall be carried up to the full height allowed by floor, deck or structural steel above.
2. All masonry horizontal joints shall be level and full to support joists, beams, floors, sills etc. above.
3. Where masonry work is required to be laid over structural stall, a harder course shall be the base course.
4. All masonry units shall be sound and reasonably straight as judged by the Architect, in keeping with specific use to which the units are put. Unit sizes shall be standard for the material and shall comply with the coursing set forth on the Drawings.
5. Where beams bear on masonry provide 5 or 6 course of solid concrete brick under the bearing area. Where joists bear on masonry provide minimum three (3) course of concrete brick under the bearing plate.

C. Bonding

1. All masonry work shall be bonded unless specifically indicated otherwise on the accompanying Drawings or herein these Specifications.
2. All piers shall be bonded each course, insofar as this is practical. All walls and piers intersecting structural walls shall be bonded with structural wall every other course.
3. Where bonding is not practical, approved galvanized metal ties shall be used and the ties shall be set approximately one (1) per 1-1/2 square feet of wall surface.
4. Where new masonry adjoins existing wing wall, delete wall insulation to form a new pier 8" deep. See paragraph 2.3.B.

D. Joints, Back plastering and Parging

1. All joints shall be struck evenly and regularly and in a manner and style to match existing (slight concave). All put-log holes shall be carefully filled and struck. Head and bed joints shall be cut clean at their intersections.

2. All head and bed joints in all masonry work shall be full joints and SHALL BE CROSS WEBBED.
 3. Tool all joints with round groove tool.
 4. There will be control joints in this work. See Elevation.
- E. Hot weather construction
1. Strictly comply with ACI 530-99 / ASCE 5-99 / TMS 402-99.
- F. Reinforcing
1. Reinforcing shall be placed in bed joints continuous at 16" spacings, measured vertically, beginning a maximum of 16" above footing. Extra reinforcing in the first bed joint immediately above and below openings shall be continuous for a distance of 4'-0" beyond each jamb of the opening.
 2. Lap reinforcement sufficiently at splices, 8" minimum, to ensure continuity; corners shall be cut and bent.
 3. Wall reinforcing shall not pass through vertical masonry control joints, except where required for structural reasons as noted on the Drawings.
 - a. Smooth bars through bond beams are required.
 4. Reinforcing shall be proper size for all thicknesses.
 5. See Drawings for Bond Beams.
- G. Insulation shall be placed with back to CMU wythe, and foil face to the brick wythe. Make sure the insulation is adjacent to the CMU so that an air space is between the brick and insulation if possible.
1. Install continuous polyester plastic mesh vent in cavity at sill flashing.
 2. Install weep vent tube at 24" o.c.
 3. Products may be Homann & Barnard Inc.
- H. CLEANING DOWN FINISHED MASONRY: All brick work shall be cleaned of mortar drippings, joints finished down, and the entire surface washed.
- I. All brick masonry shall have water-repellent product installed. See Specification Section 07190.

END 04200

1. GENERAL

1.1. DESCRIPTION

- A. Provide structural steel as shown on the Drawings and specified herein, including but not necessarily limited to:
1. All steel normally falling under definition of structural steel as set forth in latest edition of AISC Code of Standard Practice, Section 2.
 2. All steel items reasonably implied but not specifically mentioned on the Drawings or specified herein to render work secure and complete. This includes all connections and erection accessories.
 3. All structural steel (beams, lintels, bearing plates, etc.) exposed to the building exterior envelope - atmosphere shall be galvanized (see 2.1.F.) and finish coated/09900) after shop fabrication.

1.2. RELATED WORK

- A. Specified elsewhere:
1. DIVISION 0 - BIDDING & CONTRACT REQUIREMENTS
 2. DIVISION 1 - GENERAL REQUIREMENTS
 3. 01055 - Anchorage & Fastenings

1.3. QUALITY ASSURANCE

- A. Manual of AISC, Ninth Edition 1989
1. ASIC "Code of Standard Practice for Steel Buildings and Bridges"
 2. AISC "Specifications for the Design, Fabrication and Erection of Structural Steel of Buildings" including Supplement No. 3
- B. ASTM A6-72 "General Requirements for Delivery of Rolled Steel Plates, Shapes and Bars for Structural Use"
- C. AWS - "Standard Code of Arc and Gas Welding in Building Construction"
- D. "Specifications for Assembly of Structural Joints Using High Strength Steel Bolts" as approved by the Research Council on Riveted and Bolted Structural Joints of the Engineering Foundation
- E. Prime coat, whether factory or field applied, shall have nicks and skins touched up, wherein the primer coat is the final coat or the primer coat is base for the pursuing coatings.
1. Steel members (lintels) exposed to exterior shall be hot dipped galvanized after fabrication.

1.4. PROOF TESTING SERVICES

- A. Testing shall be applicable only whereupon the Architect/Engineer has rejected the Contractor's work and so notified the Contractor thereof.
- B. The Contractor may employ, at his own expense, a Testing Laboratory (or laboratories) selected by the Architect/Engineer to perform all tests and submit reports of all tests specified.
- C. The Testing Laboratory shall be responsible for conducting and interpreting the tests and shall state in each report whether or not the test results conform to the Contract Documents.
- D. The Owner may employ an independent inspector.

1.5. SUBMITTALS

- A. Submit shop drawings with complete fabrication and erection details and schedules in accord with 01340.
 - 1. Shop drawings shall have been thoroughly checked by the Fabricator before being submitted to the Architect/Engineer for review. Review is a precautionary measure only and shall not relieve the Fabricator of full responsibility of correctness of all materials, sizes, dimensions and details.
 - 2. In case structural sections or details indicated on Drawings cannot be readily obtained, substitution of sections or details of equal strength which conform to the requirements of design may be made only if approved.
 - 3. Fabrication shall not proceed until shop drawings have been reviewed. Fabrication, assembly and erection shall conform to reviewed and approved shop drawings.

2. PRODUCTS

2.1. MATERIALS

- A. Structural Steel: ASTM A 36-70a.
- B. Welding Electrodes: AWS Specifications, Designation A233 (E-60 or E-70)
- C. High Strength Bolts: ASTM A325-71a – beam to beam / beam to column
 - 1. Always provide washers.
 - 2. Beveled washers where needed.
- D. Standard Bolts: ASTM A 307-76b – anchor bolts
- E. Rivet Steel: ASTM A 502-76

- F. Galvanizing: ASTM A 123 two (2) oz. per square foot for all steel embedded in exterior walls supporting the exterior wythe (brick).
- G. Priming: All steel shall be given one (1) shop coat (two coats for members, embedded in exterior walls) of Red Oxide Alkyd primer, lead free.

2.2. FABRICATION

- A. Material shall be properly marked and match-marked where field assembly so requires. The sequence of shipments shall be such as to expedite and minimize the field handling of material.
- B. Beams and girders shall be cambered as required for loading conditions.
- C. Built up sections assembly by welding shall be free of warpage and all axes shall have true alignment.
- D. Welds not specified shall be continuous fillet welds, using not less than the minimum fillet as specified by AWS.
 - 1. 1/16" less than thinnest material up to 1/4" weld, then as specified.
- E. Take field measurements as required to verify and supplement dimensions shown on the Drawings.
- F. Provide anchor bolts and embedded plates for anchoring structural steel to the supporting concrete and masonry. Furnish, as soon as possible, detailed plans showing exact locations of all bolts to be built into concrete or masonry. Furnish templates as required.
- G. Connections:
 - 1. Field connections shall be bolted, unless otherwise noted on the Drawings. Field welded connections shall be used only where they are specifically shown on the Drawings or with A/E's approval.
 - 2. Shop connections may be riveted, welded or bolted with high strength bolts at Contractor's option. All shear connections shall be welded or bolted with high strength bolts.
 - 3. If high strength bolts are used, they shall be installed in strict compliance with AISC Specifications and ASTM A325 requirements for installation of A325 bolts.
 - 4. All structural critical field and shop welds shall be by certified welder only. The Certificates should be available for inspection by the Architect/Engineer.
 - 5. All connections not specifically shown shall fully develop critical load for member being connected.
 - 6. Bolts, where used, shall have cut washers under nuts and no threads allowed to bear on parts being connected.
 - 7. Bearing ends of columns shall be milled or sawed for true bearing on base plates. Rough bearing ends shall not be used.

- H. At brick plates and supporting flanges, provide No. 9 wire full length three inches (3") inside exposed edge – one-inch (1") tack weld at sixteen inches (16") spacing.
 - 1. See Drawings for specific exceptions and designations.
- I. All columns adjacent to unit masonry shall have adjustable anchors at twenty-four inches (24") o.c.
 - 1. See Drawings for specific exceptions and designations.

2.3. CLEANING - SHOP PAINTING

- A. All steel furnished shall be cleaned of rust, mill scale, dirt and foreign matter before application s to shop coat of paint.
- B. Paint structural steel with one (1) coat of red oxide alkyd paint. Apply additional coats as needed on surfaces skinned, nicked, burnt or peeled after assembly and erection. Horizontal steel embedded in exterior masonry wall such lintels and beams shall receive one (1) coat of epoxy primer.
- C. All steel under this heading, unless specifically noted otherwise shall be given one (1) smooth, shop coat of 2 mil dry film thickness.
- D. Hand clean and solvent-clean all unpainted and damaged shop coat areas and touch up with a compatible shop coat primer.

- 2.4. GALVANIZING - all lintels embedded in and supporting exterior face brick shall be hot dip galvanized. Only the portion effecting brick work is required to be galvanized.

3. EXECUTION

3.1. INSTALLATION

- A. Material stored at the job site shall not exceed design loads on structures so the members will not be distorted or otherwise damaged and all materials shall be protected against corrosion or deterioration.
- B. Confer with other contractors and procure necessary templates and other information required to establish number, size and location of holes or other details necessary for attachment of blocking, windows, purlins.
- C. Burning shall not be used to form holes, enlarging of holes or matching of unfair holes. No member shall be altered in field unless approved IN WRITING by the Architect/Engineer.
- D. Throughout all phases of erection and construction temporary bracing shall be introduced wherever necessary to take care of all loads to which structure may be subjected including equipment and operation of same. Wherever piles of material, erection equipment, or other loads are carried

during erection, proper provisions shall be made to safely support these abnormal loads.

- E. All members shall be cut neat, square and should be erected true and flush without twists and open joints. Light drifting to draw holds together may be used. Reference should be made to codes and specifications listed in this Section under Quality Assurance which governs all phases of fabrication, details, erection and workmanship. Responsibility for all errors of fabrication and for proper fitting of various members shall be assumed by the Contractor.
- F. Column bases shall be set on steel shims. Grouting of column bases shall be with a non-shrink, non-metallic grout.
- G. All steel exposed to view shall be free of surface imperfections and ground off to true surfaces. Exposed welds shall be ground smooth.
- H. Provide steel lintels at all locations of mechanical work passage through walls.
 - 1. Locate in conjunction with mechanical installers.

3.2. CONSTRUCTION BRACING

- A. A/E design and detailing is for finished product only. Erection rigging, bracing and handling practices are the Contractor's responsibility.
 - 1. A/E neither directs nor schedules installation.
 - 2. A/E inspects only for installation conditions related to finished product.
- B. Provide all necessary additional bracing, clips, anchors and reinforcement as needed.
 - 1. Remove after erection when exposed to view or when design load shifts will result.

3.3. ANCHORAGE

- A. All structural steel shall be mechanically anchored.
 - 1. As detailed.
 - 2. Similar to detailed work for items not specifically detailed.
- B. Masonry lintels may be an exception.
 - 1. Loose set except where noted.
 - 2. Weld back to back lintel angles 2" weld at 12" spacing top to bottom.
- C. Fully embed steel in masonry unless detailed otherwise directed by A/E in field.

3.4. PROOF INSPECTIONS

- A. Welded connections shall be inspected by the Architect/Engineer in accordance with the following:
 - 1. All welds will be visually inspected for minimum size, length and for defects.

- B. Bolted connections will be inspected in accordance with the following:
 - 1. High strength bolted connections shall be checked and approved by the "inspecting wrench" method outlined in the "Specifications for Assembly of Structural Joints Using High Strength Steel Bolts" hereinbefore specified.
 - 2. Proof test as requested by the Architect.

END 05120

1. GENERAL

1.1. DESCRIPTION

- A. Steel joists as shown on the Drawings and specified herein, including accessories.
- B. Related work specified elsewhere:
 - 1. DIVISION 1 - GENERAL REQUIREMENTS
 - 2. 05120 - Structural Steel

1.2. QUALITY ASSURANCE

- A. Steel joists shall be standard prefabricated units of a member manufacturer or the Steel Joist Institute. In lieu of the foregoing, nonmember manufacturers shall submit certification that the joists to be furnished conform to the Steel Joist Institute's Standard specification and load tables.
- B. Steel joists manufactured of light gauge cold formed steel are acceptable for installations requiring field welds to the top chord member only when the Contractor submits certification that the type and method of field welding will satisfy all structural requirements, including diaphragm shear requirements, for floor and roof assemblies.
- C. The design, fabrication and erection of steel joists shall be in accord with the "Standard Specifications and Load Tables for Open Web Steel Joists/Longspan Steel Joists" of the Steel Joist Institute, latest edition, except as otherwise shown on the Drawings or specified herein.
- D. Welding shall comply with American Welding Society "Structural Welding Code: AWS D1.1. Rev. 1/73".

1.3. SUBMITTALS

- A. Submit the following in accord with Section 01340:
 - 1. Manufacturer's Literature: Specifications and design data
 - 2. Shop Drawings: Show joist layout, details of bearings, anchorage, bracing, bridging, etc.
 - 3. Design Calculations: Submit calculations stamped by a licensed professional engineer who certifies that the joists have been designed in accord with AISC-SJI standard specifications.
 - a. This submittal is waived if fabricator is SJI member.

1.4. PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver, handle and store joists as recommended by AISC-SJI specifications.

- B. Exercise care at all times to avoid damage through rough handling during hauling, unloading, storing and erecting. Joists shall not be dropped or overstressed or stored in a bowed condition.
- C. Replace materials that have been damaged or are otherwise unsuitable. When ascertained, immediately remove such material from job site.

2. PRODUCTS

2.1. MATERIALS

- A. Structural Steel: ASTM A 36-77a.
- B. Welding Electrodes: AWS Specifications
- C. Accessories: Provide all applicable accessories necessary to complete the installation, such as but not limited to side and end wall anchors, headers, horizontal or diagonal bridging, extended ends full bottom chord extensions, joist bearing plates, anchor bolts, and government anchors.
- D. Shop Paint: Rust inhibitive paint complying with Steel Joist Institute Specifications of latest adoption.

2.2. FABRICATION

- A. Fabricate joists in accord with AISC-SJI Standard Specifications and load tables for span indicated.
 - 1. Note: On this project, special extended ends are required.
- B. Top chords shall be designed as continuous members subject to direct axial and bending stresses, in accord with the Standard Specifications.
 - 1. See Drawings for extended top chords requirements.
- C. Steel joists shall be of type shown.
- D. Minimum bearing for joists shall be 2-1/2" on steel and min. 4" on masonry. Longer bearing may be required by details and notation on structural drawings.
 - 1. Provide required bearing plates per Steel Joist Institute Standards.
 - 2. Size plates for 250 psi bearing onto masonry.
 - a. All plates to have two (2) 3/8" X 4" studs embedded in masonry or concrete.
- E. Size, type, and spacing of bridging shall be in accord with Steel Joist Institute recommendations, unless otherwise shown.
- F. All joints of steel joists shall be made by arc-welding. Connections at ends

of members shall be proportioned to develop actual design stress but not less than fifty percent (50%) of the allowable design strength of the members.

- G. Ceiling extensions for joist ends shall be furnished where suspended ceilings occur below joists.
- H. Thoroughly clean joists and accessories and apply a shop coat of paint specified to provide a minimum dry film thickness of 1.50 mils.

3. EXECUTION

3.1. INSTALLATION

- A. Field welded and bolted connections shall be in accord with AISC-SJI standard specifications for type of joist used.
- B. Where joists are supported on steel members they shall be connected by welding, unless otherwise shown.
- C. As soon as joists are erected they shall be permanently fastened in place and all bridging completely installed before the application of loads. Bridging shall be continuous, and anchored to end walls or beams.
 - 1. Where substantial construction is not provided, open side condition occurs or adjacent construction is not completed, provide diagonal bridging in addition to horizontal bridging at the last full joist space.
 - 2. Where work of other trades (such as ductwork) interferes with bridging, add diagonal bridging in addition to straight bridging in joist spaces on each side of conflict to allow deletion of top or bottom bridging in one (1) joist space.
- D. After erection of joists, touch up all welds and surfaces where shop paint has been abraded or improperly applied with same paint used for shop coat.

3.2. CONSTRUCTION BRACING

- A. A/E design and detailing is for finished product only. Erection rigging, bracing and handling practices are the Contractor's responsibility.
 - 1. A/E neither directs nor schedules installation.
 - 2. A/E inspects only for installation conditions related to finished product with deck installed.
- B. Provide all necessary additional bracing, clips, anchors and reinforcement as needed.
 - 1. Remove after erection when exposed to view or when design load shifts will result.

3.3. DESIGN APPLICATION

- A. All roof joists are designed for uplift loading due to wind.
 - 1. Provide appropriate bearing plate and bottom chord bridging.
 - 2. Provide anchor bolts to bond beams.

3.4. WELDING

- A. Bearing ends to be welded a min. of 2" X 3/16" fillet both edges at steel and/or bearing plates.
- B. Tie downs, tab over joist and 1" weld along each edge.

3.5. INSTALLATION OF BRIDGING

- A. All bridging and bridging anchors shall be completely installed before construction loads are placed on the joists. Bridging shall support the top and bottom chords against lateral movement during the construction period and shall hold the steel joists in the approximate position as shown on the plans.
- B. The ends of all bridging lines terminating at wall or beams shall be anchored thereto at top and bottom chords.

END 05210

1. GENERAL

1.1. BASE BID WORK INCLUDES

- A. Roof deck

2. PRODUCTS

2.1. MATERIALS - ROOF

- A. Metal Decking - Roof
 - 1. 20 gauge galvanized decking, Type B
 - 2. Mechanical anchors or welding as needed for I-90 to supporting structural system. 12-6-12 attachment pattern, 6-6-6 along edges.
- B. Reinforcing Flat Metal
 - 1. 16 gauge galvanized

3. EXECUTION

3.1. INSTALLATION

- A. Areas subject to reinforcement are to be laid out in conference on site with the A/E representative.
- B. Provide anchorage to structure.
 - 1. Anchorage is directly to main structurals. 12-6-12 field, 6-6-6 ends.
 - 2. Anchorage to be mechanical, power driven deck anchors (such as Hilti ENPH2 Series) or puddle welds with washers less than 20-gauge deck.
 - 3. Pull over / pull off rating shall be 400 lbs. per anchor.
- C. Provide flat stock strip metal sixteen inches (16") wide.
 - 1. Where deck changes direction.
 - 2. Where deck requires cutting top of deck to fit or bend to slope change.
 - 3. Any odd closures that become necessary such as over cut openings, wall closures, etc.
 - 4. Fasten at each high rib of intersecting deck or 6" o. c. at parallel ribs.
- D. Seal below flutes to walls as needed for sound or infiltration protection.
 - 1. Mineral wool stuffed for sound.
 - 2. Fire seal at firewalls (determined by rated openings into space).
 - 3. At all walls extended to deck above.

END 05300

1. GENERAL

1.1. WORK INCLUDES

A. Base Bid:

1. General Contractor shall provide:

- a. Non-loadbearing metal stud wall framing, with anchorage and bracing.
- b. Metal ceiling framing for Rooms 50A, 50B, and 50C. with anchorage and bridging.
- c. Formed steel shaped sections, 14-gauge and 16-thickness gauge (as indicated on drawing) and lighter for load bearing framing with floor and ceiling track, bracing, furring, bridging, for assembly generally using mechanical fastenings.

2. Alternate Bid:

- a. None

1.2. RELATED WORK

A. Specified elsewhere:

1. 09250 - Gypsum Wallboard

1.3. SYSTEM DESCRIPTION

A. Performance Requirements

1. All products, specifications and installation details shall meet the 1996 Edition of the American Iron and Steel Institute (AISI) "Specifications for the Design of Cold-Formed Steel Structural Members."

1.4. QUALITY ASSURANCE

A. Qualifications of Erector:

1. Minimum of three (3) years successful experience on comparable cold-formed metal framing projects.
2. Welders qualified in accordance with AWS D.1.

- B. Regulatory Requirements: Erect cold-formed metal framing to meet requirements of IBC 2006.

1.5. REFERENCES

- A. ASTM A446, Grade D, minimum yield 50,000 psi - Structural Steel.

- B. AWS D1.1 - Structural Welding Code.
- C. SDI Standard #1 - Steel Deck Institute.
- D. ASTM A446-76 - Steel Sheet, Zinc-coated (galvanized) by hot dip process, physical structural quality.
- E. ASTM A90-69 - Weight of Coating on Zinc-coated galvanized iron or steel articles.

1.6. DELIVERY, STORAGE & HANDLING

- A. Deliver products to site in accord with Standard Documents for Construction.
- B. Store products on site in accord with Standard Documents for Construction.

2. PRODUCTS

2.1. METAL STUDS, HEADERS, TRACK AND ACCESSORIES

- A. All products to be manufactured by the current members of the Steel Stud Manufacturers Association.
- B. All galvanized studs and joists shall be formed from steel that corresponds to the min. requirements of 1996 AISI standards.
- C. All structural members shall be designed in accord with the American Iron and Steel Institute (AISI) "Specifications for the Design of Cold-Formed Steel Structural Members" 1996 Edition.
- D. Provide all accessories including but not limited to, tracks, clips, web stiffeners, anchors, fastening devices, resilient clips and other accessories required for a complete and proper installation, and as recommended by the manufacturer for the steel members used.
- E. Fastening of components shall be with self-drilling screws or welding. Screws or welds shall be of sufficient size to insure the strength of the connection. All welds of galvanized steel shall be touched up with a zinc-rich paint. All welds of carbon sheet steel shall be touched up with paint. Wire tying of components shall not be permitted.

2.2. ACCEPTABLE MANUFACTURERS

- A. Clark Dietrich, West Chester, OH 45069, 888-437-3244
- B. Dale Industries Inc., Dearborn, MI 48128, 313/846-9400, 800/882-7883
- C. Unimast Inc., Franklin Park, IL 60131, 708/451-1410, 800/323-0746

2.3. MATERIALS

A. Steel Framing

1. Studs, Interior Wall: Size as detailed, depth to provide total wall thickness shown in conjunction with finish surfaces or cladding indicated. Thickness determined by design conditions; galvanized.
 - a. See detail on drawing for material selection.
2. Track: Formed galvanized steel; channel shaped; same width as studs, for tight fit; 16 gauge solid web.

B. Accessories

1. Bracing, Furring, Bridging: Formed galvanized sheet steel; channel and strip shaped as indicated or as appropriate to conditions.
2. Plates, Gussets, Clips: Galvanized formed steel, thickness determined for conditions encountered as detailed, use manufacturer's standard shapes when available.
3. Infiltration Barrier: Install Styrofoam infiltration pad between base plate and concrete sill.
4. Install Owens Corning Acoustimac Sound Sealing insulation panels in walls and between ceiling joists.

C. Fastenings

1. Self-drilling, self-tapping screws, bolts, nuts and washers: hot-dipped galvanized: ASTM A90-69.
2. Anchorage Devices: Power driven or powder actuated, drilled expansion bolts; screws with sleeves or tapcons.
3. Welding: AWS D1.1.

D. Finishes

1. Galvanizing: ASTM A90-69, 1.25 oz./sq. ft.
2. Primer: Zinc chromate touch-up for galvanized surfaces.

2.4. FABRICATION

- A. Form members to manufacturer's standard shapes meeting design criteria.
- B. Cut right angle connections of framing components to fit squarely against abutting members. There shall be no gaps in structural walls.
- C. Connect members together by self-drilling #8 pan head screws--four (4) screws per connection in structural walls.
- D. Galva-Prime non-galvanized steel to 1.5 mil minimum dry film thickness.

3. EXECUTION

3.1. ERECTION

- A. Align floor and ceiling tracks, locating to wall layout. Secure in place with screws or welding at maximum 16 inches o.c.
 - 1. Sixteen inches (16") o.c. maximum non-structural
 - 2. Twenty inch (20") o.c. max for ceiling framing.
- B. Place studs at sixteen inches (16") o.c. and not more than two inches (2") from abutting walls and at each side of openings. Connect studs to tracks using clips and ties, screws, or welding, in accordance with manufacturer's recommendations. Check manufacturer's recommendations for structural stud for mezzanine and follow.
- C. Construct corners using minimum three (3) studs. Double studs at door, window and sidelight jambs. Install intermediate studs above and below openings to match wall stud spacing.
- D. Provide deflection allowance below supported horizontal building framing in ceiling or head track for non-load bearing framing.
- E. Attach cross studs or furring channels to studs for attachment of fixtures behind lavatory basins, toilet and bathroom accessories, grab bars and other items anchored to partitions or walls.
- F. Install additional framing between studs for attachment of:
 - 1. Electrical boxes and other mechanical and electrical items
 - 2. Door bumper stops
 - 3. Hardware
 - 4. Wall supported equipment and accessories

3.2. INSTALLATION (AXIAL LOAD-BEARING)

- A. Runners shall be securely anchored to the supporting structure as shown on the Drawings.
- B. Complete, uniform and level bearing support shall be provided for the bottom runner.
 - 1. Install Styrofoam bearing pad between concrete sill and metal plate.
- C. Framing of wall openings shall include headers and supporting studs as shown on the Drawings.
- D. Studs shall be plumbed, aligned and securely attached to flanges for both upper and lower runners.

- E. Splices in axially loaded studs shall not be permitted.
- F. Erect load bearing studs one piece full length. Splicing and wire tying of framing components is not permitted. Join members forming trusses by welding.
- G. Erect load bearing studs, brace, and reinforce to develop full strength to meet design requirements.
- H. Make provision for erection stresses. Provide temporary alignment and bracing. Touch-up field welds and scratched or damaged galvanizing.
- I. Ensure framing provides true and flat surfaces, ready to receive gypsum board finish.
- J. On load-bearing wall place one (1) stud approximately in line with each steel roof joist. See Structural Plan.
- K. For acoustical insulation if panels are used fit around studs & bridging.

END 05400

1. GENERAL

1.1. WORK INCLUDES

A. Base Bid

1. Contractor shall provide incidental metal work required and shown on the Drawings – grab bars.
2. Contractor shall:
 - a. Consult the drawing for incidental, ornamental and safety fabricated metal work.
 - b. Take field measurements and submit Shop Drawings.
 - c. Hangers.
 - d. Drain line supports.

1.2. RELATED WORK

A. Specified elsewhere

1. 01055 - Anchorage & Fastenings
2. 03300 - Concrete
3. 04200 - Unit Masonry
4. 07900 - Sealants & Caulks
5. 09900 - Painting

1.3. QUALITY ASSURANCE. Regulatory Requirements: Illinois Steel Products Procurement Act, as amended (Illinois Revised Statutes, ch. 48, par. 1801 et. seq.).

1.4. SUBMITTALS

A. Submit Shop Drawings in accordance with 01340.

1. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.
2. Include erection drawings, elevations, details as applicable.
3. Indicate welded connections using standard AWS welding symbols. Indicate net weld lengths.

2. PRODUCTS

2.1. MATERIALS

A. Steel Sections: ASTM A36-77a.

B. Steel Tubing: ASTM A53, Grade B.

1. Handrail tube to be nominal 1¼“diameter O.D. 1.66” standard weight.

2. Provide appropriate steel brackets for welding to post or bolting to wall.

C. Bolts, Nuts, and Washers: ASTM A36-77a minimum.

D. Welding Materials: AWS D1.1; use correct type for materials being welded.

E. Primer: Red for shop application and field touch-up. See Section 09900.

2.2. FABRICATION

A. Verify dimensions on site prior to shop fabrication.

B. Fabricate items with joints tightly fitted and secured.

C. Fit and shop assemble in largest practical sections for delivery to site.

D. Grind exposed welds flush and smooth with adjacent finished surface finished surface. Ease exposed edges to a 1/8" uniform radius.

E. Exposed Mechanical Fastenings: Flush countersink screws or bolts, unobtrusively located, consistent with design of structure, except where specifically noted otherwise.

F. Supply all components for anchorage of metal fabrications. Fabricate anchorage and related components of same material and finish as metal fabrication, except where specifically noted otherwise.

2.3. PRIMING PROTECTIVE COATINGS

A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

B. Clean all ferrous metal in accordance with applicable requirements of SSPC-SP1 (Solvent Cleaning) followed by cleaning with applicable requirements of SSPC-SP2 (Hand Tool Cleaning).

C. Apply specified primer to all ferrous metal surfaces by brush or spray to a dry film thickness of 2 mils. (100% cover)

D. Primer paint applied on ferrous materials shall be in accordance with Section 09900.

2.4. MANUFACTURERS

A. R.B. Wagner, Milwaukee, WI, phone 888/243-6914

B. Or equal

3. EXECUTION

3.1. PREPARATION

- A. Obtain Architect/Engineer's WRITTEN APPROVAL prior to site cutting or making adjustments not scheduled.
- B. Clean and strip site primed steel items to bare metal where site welding is scheduled.
- C. Make provision for erection loads with temporary bracing. Keep work in alignment.

3.2. INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
 - 1. In case of stair railing - parallel to stair noses.
- B. Perform field welding in accordance with AWS D1.1.
- C. After installation, touch-up, field welds, scratched or damaged surfaces with primer. Primer shall be same material as shop primer.

3.3. ADA SUPPORT RAILINGS

- A. Install per manufacturer's instructions for manufactured items.
- B. Wall - bracket mounted handrails shall be 1.66" O.D. at 34" above floor.
 - 1. Railings to meet OSHA regulations, BOCA and Illinois Accessibility Code.

3.4. MISCELLANEOUS FRAMES AND SUPPORTS

- A. Provide miscellaneous metal angles, plates and assemblies shown on Drawings with anchors, bolts and accessories required, including but not necessarily limited to the following:
 - 1. Steel lintels at all openings/typical per opening shown on the Drawings.
 - 2. Shelf angles
 - 3. Clip angles
 - 4. Seat angles
 - 5. Sub-structural members per Detail Drawings
 - 6. Pipe hangers

3.5. MISCELLANEOUS SPECIALTIES

- A. Provide miscellaneous assemblies shown on the Drawings, with anchors and accessories required, including but not limited to:
 - 1. Exterior roof ladder, hot dip galvanized
 - 2. Roof access ladder, primed

3. Stair and ramp railings
 - a. Per Details
 - b. Per Code for height, run, anchorage, sphere clearance
4. Elevator pit ladder
5. Stair treads and risers

END 05500

1. GENERAL

1.1. WORK INCLUDES

A. Base Bid:

1. Contractor provide custom metal side panels at HVAC units.

1.2. RELATED WORK

A. Specified elsewhere:

1. 07600 – Sheet Metal Flashing & Trim
2. 07900 – Sealants & Caulk

2. PRODUCTS

2.1. METAL MATERIAL

- A. Ceiling Trim: 24-gauge galvanized pre-finished white
- B. HVAC unit closure panel: .050 mil finish aluminum
- C. Duct Modifications: Galvanized sheet metal with G90 finish

2.2. METAL FABRICATION

- A. Metal trim – provide hemmed edges on all exposed edges.
 1. Fabricate as shown on Drawings.
 2. Provide material with fewest joints as **possible.**
 3. **Coordinate trim layout with ceiling and wall work.**

3. EXECUTION

3.1. INSTALLATION

- A. Secure all sheet metal trim to firm solid material.
 1. Any screw connections, which are visible must be smooth pan head of same material and finish of metal.
- B. Duct modifications shall be installed according to SMACNA standards and comply with leakage classification 12.

END 05580

1. GENERAL

1.1. WORK INCLUDES

- A. The Contractor shall provide rough carpentry as shown on the Drawings and specified herein.
 - 1. Framing and forming for concrete work.
 - 2. Provide spacers and braces where required to secure the finished wall surface in continuous plane surface.
 - 3. Incidental alteration required to allow for specified work.
 - 4. Provide blocking pursuant to existing and new roof work.
 - 5. Provide solid 2" X 6" crippled blocking between studs at anchorage points for railing brackets, accessory fixtures, etc., as applicable.

1.2. RELATED WORK

- A. Specified elsewhere
 - 1. Section 03300 – Concrete
 - 2. Section 07530 – EPDM Elastomeric Membrane Roofing
 - 3. DIVISION 8 - DOORS & WINDOWS

1.3. PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Immediately upon delivery to site, place materials in area protected from weather.
- B. Store materials a minimum of six inches (6") (150 mm) above ground on frame work or blocking and cover with protective waterproof covering, providing adequate air circulation or ventilation.
- C. Seasoned materials shall not be stored in wet or damp areas.

1.4. QUALITY ASSURANCE

- A. Grading Rules:
 - 1. Lumber grading rules and wood species shall conform with Voluntary Product Standard PS 20-75.
 - 2. Grading rules of the following associations shall also apply to materials produced under their supervision:
 - a. Northeastern Lumber Manufacturer's Association, Inc. (NELMA).
 - b. Southern Pine Inspection Bureau (SPIB).
 - c. West Coast Lumber Inspection Bureau (WCLIB).
 - d. Western Wood Products Association (WWPA).
 - e. Redwood Inspection Service (RIS).

3. Plywood shall conform to the following:
 - a. Softwood Plywood - Construction and Industrial: Product Standard PS 1-74.
 - b. Hardwood Plywood: Product Standard PS 51-71.

2. PRODUCTS

2.1. MATERIALS

A. Lumber:

1. Dimensions:
 - a. Specified lumber dimensions are nominal: verify actual dimension required to accomplish the details shown.
 - b. Actual dimensions shall conform to industry standards established by the American Lumber Standards Committee and the rule writing agencies.
2. Moisture content: nineteen percent (19%) maximum at time of permanent close in of building or structure, for lumber 2" or less nominal thickness.
3. Surfacing: surface four sides (S4S), unless otherwise shown, or specified.
4. Framing lumber: 2" (51 mm) to 4" (102 mm) thick, 2" (51 mm) to 4" (102 mm) wide, any commercial softwood species, unless otherwise shown or specified.
 - a. Light Framing:
 - 1) General Framing: Standard and Better Grade.
 - 2) Plates, Blocking, Bracing & Nailers: Utility grade.
5. Boards: 1 in. (25 mm) to 2 in. (51 mm) thick; any commercial softwood species, unless otherwise shown or specified. Furring and grounds shall be minimum No. 1 Common Grade.

B. Plywood: CC EXT-APA.

1. 5 ply minimum.
2. Preservative treated when used as sheathing, decking or anchorage under roofing, under metal facing and facing clips, underlayment, and in back of brick veneer.
 - a. Minimum treatment .25 lbs. pcf in accord with 2.1.C.1.a. herefollowing.

C. Pressure Treated Wood:

1. Preservative pressure treated wood and all roof related blocking and sheathing: Waterborne salt preservatives for painted, stained, encapsulated or exposed natural wood products:

- a. ACQ

D. Rough Hardware:

1. Bolts: FS FF-B-575C.
2. Nuts: FS FF-N-836C.
3. Expansion Shields: FS FF-B-561C.
4. Lag Screws and Bolts: FS FF-B-561C.
5. Toggle Bolts: FS FF-B-588C.
6. Wood Screws: FS FF-S-111C.
7. Nails and Staples: FS FF-N-105B.
8. FABCO/H-3, or equal, stainless steel top seal fasteners.
9. Top Seals/H-3 stainless steel, carbon steel and cadmium plated as applicable with Weath-R-Seal washers.
10. Tuff Tites #305 stainless steel and cadmium plated as applicable.
11. Top Seal/H-3 stainless steel, cadmium plated and carbon steel (as applicable) structural screws.
12. RED HEAD stud anchors.
13. Rawl - Studs.
14. Rawl - Double.
15. Rawl - Single.
16. Wood framing nails not exposed to weather shall be coated box nails.
17. Nails exposed to weather shall be dip galvanized nails.

E. Rough hardware and fasteners at treated wood

1. Similar to above, but stainless steel for certified treated wood exposure.

3. EXECUTION

3.1. PREPARATION

- A. Examine all surfaces to receive the parts of the work specified.
- B. Verify all dimensions of in place and subsequent construction.
- C. Application or installation of materials constitutes acceptance of existing conditions.
- D. See Drawing Details.

3.2. INSTALLATION

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

- B. Cut and fit framing, blocking etc. to accommodate the other work.
- C. Interlock curbing corners.

END 06100

1. GENERAL

1.1. WORK INCLUDES – BASE BID

- A. The Contractor shall remove oak trim around existing new windows in Rooms 48, 49, 50 and 52.
 - 1. The same trim may be reused around windows in Rooms 54-57 with the addition of flat stock as filler panel.
 - a. If existing trim is damaged when removed then new trim will need to be made to match the existing removed trim – bid this.

1.2. QUALITY ASSURANCE

- A. All custom woodwork shall comply with the applicable requirements of the AWI Quality Standards established by the Architectural Woodwork Institute.

1.3. RELATED REQUIREMENTS

- A. Specified elsewhere
 - 1. 09900 - Painting

2. PRODUCTS

2.1. MATERIALS

- A. Exposed wood trim shall be one-inch (1”) clear select oak.
 - 1. Shape as shown on the Drawings.
- B. Be sure to field measure after field framing is installed to get proper wood depth.

3. EXECUTION

3.1. INSTALLATION

- A. Examine all surfaces to insure that wood trim may be properly installed.
- B. Ends mitered – edges eased.
- C. Secure as shown on the Drawings.

3.2. FINISH

- A. Stain with color to darken a little to match existing removed from Rooms 48, 49, 50 and 52.
- B. Finish with two (2) coats clear polyurethane.

END 06200

DIVISION 07 – THERMAL & MOISTURE PROTECTION
Section 07190 – Water Repellent Coatings

1. GENERAL

1.1. WORK INCLUDES

A. Base Bid

1. Contractor shall provide repellent coatings for exterior masonry wall surfaces on new walls.
2. Provide repair of masonry walls so that a 10-year warranty could be provided to the Owner; however a written 10-year warranty will not be required.

1.2. RELATED WORK

A. Specified elsewhere:

1. 01010 - Project Summary
2. 07900 - Sealants & Caulks
3. 04200 – Unit Masonry

1.3. QUALITY ASSURANCE.

- A. Qualifications of Installers: Employ only experienced craftsmen, skilled in the installation of the specified products.

1.4. REFERENCES

- A. Manufacturer's catalogs: The acceptable manufacturer's current catalog at date of bidding documents is incorporated by reference to the same force and effect as if repeated herein at length.

1.5. SUBMITTALS

- A. Make all submittals in accord with 01340.

B. Product data:

1. Materials description - three (3) copies.
2. Manufacturer's current printed installation instruction for each product - three (3) copies.
3. ASTM-C-642 Test Record - three (3) copies.

1.6. DELIVERY, STORAGE & HANDLING

- A. Deliver all materials in manufacturer's original containers, with seals unbroken, labels, and product's and manufacturer's names intact and legible.

1. No mixing of water repellent coatings on site.
2. Material to arrive to job site ready to be installed.

- B. Store all products in a manner to prevent damage, in a secure place, out of way of construction operations. Provide protection until ready for use.
 - C. Handle in accordance with manufacturer's recommendations.
- 1.7. SEQUENCING/SCHEDULING
- A. Install prior to the installation of the new roofing.
- 1.8. WARRANTY
- A. Contractor's Warranty
 - 1. Two (2) years in accordance with General Conditions.

2. PRODUCTS

- 2.1. ACCEPTABLE MANUFACTURERS. Use only the specified product of the following manufacturers:
- A. Evonik Industries (630) 393-1919, ext. 21
 - B. ProSoCo (800) 255-4255
 - C. Chemprobe Technology, Brookfield, IL (708) 387-0305
 - D. Products must be delivered ready to use – no mixing on site.
- 2.2. EXTERIOR MASONRY SEAL - ACCEPTABLE PRODUCTS
- A. Alkyltrilkoxysilanes with activator. Do not use site mix products.
 - 1. Protectosil Chem-Trete PBVOC
 - 2. ProSoCo Sure-Klean Silozane
 - 3. Chemprobe Dur-A-Pel 100

3. EXECUTION

- 3.1. PROJECT/SITE CONDITIONS
- A. Masonry shall be clean of foreign deposits and shall be dry. The determination of percent of dry shall be in accordance with the project manufacturer's recommendation.
 - B. Environmental conditions:
 - 1. Weather: Do not install products during adverse weather conditions.
 - 2. Temperature: Ensure that surface and ambient temperatures are within the range recommended by the manufacturer.

3.2. INSPECTION

- A. Thoroughly inspect all new construction and the conditions under which the work will be performed.
- B. Report to the Architect/Engineer IN WRITING all conditions that would adversely affect installation of the work.
- C. Verify that all pre-application conditions are reasonably in accord with manufacturer's recommendations.
- D. Start of work constitutes acceptance of the construction and conditions.

3.3. PREPARATION

- A. Clean and prepare in accordance with Manufacturer's instructions. Remove all loose materials and other foreign matter which might impair penetration.
 - 1. Use less than 1,000 psi for cleaning of masonry surfaces.
- B. Protect plants, wood trim, glazing, etc. that may be adversely impacted by the water repellent.

3.4. INSTALLATION

- A. Comply with the Product Manufacturer's printed instructions.
 - 1. Installation shall follow the Manufacturer's recommended procedures corresponding to the installation procedure for a ten (10) year application guarantee.
 - 2. See paragraph 1.7 of this section.
 - 3. Application shall follow sealant and caulking application at wall penetrations.
- B. SPILLAGE
 - 1. Do not allow compounds to overflow or spill onto adjacent building material which may be subject to damage.
 - 2. Use catch sheets or other precautionary devices to prevent staining of adjoining surfaces as shall become necessary.

3.5. CURING

- A. Cure applied compounds in compliance with manufacturer's instructions.
- B. Comply with required environmental conditions pursuant to post application as recommended by the Product Manufacturer.

3.6. INSPECT & CLEAN UP

- A. Carefully examine all work to confirm installation compliance and adequacy of application.
- B. Clean up. Remove all surplus products, containers and rubbish and dispose of off site.

END 07190

DIVISION 7 – THERMAL & MOISTURE PROTECTION
Section 07200 - Insulation

1. GENERAL

1.1. DESCRIPTION

- A. The Contractor shall provide insulation as shown on the Drawing and as specified herein, for roof and walls.
 - 1. Roof base insulation is three inch (3") ISO.
 - 2. Roof tapered insulation will be 1/8" per ft. to center.
 - 3. Wall insulation is two inch (2") ISO.

1.2. RELATED WORK

- A. Specified elsewhere:
 - 1. 05400 – Cold-Formed Metal Framing
 - 2. 06100 - Rough Carpentry
 - 3. 07530 - EPDM Elastomeric Membrane Roofing

1.3. SUBMITTALS. Submit Manufacturer's Literature in accordance with 01340 (materials description and installation instruction for each type insulation).

1.4. PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Handle and store in such a manner as to prevent damage. Store under cover and above ground. All damaged or otherwise unsuitable material, when so ascertained, shall be immediately removed from the job site.
- B. Store all materials supported by blocking runners 4" above bearing surface.
- C. Maintain stored insulation weather free. Provide and maintain repellent poly protection cover secured against blowing rain.
- D. Tie down and secure against wind damage.

1.5. WARRANTY

- A. Insulation system shall be included in the roofing membrane manufacturer's full system warranty paragraph for roof insulation.
 - 1. See Section 07530 for warranty requirements.
- B. Other insulation applications, one (1) year.

2. PRODUCTS

2.1. MATERIALS - ROOF

A. Constant thickness insulation - polyisocyanurate core board.

1. Description

- a. Three inch (3") thickness/one (1) base layer.
- b. Fiber reinforced facers, sheet size, 4' X 8' preferable.

2. Specification

- a. Federal specification HH-I-1972/1.
- b. Factory Mutual Class 1 per FM 4450.
- c. Condition R value 5.88 minimum per ASTM C 518 Test Methods and PIMA Conditioning Procedure 101 or RICTIMA Bulletin 281-1.

3. Compliance: insulation system must comply with roofing manufacturer's standards for uplift, delamination, warranty and general compatibility.

- a. Comply with warranty requirements for full system warranty.
- b. Coordinate material selections for full system warranty.
- c. System aged R value 2-1/2" iso board plus 1/2" brown board to meet or exceed R.20 as a minimum. Thinner board may not be used. Use thicker if needed for R-20.

B. Tapered insulation - polyisocyanurate core - Use only as necessary to accomplish drainage, see also Roof Plan for limited use. The joists for the Addition are flat so tapered insulation will be required.

1. Description

- a. Three inch (3") constant thickness baseboard is required.
- b. 1/2" minimum starter thickness for taper board.
- c. Facer required.
- d. Taper 1/8" per foot.

2. Specifications

- a. Same as 07200/2.1.A.2. above.

3. Compliance

- a. Same as 07200/2/1.A.3. above.

- C. Fill insulation - polyisocyanurate core - required with tapered system.
 - 1. Description
 - a. Thickness as required, one inch (1") minimum.
 - b. Facer not required.
 - 2. Specifications
 - a. Same as 07200/2.1.A.2. above.
 - 3. Compliance
 - a. Same as 07200/2.1.A.3. above.
- D. Top layer 5/8" DensDeck board adhered per roofing membrane manufacturer recommendation.
- E. Fasteners (for base insulation only)
 - 1. Fasteners as required for guarantee, also for roofing system unballasted alternate mechanical anchorage.
 - a. Provide rust resistant mechanical fasteners to achieve FM I-90 anchorage.
 - b. Optional, FM approved adhesives that will achieve FM I-90 anchorage and that are compatible with the roofing membrane and maintenance system warranty requirements.

2.2. MATERIALS - MASONRY WALLS AND FOUNDATIONS

- A. Constant thickness two inches (2") unless noted otherwise, extruded polystyrene, closed cell.
 - 1. Poly ISO foil faced
 - 2. Firestone Building Products LLC
- B. Provide mortar block mesh at flashings and weeps.

2.3. MATERIAL – METAL STUD WALLS

- A. Mineral wool, sound and fire safing as detailed between Rooms 50A, 50B and 50C.
 - 1. Johns-Manville
 - 2. Or equal.

3. EXECUTION

3.1. PREPARATION

- A. Examine all conditions for compliance with Product Manufacturer's requirements.
- B. Application or installation of materials constitutes an acceptance of the existing conditions.
- C. Verify all dimensions of in place and subsequent construction.

3.2. INSTALLATION - ROOF

- A. Installation shall be mechanically anchored in accord with I-90 standards as coordinated with selected roofing system (no anchors for ballasted).
- B. Install tapered and fill systems when needed as bottom course of insulation; install fiber faced constant thickness insulation on top surface to receive roofing system.
- C. Inspect for proper installation:
 - 1. Tight side and edge.
 - 2. Offset joints in layered application.
 - 3. Do not use broken boards.
 - 4. Fill in chipped or damaged spots in insulation.
- D. Protect properly to prevent crushing, delamination or abuse to insulation systems during subsequent operations.
- E. Taper systems shall be installed as true 1/8" taper systems, both ways from drains (i.e., do not taper one way and install cricket or saddle between drains). See plans for roof layout.

3.3. INSTALLATION - MASONRY AND FOUNDATION

- A. Install to assure snug tight fit. Repair or replace damaged materials.
- B. Coordinate with flashings where occur such that flashing through insulation space will not pocket moisture.
 - 1. Mortar blocks to be provided at flashings.
 - 2. Lintels and weep lines to allow water flow.

3.4. INSTALLATION – METAL STUD WALLS

- A. Secure batt insulation to studs.
 - 1. Insure no gaps exist between insulation and studs.
 - 2. Vapor barrier will be primed on inside surface of walls.

END 07200

DIVISION 7 - THERMAL & MOISTURE PROTECTION
Section 07530 – EPDM Elastomeric Membrane Roofing

1. GENERAL

1.1. WORK INCLUDES

- A. The Contractor shall provide single ply 90 mil EPDM synthetic rubber fully adhered roofing with flashing system(s) as shown on the Drawings and specified herein, and related work for perimeter edge and flashing of equipment onto new roof. Included in total system NDL Manufacturer's warranty – FM, I-90 min. uplift, 70 mph wind speed and ANSI / SPRIES-1. Six-inch (6") or seven-inch (7") double sided seam tape in addition to minimum manufacturer's required field and flashing seam throughout entire roof project / areas.
1. Remove the existing construction as needed to tie into existing system.
 - a. Provide appropriate tie in or flashing and repairs to keep tie in water tight and serviceable.
 - b. The roof adjacent to the west will be replaced in the summer of 2019. At that time the tie in will need to be compatible with 30-year warranty.
 2. Provide new materials as needed and as shown on the detail drawing sheets.
 - a. Insulation (Section 07200)
 - b. Roofing membrane
 - c. Resilient flashings
 - d. Metal cap flashings
 - e. Expansion and construction joints
 - f. Counterflashing and termination bars
 - g. Roof protection flashings
 - h. Wood blocking: addition extension and reconstruction at edge and curbs.
 - i. Raised curbs, vents, roof edges as detailed or as needed for warranty.
 - j. New downspouts and scupper boxes. See drawings.
 - k. Three inch (3") splice tape or six inch (6") double sided seam, or seven inch (7") double sided seam tape.
 - l. Adhesives and accessories, top quality butyl adhesive and accessories required for Manufacturer's total system warranty.
- B. Adhered: Areas, 90-mil EPDM adhesive system, perimeter detail and counter flashing as detailed. Perimeter paver ballast and paver walkways. FM, I-90 uplift and 70 mph wind speed. Double-seaming and Manufacturer's 30-year NDL Warranty.

1.2. RELATED REQUIREMENTS

A. Specified elsewhere

1. DIVISION 0 - BIDDING & CONTRACT REQUIREMENTS
2. DIVISION 1 - GENERAL REQUIREMENTS
3. 06100 - Rough Carpentry
4. 07600 - Sheet Metal Flashing & Trim
5. 07900 - Sealants & Caulks
6. 07200 - Insulation

1.3. MECHANICAL WORK AND ELECTRICAL WORK

A. Mechanical work on this roof will include a new Energy Recovery Unit (ERU) and will need support curb and at least two penetration curbs plus electrical power. This ERU will be part of the project but will be installed over the existing 60 mil roof.

1. Roofer flash in the curbs for this equipment – curb provided by ERU manufacturer.

1.4. DEFINITION ROOFING SYSTEM MANUFACTURER. Any of the manufacturers whose systems are specified under "Acceptable Systems" in this Section, and herein called "Manufacturer".

1.5. QUALITY ASSURANCE

A. Qualifications

1. Installers shall be experienced craftsmen, skilled in the installation of the specified products set forth in these and related documents.
2. Contractor shall:
 - a. Have a minimum of five (5) years experience as certified applicator for this or for like roofing systems specified in this document and shall be certified by the Product Manufacturer whose product is to be installed.
 - b. Be certified by the State of Illinois in accord with the Illinois Roofing Industry Licensing Act, as amended. (Illinois Revised Statutes ch. 111, Par. 7501 et seq.)

B. Requirements of regulatory agencies

1. Permits:
 - a. No charge for permits.
 - b. Architect will file forms for Regional Office of Education permit – no charge to Contractor. Note: To meet legal requirements in the State of Illinois including any municipalities, the Regional Office of Education permit is all that is required.

2. Tests or standards by independent agencies whose classifications and requirements have general acceptance as regulatory:
 - a. American Society for Testing and Materials (ASTM).
 - b. Factory Mutual Laboratories (FM).
 - c. National Fire Protection Association (NFPA).
 - d. Underwriter's Laboratories, Inc. (UL).
 - C. Source Quality Control - The Roofing System Manufacturers shall assume full responsibility for certifying that:
 1. Prior to the start of work and material acquisition, the Contractor shall submit a letter to certify that the manufacturer has reviewed the project and:
 - a. They have examined project drawings, specifications, on site conditions and warranty requirements.
 - b. Their products herein specified are acceptable for and compatible with the roofing and flashing system design.
 - c. If their system is used, they certify that all products delivered to the site will meet or exceed project specification requirements.
 - d. They will issue the specified warranty for the roofing and flashing system is installed in accordance with the documents. See 1.8 of this Section.
 - D. Referenced catalogs: The catalogs, current as of date of bidding documents, of the manufacturers specified are incorporated herein by reference.
- 1.6. SUBMITTALS. Make all submittal in accordance with 01340.
- A. Roofing firm endorsements: At least fifteen (15) business days prior to starting the work submit roofing firm's name, address, telephone number and Manufacturer's endorsement of roofing firm to Architect/Engineer.
 - B. Shop drawings
 1. Submit shop drawings of Roofing System Manufacturer for approval.
 2. Submit only system manufacturer approved shop drawings to Architect/Engineer.
 3. Minimum scale: 1-1/2" = 1'-0" for details except where otherwise specified.
 4. Submittal shall incorporate the Architect/Engineer prepared documents that is Drawings and these specifications, wherein said documents exceed the Manufacturer's recommendations.
 5. Include wherein applicable:
 - a. Resilient flashing, cap and counterflashing details.
 - b. Gutters/scuppers/perimeter curb related sheet metal.
 - c. Fasteners.

- d. Expansion and control joints.
- e. Mechanical/electrical equipment curbs.
- f. Copings.
- g. Flashing of extended roof curbs.
- h. Flashing of through roof pipes and columns.

C. Product data

- 1. Insulation
- 2. Joint seal or tape. (Self-adhering battens, etc.)
- 3. Manufacturer's specification and instruction manual for all components of roofing system.

D. Samples wherein same are requested by the Architect:

- 1. Constant thickness isocyanurate insulation: two (2) pieces 12" X 12".
- 2. Sheet metal in conjunction with roofing: two (2) pieces of each type, 4" X 4".
- 3. Membrane: two (2) pieces 12" X 12".
- 4. Fabricated metal flashing end caps, miters and flashing lap systems and covers: one (1) assembled sample each configuration.

1.7. PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver all materials in Manufacturer's original, unopened containers and rolls with all labels intact and legible.
- B. Deliver materials requiring fire resistance classification packaged with labels attached as required by labeling service.
- C. Deliver materials in sufficient time and quantity to allow continuity of work and compliance with approved construction schedule.
- D. Handle rolled goods in manner to prevent damages to edges or ends.
- E. Store all materials on clean raised platforms with weather protective covering when stored outdoors.
- F. Store rolled goods in accordance with Manufacturer's instructions.
- G. Provide continuous protection of materials against damage or deterioration.
- H. Remove damaged or defective materials from site.
- I. Comply with fire and safety regulations.
- J. Follow Manufacturer recommendations as minimum except where contract documents exceed Manufacturer recommendations. Where Contract Documents are in excess of the Manufacturer recommendations, the contract documents supersede.

- K. PROTECT INSTALLED MATERIAL FROM TRAFFIC DAMAGE BY COVERING ALL ROOF TRAFFIC BY 5/8" THICK SHEATHING PLYWOOD IN ADJACENT 4' X 8' SHEETS LOOSE LAID EMPLOYING CARE NOT TO DAMAGE ROOFING MATERIALS. KEEP THE AREA UNDER THE TRAFFIC BOARD FREE OF ALL OBJECTS (BALLAST) OF ANY SIZE OR CONFIGURATION.
1. Provide puncture protection mat under plywood and six inches (6") beyond plywood all around.
 2. Remove plywood and mat at conclusion of work.

1.8. JOB CONDITIONS

- A. Contractor to avoid concentrated material loads. DISTRIBUTE LOADS AND ALWAYS ACROSS JOISTS -- NEVER PARALLEL WITH FRAMING MEMBERS.
1. Max. load 30 lbs. per sq. ft.
- B. Environmental requirements: Except as otherwise authorized by Architect/Engineer, follow Manufacturer's written request for variance:
1. Apply roofing in dry weather.
 2. Apply roofing only when dry substrata and substructures prevail.
 3. Provide all required Removal work in a dust free manner using closed chutes and water mist.
 4. Provide water tight tie-off at the end of each day.
- C. PROTECTION
1. AVOID HEAVY TRAFFIC ON COMPLETED WORK.
 - a. TRAFFIC CORRIDORS, THOSE AREAS FROM HOISTS TO WORK APPLICATION AREAS, SHALL BE TEMPORARILY COVERED WITH 3/4" X 4' WIDE PLYWOOD BEGINNING WHEN INSULATION IS FIRST INSTALLED.
 - b. TRAFFIC CORRIDORS SHALL BE CONTINUALLY PROTECTED UNTIL FINAL INSTALLATION OF MEMBRANE AND BALLAST, WHEN APPLICABLE. SEE DETAIL DRAWINGS.
 2. Restore to original condition or replace all work or materials damaged by roofing operations whether a part of the work of this Contract or adjacent thereto.
 3. Protect paving and building surface(s) adjacent to hoists and other roofing equipment. (See 1.7.C.1 above.)
 4. Remove protection upon completion of roofing work.
- D. Sequencing and scheduling prior to commencement of work.
1. Contractor: Provide detailed schedule of all reroofing operations.

Scheduling shall be subject to approval of the Owner as same relates to the Owner's occupation of the building.

2. Designate an on site foreman in charge of operations.
 - a. Provide experience record for the roofing foreman upon request by the Architect/Engineer.
 - b. The Contractor's roofing foreman shall be subject to the approval of the Architect/Engineer on behalf of the Owner. Said approval shall be based upon previous experience record.
 - c. The Contractor's on site foremen shall be the Contractor's assigned Safety Manager for the project unless the Contractor makes a specific assignment in writing otherwise.
 - d. The assigned foreman in charge of site operations and safety shall be on the job at all times during construction.
3. The Roofing Contractor's Project and On Site Foreman shall assign and coordinate all operations of the Roofing Contractor, his Subcontractors and his Suppliers for the work in the Contract Documents.

1.9. WARRANTY

- A. Contractor shall provide the following minimum warranties:
 1. Contractor: 1-Year Warranty
 2. Manufacturer: On the new roof system, provide a thirty (30) year comprehensive Manufacturer's Warranty meeting the specific warranty requirements of these documents. See Paragraph 1.1.C.4 of Section 01740.
- B. Coverage shall be pursuant to the following inclusions:
 1. Materials and workmanship – thirty (30) year total system warranty.
 - a. Inclusive of EPDM roofing membrane.
 - b. Inclusive of resilient flashing cured and uncured.
 - c. Inclusive of attachment systems.
 - d. Inclusive of insulation system.
 - e. The warranty period shall commence upon total completion of all roofing and flashing, both resilient and sheet metal work.
 - f. The basic meaning of the Warranty shall be to maintain the building interior free of water or moisture penetration from the exterior through the membrane or flashing system.
 2. Terms, conditions and limitations.
 - a. Installation of roofing system must be by a contractor approved by the Manufacturer.
 - b. During thirty (30) year term of this maintenance free

Warranty, Manufacturer shall have access to the roof for inspections during normal business hours. Manufacturer shall furnish his own ladders where applicable.

- c. Owner shall furnish the Manufacturer a written notice of any defect or leak in the roof and of any claim under this Warranty within thirty (30) days of the discovery of the defect or leak in the roof. Such notice shall be given by registered mail to the Manufacturer. The Manufacturer shall provide the Owner with the applicable addresses, telephone numbers and technical personnel to be so notified and keep the Owner updated on such information throughout the thirty (30) year period.
- d. If there is a failure of materials or workmanship within the scope of this Warranty, the Manufacturer shall repair the defect.
 - 1) The remedy stated herein is the SOLE AND EXCLUSIVE REMEDY for defects or failure of the materials supplied by the Product Manufacturer and workmanship supplied by the Contractor.
 - 2) Manufacturer shall under no circumstances be liable for incidental or consequential damages including, but not limited to, damages to building or building contents, except wherein notice has been given to the Manufacturer and Manufacturer does not respond and commence repair within twenty (20) business days following notification and continue said repair in uninterrupted sequence.
 - 3) Wherein Manufacturer does not respond within fifteen (15) business days to notice of defect, the Manufacturer shall become liable for incidental and consequential damages including building and building contents.
- e. This Warranty shall not be applicable to damage or loss caused in whole or in part by:
 - 1) Natural disasters, including but not limited to lightning, gales, hail and/or hurricanes in apparent excess of I-90 standards or similar natural disasters.
 - 2) 70 mph maximum wind speed, vandalism, acts of war, or civil disobedience.
 - 3) Alteration of roof or installation of structures, fixtures, or utilities on or through the roof without prior written approval of the Manufacturer.
 - 4) Non-typical or unusual environmental fallout or manufacture in building of commercial/industrial solvents, acids, caustic fluids, oils, waxes, greases, absorbent clays, bleaches or plasticizers.
 - 5) Failure by the Owner or lessee to use reasonable care in roof maintenance (as provided by the Manufacturer which carefully, thoroughly describes

- proper and improper maintenance procedures).
- 6) Traffic or storage of materials on the roof which inflicts physical damage.
 - 7) Infiltration or condensation of moisture in, through, around or above the walls of the building.
 - 8) Acts of parties other than personnel of the manufacturer or the authorized Contractor.

f. Manufacturer shall have the right to suspend its obligations under this Warranty if all bills for installation, supplies and services have not been paid in full to Contractor following materials in installation acceptable to Architect/Engineer per Contract Documents.

1.10. WARRANTED TIE-INS

- A. South edge tie-in is to adhered 60-mil Carlisle.
- B. West of this addition there is a tie-in to an adhered 60 mil EPDM roof about twenty-one (21) years old.

2. PRODUCTS

2.1. MATERIALS. For the entire system, use materials either manufactured by or certified as compatible by one of the acceptable system manufacturers. All EPDM shall be 60-mil thickness (not inclusive of felt back where applicable).

2.2. Roofing Membrane System

- A. Rubber Membrane 090-mil EPDM rubber system fully adhered.
 1. Carlisle Syn Tec Systems, Carlisle, PA
 2. Firestone Building Products, Co., Carmel, IN - Firestone Rubbergard
 3. Johns Manville, Denver, CO
- B. Resilient Flashing; 060 mil uncured formable EPDM shall be of same source by name as the membrane system.
 1. Use only where required for manufacturer's warranty.
- C. Adhesives
 1. Adhesives for adhering membrane shall be the manufacturer recommended contact type adhesive for the substrate condition.
 2. Seam adhesive shall be the membrane manufacturer's top-grade butyl base type contact seam adhesive or manufacturer self vulcanizing seam tape.
 3. Insulation adhesives: as required for warranty.
 4. Insure that adhesive application complies with I-90 standards.
- D. Seam sealant and seam tape shall be manufacturer's recommended seam sealant or tape.

1. Provide necessary seam work or seam primers as recommended.

E. Anchor bars

1. Manufacturer's recommended type as a minimum standard unless detailed otherwise.
2. See drawings for heavier or stiffer bar anchors at detailed conditions.
3. Conditions not detailed but similar to detailed conditions shall be handled with similar bar anchor materials.
4. Finishing termination bars (where exposed to view) and as noted on the Drawings:
 - a. Metal Era, Inc. - Model CB-175 with .040" CF 175 Snap On Cover.
 - b. Carlisle - Design Accessories per drawing details with .040" Snap On Cover.
 - c. J.P. Stevens Accessories Elastomerics Corp. - High-Tuff with .040" Snap On Cover.
 - d. Firestone, Johns-Manville approved material.
 - e. First and last anchor hole in any bar segment shall be 1" from ends.

F. Walkway pads will not be required for this project.

1. Select dark color to enhance snow melt.
2. Provide puncture mat below and four inches (4") from blocks.
3. Layout to space one inch (1") - two inches (2") apart.

G. Insulation - see 07200

H. Ballast - not required at this project

3. EXECUTION

3.1. NIGHT CUT OFF (See 1.1. of this Section).

- A. Provide tie-off per EPDM Manufacturer's recommendations between new/old roof or deck system each day, watertight and wind resistant.
1. Cut back cut off for proper extensions of each days' work. Inspect resulting deck following tear-off for structural condition.

3.2. BLOCKING AND ANCHORAGE. Where Drawings Sectional Details do not account for surface of the insulation and surface of the wood blocking lying in same plane and wherein same is a Manufacturer's requirement, the Contractor shall so provide by tapering wood blocking so the concealed base EPDM anchor shall be screwed into the wood blocking as detailed. This requirement applies to perimeters, curbs, parapets, equipment rails, saddles and crickets as shown on the drawings specifically or reasonably inferred by similarity.

3.3. INSPECTION

- A. Verify that all work of other subcontractors that penetrates roof deck or requires men and equipment to traverse roof deck has been completed. Protect all reroof work from traffic damage. See Paragraph 1.7.C of this Section and Paragraph 3.3.A.3 of Section 07600.
- B. Examine all surfaces for inadequate anchorage, foreign material, moisture, unevenness or other conditions that would prevent execution and quality of installation of specified roofing and flashing system and accessory items.
- C. Do not issue a proceed order to a subcontractor or proceed with work until all defects are corrected to the satisfaction of and with the written approval of the roof system manufacturer.

3.4. PREPARATION. Thoroughly clean all surfaces against or into which work will be installed. Ensure that all surfaces are clean and dry before starting and during performance of work. Follow roofing system manufacturer's recommendations.

3.5. INSTALLATION

- A. Install roofing and flashing system(s) and all accessory items in strict accordance with system Manufacturer's printed instructions current at date of bidding documents.
 - 1. Except wherein the Documents designate in excess of Manufacturer's requirements; in such case proceed per Documents.
- B. Contractor may employ membrane manufacturer's standard details in lieu of details shown on Drawings, **ONLY** upon confirmation IN WRITING to the A/E that the Manufacturer's system exceeds the quality, longevity and future ease of replacement of the system detailed on the Drawings, otherwise these specifications and accompanying drawing shall control materials and installations.
- C. Double lap all field seams with second cross-lap or provide six inch (6") or seven inch (7") double sided seam tape.
 - 1. Use minimum three inch (3") lap tape or six inch (6") or seven inch (7") double sided seam tape.
 - 2. All laps to be included in warranty.
- D. **Sealhead stainless steel screws** shall be secured in all pre-punched (or drilled) holes in 07530/2.2.E finishing anchor bars.

3.6. EXISTING ROOFS

- A. Existing roof to the west will have mechanical curb done.
 - 1. Existing roof to west adhered 60 mil EPDM twenty-two (22) years old. Warranty is expired.

- B. Protect all existing roof surfaces, repair damage as occurs.
- C. **DO NOT CONCENTRATE STORAGE OF ANY MATERIALS ON EXISTING ROOFS (NOT IN SCOPE OF WORK) OR ON ANY AREA OF NEW ROOF.**

SPREAD OUT LOADS OF STORED MATERIAL.

3.7. FIELD QUALITY CONTROL

- A. Roofing System Manufacturer will provide on site observation and instruction as the Manufacturer deems necessary.
 - 1. Adjustments in the system design necessary to meet manufacturer's requirements for guarantee are subject to Architect's approval and shall be included at no additional charge.
- B. Carefully clean surfaces prior to applying adhesives.
- C. Proper fit and lay out membranes.
 - 1. Avoid wrinkles.
 - 2. Avoid bubbles.
 - 3. Install without stretching or applying under stress.
 - 4. Handle carefully to minimize patching.
 - 5. Keep seam adhesives in proper alignment to avoid seam sealant over adhesive.
 - 6. Carefully apply contact adhesive in a thin uniform manner.

3.8. ADJUST & CLEAN

- A. Carefully inspect all completed work. Correct all defects.
- B. Clean up spill, debris and remove surplus materials at the end of each day.
- C. Provide adequate protection of completed work until substantial completion. Prevent traffic, storage of materials or equipment on completed roofing. Finally, remove 3/4" thick X 4' wide plywood from traffic lanes over complete membrane installation. See 1.7.C of this Section.
- D. Do not store materials or equipment on the completed roof.
- E. Finally clean up all rubbish, debris, surplus materials, tools and equipment and remove from the site.
- F. Provide manufacturer inspection and warranty paper work.

END 07530

sDIVISION 7 – THERMAL & MOISTURE PROTECTION
Section 07600 – Sheet Metal Flashing & Trim

1. GENERAL

1.1. REQUIREMENTS INCLUDE

- A. Contractor shall provide metal flashing inclusive of trim, associated with the reroof work as shown on the Drawings and specified herein. Aluminum gauge as noted on Details; color – dark brown. Detail specific. All finish colors are listed on coordinating detail drawings.
- B. Contractor shall verify on site flashing and trim dimensions to accomplish the design intent of the drawing details.
 - 1. Four new Scupper Boxes and Downspouts are to be installed. .040 aluminum for Scuppers and .050 for Downspouts.
- C. New edge flashing (trim) to be provided to be compatible with 30-year warranty by Roofing Material Supplier.
 - 1. New edge flashing to look the same as existing.
- D. See Alternate for underground drainage system.

1.2. RELATED WORK

- A. Specified elsewhere
 - 1. 01010 - Project Summary
 - 2. 06100 - Rough Carpentry
 - 3. 07530 - EPDM Elastomeric Membrane Roofing
 - 4. 07900 - Sealant & Caulks
 - 5. 01030 - Alternates

1.3. QUALITY ASSURANCE

- A. Sheet metal flashing and trim shall conform with the following:
 - 1. Specified requirements of the manufacturer of the metal.
 - 2. Recommended practices contained in "Aluminum Construction", from the Aluminum Association, 750 Third Avenue, New York, NY 10017, latest edition.
 - 3. Anodized quality ASTM B-136, ASTM-B-137 or ASTM-B-244.

1.4. REFERENCE STANDARDS

- A. ASTM B209-79, Alloy 3003-H14: Aluminum
 - 1. H-24 temper where required for spring action. See details on the Drawings.
 - 2. See Drawings for thickness.

- B. ASTM A617-77, Type 304: Stainless Steel.
 - 1. 2D finish, dull, cold-rolled, annealed.
 - 2. See Drawings for location, configuration and thickness.
 - C. ASTM A446 zinc coated (galvanized) sheet steel.
 - 1. Box annealed steel
 - 2. Zinc coating, G-90 (1.25 oz.).
 - 3. See drawing for thickness.
 - 4. Top coating in accord with AAMA 621-96 Standards.
- 1.5. SUBMITTALS. Make all submittals in accord with 01340. Submittals are not returnable.
- A. Product data:
 - 1. Manufacturer's Literature: Materials description and current printed installation instructions for manufactured items.
 - 2. Shop Drawings: Typical details of fabricated and formed configurations.
- 1.6. DELIVERY, STORAGE & HANDLING
- A. Deliver products to site in accordance with Section 01600. Store all products in a manner to prevent damage, in a secure place, out of way of construction operations. Provide protection until ready for use.
 - B. Handle in accord with manufacturer's recommendations.
- 1.7. WARRANTY
- A. The Contractor shall warrant metal flashing and trim to be free of faults and defects for two (2) years from date of Substantial Completion.
 - B. Manufacturer shall warrant "Kynar 500" finish surfaces for 20 years.

2. PRODUCTS

2.1. MATERIALS

- A. Aluminum: Comply with reference standards.
- B. Stainless Steel: Comply with reference standards.
- C. Galvanized steel - comply with reference standards, G90 prior to finish coating on any preformed metal panels, noted as galvanized prior to finish.

- D. Finishes - see Drawings.
1. Aluminum: Kynar finish on gutters, downspouts, fascia, counterflashing and on pipe / conduit screen.
 2. Stainless Steel: Dull finish.
 3. Paint Lock: Paintable finish.
 4. Galvanized, pre-finished "Kynar" fluorocarbon finish.
- E. Screws, Bolts and Nuts: Stainless steel with sealhead washers where exposed to weather.
- F. Pop rivets must be aluminum for aluminum base metal. In all other locations, pop rivets to be stainless steel.
- G. Washers
1. Same alloy as screw or bolt minimum .04 in. thick.
 2. Material same as adjacent screw head.
 3. All exposed washers shall be seal type: See Paragraph H, herefollowing.
- H. Reinforced Membrane Insulator: Apply as an isolator between dissimilar metals.
- I. Resilient Washers: Neoprene, minimum .062 in. thick. Must be factory adhered to washers (Item 2.1.E).
- J. Exposed galvanized steel: Shall be hot dip galvanized on box annealed steel. (H.D.G.)
- K. Scuppers to be .050 aluminum.
- L. Downspouts to be .050 aluminum with seam at corner, 4" x 6"
1. Metal Era, Inc. ~ 5" x 5" or 6" x 6" industrial style downspout with Style 2 wall strap anchors may be used. Kynar 500 finish.
 2. Sheet metal as designated on Drawings only.
- M. Edge / fascia / counter flashing to be .040 aluminum ~50'± between expansion joints. Kynar 500 finish.
1. Metal Era or shop formed. Metal Era or a manufactured edge may be used if the lay down scupper openings in fascia can be integrated into the flat face.

3. EXECUTION

3.1. INSPECTION

- A. Thoroughly inspect all existing construction and the conditions under which the work will be performed. Report to the Architect/ Engineer IN WRITING

all conditions that would adversely affect installation of the work.

- B. Start of work constitutes acceptance of the construction and conditions.

3.2. FABRICATION

- A. Metals: Comply with drawing reference.
- B. Verify dimensions at site prior to shop production fabrications.
- C. Form, fabricate and assemble all work in the shop to extent feasible and, if necessary, mark to ensure proper installation at the project site. Disassemble only to the extent necessary for shipment. ASSEMBLY MARKS SHALL BE APPLIED TO BLIND SIDE of the finished installation.
- D. Use the proper thickness of metal, adequate stiffeners, supports and proven details of assembly so that the finished product will conform to the highest standards of the industry. All clips shown on the Drawing are to be continuous. Segment cover caps are five inches (5") wide as detailed.
- E. Fabricate items with the minimum number of joints, using concealed fasteners wherever possible. Lap or lock joints but do not rivet or otherwise restrict relative movement of sections. SEE DETAIL NOTES FOR EXPANSION PROVISIONS. Gutters require covered expansion joints noted on plans.
- F. Limit all segments to fifty feet (50') in length. Minimum length ten feet (10'). Allow for minimum ½" expansion per segment length, unless otherwise specified. Assemblies require 5" cover at ½" expansion joint. Miter and lap two inches (2") min. and seal, or weld all internal or exterior corners and end caps. Some assemblies are required to be (lapped) installations, see Details.
- G. See the Drawings flashing details and configuration. Running flashing and trim metal splices shall be separated ½" for expansion and covered with .040 X 5" wide cap flashing set in double bead of sealant. Anchor screws shall pass in the ½" no-contact expansions space. Lock-splice caps in place securely. Finish sealant is to match metal finish color.
- H. All open ends of running flashing or counter flashing shall be neatly closed by fabrication of end cap running two inches (2") back under the running flashing, sealant with sealant and appropriately mechanically secured in place. Flashing shall extend four inches (4") beyond perpendicular membrane and/or counter flashing. This includes extending around corners where encountered.
- I. Should cap lengths require more screws than shown on the Drawing to hold the splice cap close to the flashing, the same shall be furnished and installed by the Contractor in a uniform pattern throughout the job.

3.3. INSTALLATION

- A. Examine all surfaces to receive the metal flashing and trim.
 - 1. Verify all dimensions of existing and subsequent constructions.
 - 2. Installation of metal flashing and trim shall constitute acceptance of existing conditions.
 - 3. Coordinate work with Plumbing and Electrical Work.
- B. Erect all the members plumb, level and in line securely anchored and properly related to other parts of the work.
- C. Protect metal surfaces that are to be in contact with dissimilar metals. See 2.1.F.
- D. Coordinate flashing installation with work under Section 07900.
- E. All holes in sheet metal flashing anchored by screws exposed to temperature change and which is applied in segments in excess of 4'0" lengths shall be 3/16" diameter over size to accommodate expansion and contraction.
- F. Anchor holes in material segments shall commence and end on maximum of three inches (3") from the ends of the segment.

3.4. MECHANICAL FASTENERS - ACCESSORIES

- A. Stainless Steel Screw Manufacturers
 - 1. Fastenal Co., 2001 Theurer Blvd., Winona, MN 55987
 - 2. Dynamic Fastener Services, P.O. Box 231, 13902 Century Lane, Grandview, MO 64030.
 - 3. Guardian Fastener & Closure Systems, Telephone 800-633-GFCS.
 - 4. Sierra Fasteners, Inc., 1710 East Guthrie, Unit C, Des Moines, IA 50316.
 - 5. Fabco Fastening Systems, Townsend Div. of Textrean, Inc., West Newton, PA 15089.
 - 6. All screws shall be of alloy which will field test zero magnetic attraction.
 - 7. Install sealant in joint to be secured by screws prior to tightening.
- B. See Section 07530 for seal head screws.
- C. Pop rivets
 - 1. Install sealant in lap joints to be secured by pop rivets prior to installing rivets.
 - 2. Lap joints to be pop riveted shall not be visible where possible.

3.5. ADJUST & CLEAN

- A. Upon completion of installations, carefully examine all work to confirm installation compliance and adequacy and correct all defective work.
- B. Clean up all rubbish, debris, surplus materials, packaging and tools and dispose of same off site in accordance with Federal, State and local regulations.

END 07600

DIVISION 7 - THERMAL & MOISTURE PROTECTION
Section 07900 - Sealants & Caulks

1. GENERAL

1.1. WORK INCLUDED

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

1.2. RELATED WORK

- A. Specified elsewhere
1. 04200 – Masonry
 2. 08100 – Hollow Metal Work
 3. 08400 – Aluminum Doors & Frames
 4. 08500 – Aluminum Windows

1.3. HANDLING & STORAGE

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

1.4. WARRANTY

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

2. PRODUCTS

2.1. MATERIALS

- A. Exterior for metal-to-metal, metal-to-glass and for glass-to-glass installations (S-1).
1. Sealants shall be one (1) part type.
 2. Serviceable life expectancy shall be twenty (20) year minimum in Manufacturer's printed material for applications proposed.
 3. Approved products area as follows:
 - a. General Electric Silicone Series 1200.
 - b. Dow Chemical 780 Silicone Rubber Sealant.
 - c. Products Research & Chemical Corp. (PRC) 4588 Polyisobutylene.
 - d. Sonneborn NP-1
 4. Use a. or b. above for windows.

- B. Exterior grade for masonry-to-masonry, metal-to-masonry, wood-to-masonry, and glass-to-masonry (S-2).
1. Material's serviceable life expectancy shall be twenty (20) year minimum in Manufacturer's printed material for the applications proposed.
 2. Approved products are as follows:
 - a. Sonneborn NP-1
 - b. Silaflex 1A
 - c. Vulkem 116
 3. Make sure sealant used with E.I.F.S. is approved by E.I.F.S. Manufacturer.
- C. Interior grade caulk shall be one (1) part, paintable (S-3).
1. Chemical make-up shall permit 5% joint movement from 20 deg. F to 110 degrees F and shall be skinning type.
 2. Approved products are as follows:
 - a. DAP Latex Caulk
 - b. Pecora BC 158
 - c. Tremco Butyl Sealant
- D. Grade on horizontal joints, exterior/interior grade sealant shall be one (1) part, self-leveling for concrete contraction/expansion joints (S-4).
1. Approved products are as follows:
 - a. Sonneborn Sonolastic S.L.1
 - b. Vulkem 45
 - c. Dow Chemical 880
- E. Insure that various products specified above meet various Manufacturer's requirements; change products if so recommended.**

2.2. JOINT FILLER

- A. Joint Filler F-3, closed-cell polyethylene approved products shall be as follows:
1. Ethafoam by Dow Chemical.
 2. Expand-O-Foam by Williams Products, Inc.
 3. Filler Foam FF-4 by Progress Unlimited, Inc.
 4. Safe-T-Grip Filler Gasket by Structural Specialties Corp.

- 2.3. JOINT CLEANER. Joint cleaner shall be that cleaner recommended by Sealant Manufacturer for specific joint surface and conditions.

- 2.4. JOINT PRIMER AND SEALER. Joint primer and sealer shall be those compounds recommended by Sealant Manufacturer for the specific joint surface and conditions.

3. EXECUTION

3.1. PREPARATION

- A. Examine all surfaces to receive the parts of the work specified herein. The application or installation of materials constitutes acceptance of the substrate.
- B. Clean surfaces and remove protective coatings, which may fail in adhesion or interfere with bond of compound so surfaces are free of deleterious substances, which might impair the work.
- C. Prime surfaces per the Sealant Manufacturer's instructions.
- D. Install bond breakers in locations and of type recommended by the Sealant Manufacturer to prevent bond or sealant to surfaces where such bond might impair the performance of the sealant.

3.2. INSTALLATION

- A. Install all materials in accordance with Manufacturer's printed instructions. Unless otherwise directed, conform as follows:
 - 1. Compounds shall not be installed at temperatures below 40 deg. F unless the Manufacturer specifically permits the application of his materials at a lower temperature.
 - 2. If job conditions require installation of compounds below the minimum installation temperatures recommended by the Manufacturer, consult the Manufacturer's Representative and establish the minimum provisions required to ensure the satisfactory work.
 - 3. Confine compounds to joint areas shown. Use masking tape to prevent staining of adjoining surfaces, spillage and/or migration of the compound out of joints. Tool surfaces to shape shown or, if none is shown, to a flush or slightly concave surface. Remove excess compound and clean adjoining surfaces as may be required to eliminate any indication of soiling or migration.
 - 4. In joints which are not subject to traffic, apply sealants to a minimum depth of 50% of the normal joint width but not less than 3/8" or more than 1/2" deep.
 - 5. Apply non-elastomeric compounds in exposed joints with the depth of compound not less than the joint width.
 - 6. Sealant shall be poured over a bond breaker tape or zip strip Joint Filler. The joint shall be masked off adequately to assure a clean, flush and finished installation.
 - 7. Sealants and caulks shall be a color selected to blend with adjacent material color.

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

3.3. SEALANT COLOR SELECTION

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

3.4. SEALANT APPLICATION

- A. Appearance conditions: Throughout the interior of the construction provide sealants as needed to visually finish all installations.
 - 1. Construction joints
 - 2. Abutting dissimilar materials
 - 3. Wall, floor and ceiling penetrations
 - 4. Joints subject to water penetration
 - 5. Irregular joints
 - 6. Unintended gaps, cracks or openings such as at poorly executed electrical device cover plates
- B. For exterior/building envelope conditions: Select the proper sealant to provide resistance to air or water infiltration at all exterior envelope joints, connections of dissimilar materials:
 - 1. Wall expansion joints
 - 2. Doors & windows
 - a. Bed all thresholds in urethane sealant.
 - 3. Wall penetration
 - 4. Abutting dissimilar materials
 - 5. As needed to control infiltration
 - a. Water
 - b. Air
 - c. Vermin and insects
- C. Appearance conditions: Throughout the interior of the construction provide sealants as needed to visually finish all installations.
 - 1. Wall expansion joints
 - 2. Construction joints

3. Abutting dissimilar materials
4. Wall, floor and ceiling penetrations
5. Joints subject to water penetration
6. Irregular joints
7. Unintended gaps, cracks or openings, such as at poorly executed electrical device cover plates.

END 07900.

1. GENERAL

1.1. WORK INCLUDED

- A. The General Contractor shall provide hollow metal doors, frames, sidelights and vision panel frames as shown on the Drawings and specified herein.
 - 1. New steel doors and frames for the Classrooms, the Restroom, and the Calming Rooms and Closet 51.1.

1.2. RELATED WORK

- A. Specified elsewhere:
 - 1. DIVISION 0 - BIDDING & CONTRACT REQUIREMENTS
 - 2. DIVISION 1 - GENERAL REQUIREMENTS
 - 3. 01055 - Anchorage & Fasteners
 - 4. 07900 - Sealants & Caulks
 - 5. 08700 - Door Hardware
 - 6. 09900 - Painting
- B. See Door Schedule shown on the Drawings.

1.3. SUBMITTALS

- A. Submit shop drawings in accord with 01340. Show type of door and frame for each opening, full scale sections of all typical members, dimensioned elevations, anchors, reinforcements, and other required components.

1.4. HANDLING AND STORAGE

- A. Handle and store doors and frames at the job site in such a manner as to prevent damage. Wrappings or coverings shall be removed upon arrival of doors at the job site.
- B. Doors shall be stored in a vertical position of blocking, clear of floor with blocking between the doors to permit air circulation between the doors. All damaged or otherwise unsuitable doors and frames, when so ascertained, shall be replaced.

2. PRODUCTS

2.1. MATERIALS

- A. Structural Steel Shapes: ASTM A36-70a.
- B. Sheet Steel: ASTM A 366-72, commercial quality, cold rolled, stretcher leveled.

- C. Galvanized Steel ASTM A 366-72 .5 oz/square foot per side.
- D. Primer: Phosphate treated, gray zinc chromate baked on inside and outside of all sections.

2.2. MANUFACTURERS

- A. Acceptable manufacturers of standard 16-gauge doors and frames:
 - 1. Steelcraft - Cincinnati, Ohio
 - 2. The Ceco Corporation - Chicago, Illinois
 - 3. Mesker Door Co., Inc., Huntsville, AL
 - 4. Fenestra Corporation - Erie, Pennsylvania
 - 5. Curries Co., Mason City, IA
 - 6. Amweld Building Products, Garrettsville, OH

2.3. FABRICATION

- A. Fabricate hollow metal doors and frames as shown on the Drawings and in accordance with best shop practices. Frames shall be welded rigid, neat in appearance, and free from defects. Field measurements shall be taken as required for coordination with adjoining work.
- B. Form exposed surfaces free from warp, wave and buckle, with all corners square, unless otherwise shown. Set each member in proper alignment and relationship to other members with all surfaces straight and in a true plane.
- C. Reinforce members and joints with steel plates, bars, rods or angles for rigidity and strength.
- D. Conceal all fastenings unless otherwise shown or specified.
- E. Provide combination type hollow metal door frames to be used as both door buck and trim, formed to profiles.
- F. Unless otherwise shown, fabricate all interior frames of 14 gauge steel primed steel.
- G. All corners shall be welded and ground smooth exhibiting a neat smooth flush finish.
 - 1. Provide proper returns at all edges.
- H. Doors and frames shall be mortised and reinforced for hardware in accordance with the Hardware Manufacturer's instructions and templates. Reinforcing shall be drilled and tapped to receive hinges, locks, strikes, and closers. Cover boxes shall be provided for hardware cutouts. The hinge reinforcements shall be 7-gauge. Angle floor clips have two holes each for 3/8" anchor.

- I. Make provisions for installing rubber door mutes on interior door frames. Three (3) for single frames.
- J. Provide internal reinforcement for surface mounted hardware in frames to match locations shown or specified for doors.
- K. Furnish at least three (3) adjustable metal anchors in each jamb of shapes, sizes and spacing shown or required for anchorage into adjoining wall construction. Fabricate joint anchor of steel no lighter than gauge used for the frame, unless otherwise shown.
- L. Floor anchor clips for each jamb shall be not less than 14-gauge steel with two anchor holes and welded to frame. Terminate bottom of frames at the indicated finished concrete floor level.
- M. Miter, fit, weld, and grind smooth corners of panel moldings for glass panels to form continuous frames around panels. Furnish removable moldings of minimum 18-gauge steel. Secure removable moldings with not less than No. 6 x 32 Phillips, oval-head countersunk machine screws at 12" o.c.
- N. Doors shall be as follows:
 - 1. 1-3/4" thick.
 - 2. 14-gauge face sheets.
 - 3. 14-gauge edge channels.
 - 4. 1/8" beveled lock side.
 - 5. S.D.I. Type III extra heavy-duty seamless full flush.
 - 6. Foam filled core on exterior doors.
 - 7. Cut out mortise and reinforce for hardware mounting.
 - 8. 7-gauge drilled and tapped hardware.
 - 9. Fully galvanized and primed back and face side.
 - 10. UL labeled frames and doors per Doors and Frames Schedule shown on the Drawings.
- O. Frames shall be as follows:
 - 1. Section shall be PR-15 with 1/2" X 5/16" return adjacent to wall anchorage, welded construction.
 - 2. Stops 5/8" deep X 1-15/16" door pocket X 2" casing face at side jambs and 4" casing face at door head jambs.
 - 3. Loose stops for glazed frames shall be 1/2" thick X 1-1/4" wide - screw anchored to frames.
 - 4. See Door Schedule to frame depth greater than six inches (6").
 - 5. Frames shall be 14 gauge.
- P. Top and bottom edges all doors shall be closed with a continuous recessed channel not less than 16-gauge, extending full width of door and spot welded to both faces. Both vertical edges of doors shall be leveled 1/8" in 2".
- Q. Provide clearances for hollow metal doors of 3/32" at jambs and heads,

1/8" at meeting stiles for pairs of doors and 3/8" at bottom where no threshold is required. 3/8" to increase 1/4" where door swings over carpet. Where a threshold is shown, provide 1/8" in 2".

- R. In addition to other requirements for hollow metal doors and frames specified herein, comply with the label requirements of the National Fire Protection Association and applicable local codes. Fabricate doors and frames in accordance with the requirements of the NFPA Standard No. 30 and UL Standard for Safety No. 60 for the class of door opening shown or scheduled.
- S. Provide accessories for doors per the Drawings and per Section 08700.

2.4. SHOP PAINTING

- A. Thoroughly clean all metal surfaces of loose scale, shavings, filings, dirt and other deleterious materials by using wire brushes or other effective means. Remove grease and oil by solvent cleaning.
- B. Chemically treat all surfaces with phosphate compound to assure maximum paint adherence. Apply one coat of primer, baked on. Cover all surfaces without runs, smears or bare spots. THOROUGHLY PRIME JAMBS INSIDE AND OUTSIDE.
- C. Prime coat inside surfaces of frames.
- D. Prime coat inside surface of all removable stops, as well as the frame area covered by such stops.

3. EXECUTION

3.1. PREPARATION

- A. Examine job site conditions to receive the work. Installation shall confirm acceptance of job site conditions and preparation.
- B. Verify all dimensions of in place and subsequent construction.

3.2. INSTALLATION

- A. All items shall be set in their correct locations as shown on details and shall be level, square, plumb and at the proper elevations and in alignment with other work.
- B. All interior and exterior joints between glass, framing and mullion members shall be tightly sealed with elastomeric sealant in order to assure a vibration free and watertight installation.
- C. All materials shall be screwed in place using backing, masonry plugs or anchor straps as applicable.

- D. Where moldings are joined, they shall be accurately cut and fitted to result in a tightly closed joint.
- E. After erection, protect exposed portions of framing from damage by grinding and polishing machines, plaster, lime, acid, cement or other harmful compounds.
- F. All doors and frames to be factory primed and receive two (2) coats satin DTM latex paint in field.

END 08100

1. GENERAL

1.1. WORK INCLUDED BASE BID

- A. For Colene Hoose, provide three (3) 16" x 16" hatch doors in Rooms 50A, 50B and 50C. Verify dimensions.
- B. Provide one hatch door 24"w x 30"h in existing 12" masonry east exterior of Room 52.1.

1.2. RELATED WORK

- A. Section 04200 Unit Masonry
- B. Section 06110 Rough Carpentry
- C. Section 09250 Gypsum Wall Board
- D. Section 09900 Painting

1.3. SUBMITTALS

- A. Provide shop drawings of material to be used.

2. PRODUCTS

2.1. MATERIALS

- A. Steel construction
 - 1. **Material:** Steel: Door 20 gauge and frame 16 gauge G-90 paint bond galvanized steel.
 - 2. Construction Details:
 - a. Door: 20 gauge (.912 mm thick) cold rolled steel
 - b. Frame: 16 gauge cold rolled steel with 1" Flange
 - c. Hinge: Concealed continuous piano hinge
 - d. Latch: Allen/Key operated latch bolt
 - e. Finish: White baked on powder coat.
 - f. Insulation: 2" thickness fire rated mineral fiber, 8 R value.
 - g. Other: Interior release mechanism, furnished by factory installed by others. Self-closing by gravity (three in 50A, 50B, and 50C).
 - h. Hatch in 52.1 shall be similar except hinge on the left jamb.

2.2. MANUFACTURER

- A. BILCO Products Company – Telephone: (203) 934-6363, www.bilco.com

B. Babcock-Davis – Telephone: (888) 412-3726, www.babcockdavis.com

3. INSTALLATION

3.1. DESCRIPTION

- A. Install one (1) ceiling hatch in each room: 50A, 50B, & 50C.
 - 1. Provide header for one ceiling joist in each room to allow for installation. Provide framing to complete installation.
 - 2. Install so each unit is between joists so that the panel can be open fully.
 - 3. Provide to allow unit smooth unobstructed operation.
- B. Install in wall Room 52.1.

END 08311

DIVISION 8 – DOORS & WINDOWS
Section 08400 – Aluminum Frames, FRP Doors, & Hardware

1. GENERAL

1.1. WORK INCLUDED

- A. General Contractor shall provide exterior grade aluminum frames with hybrid aluminum & FRP doors as shown on the Drawings and specified herein.
1. Perimeter single FRP doors as indicated on Plans.
 2. Insulated panels
 3. All weather-stripping, cushion felts, and thresholds to be new.
 4. ADA Compliant hardware by hardware supplier
 5. Latchsets and locks to be new. Panic hardware to be installed.

1.2. RELATED WORK

- A. Specified in other Sections:
1. DIVISION 1 - GENERAL REQUIREMENTS
 2. 01055 - Anchorage & Fasteners
 3. 07900 - Sealants & Caulks

1.3. QUALITY ASSURANCE

- A. Provide aluminum reinforced FRP doors and aluminum frames made of components of standard construction furnished by one manufacturer as coordinated assemblies.
- B. Exterior-to-Interior Doors, Frames: Anodic Finish ASTM-B-136, ASTM-B-137 or ASTM-B-224 Test Methods.
1. Natural anodized finish, AA-M12C22A (.7 mils)
- C. Reinforce the doors and frames to receive hardware components. In particular, reinforce the door and frame for closers and stops. Show reinforcing on the shop drawings.

1.4. SUBMITTALS

- A. Provide Data: For each type of door and frame indicated, include door designation, type, level and model, material description, core description, construction details and finishes.
- B. Submit the following in accordance with Section 01340:
1. Manufacturer's Literature: Materials description and installation instructions for system used.
 2. Shop Drawings: Complete layout of frame and door elevations, framing details, reinforcing peripheral conditions, and anchorage.

3. Complete description of hardware and parts list for future maintenance.

1.5. DELIVERY, STORAGE AND HANDLING

- A. Deliver doors and frames, cardboard-wrapped or crated to provide protection during transit and job storage. Provide additional protection to prevent damage to factory-finished doors and frames.
- B. Inspect doors and frames on delivery for damage and notify shipper and supplier if damage exists. Minor damages may be repaired provided refinished items match new work and are acceptable to the Architect. Remove and replace damaged items that cannot be repaired as directed.
- C. Store doors and frames at building site under cover. Avoid using non-vented plastic or canvas covers that could create a humidity chamber.

1.6. WARRANTY

- A. Warrant FRP doors, Aluminum frames, and factory hardware against failure in materials and workmanship, including excessive deflection, faulty operation, defects in hardware installation, and deterioration of finish or construction in excess of normal weathering.
- B. Warranty period: Ten years starting on date of shipment. In addition, a limited lifetime (while the door is in its specified application in its original installation) warranty covering: failure of corner joinery, core deterioration, delamination or bubbling of door skin.

2. PRODUCTS

2.1. MANUFACTURERS. Use all one manufacturer.

- A. Special-Lite, Inc., Decatur, MI, 800-821-6530
- B. Kawneer Flush line, Franklin, IN, 317/738-2600
- C. Or approved equal – obtain approval before bidding.
 1. Or provide price increase or deduct on Substitution / Voluntary Alternate Form.

2.2. FINISH

- A. Natural anodized
- B. ADA hardware to match

2.3. APPLICABLE DOOR TYPES

- A. Door locations are shown on Sheet A-1

1. FLUSH FACE SINGLE Door is Special-Lite SL-17 for the exit door out of Room 53. (Verify all door dimensions and quantity).
 2. FLUSH FACE DOUBLE Door with mullion Room 58.2.
 3. Coordinate door, stile, framing and reinforcement with selected hardware. All FRP doors have 24" x 24" vision panel sill at 48" AFF.
 4. Fully weatherstripped.
 5. Exterior doors shall have minimum isocyanurate insulation of 1".
 6. 0.120" FRP both sides, color to be selected.
- B. Flush face single FRP door is Special-Lite SL-17 for Room 53 door that is 36" x 84". Verify all dimensions.
- C. Flush Face Double Doors are Special-Lite SL-17 for the one set of double doors that are 72"w x 84"h. This set to be provide with removable mullion.
- D. Clearances: Not more than 1/8 inch (3.2 mm) at jambs and heads, except not more than 1/4 inch (6.4 mm) between pairs of doors. Not more than 3/4 inch (19 mm) at bottom, with standard being 5/8 inch (15.9 mm) at bottom.
- E. Door Edges: Lock stile to be factory beveled 1/8" in 2" for rub free operation. Square lock-edge will not be accepted.
- F. Tolerances: Maximum diagonal distortion – 1/16 inch (1.6 mm) measured with straight edge, corner-to-corner.
- G. Hardware Reinforcement: Fabricate all hardware reinforcements utilizing premium high density polyethylene (HDPE) and fiberglass blocking. Any form of wood or metal reinforcements will not be accepted.
- H. Exposed Fasteners: Unless otherwise indicated, provide stainless steel, countersunk flat or oval heads for exposed screws and bolts.
- I. Thermal-Rated (insulating) Assemblies: At exterior locations and elsewhere shown or scheduled, provide doors fabricated as thermal-insulating door and frame assemblies, with an "R" value of 11-12.
- J. Hardware Preparations: Prepare doors and frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier. Doors and frames must be factory pre-drilled for all mortised hardware preps. Pilot and through-bolt holes for all surface mounted hardware to be drilled at the project site during installation.

2.4. FRAMING SYSTEMS

- A. Special-Lite 450T 2" X 4 1/2" or Kawneer 451.
1. .125" Thick mill finish extruded aluminum for three doors.
 2. Necessary clips, stops and framing components to complete the framing system.
 3. Sealants and closure pieces.

- B. Accessory trim pieces: Provide necessary closure pieces on extruded aluminum to properly finish jambs and head.
- C. Basic Systems - 4-1/2" X 2" X 3/16" wall thickness aluminum.
- D. All designated openings to receive new aluminum frame.
 - 1. Tri-Fab 450 or equal
 - 2. 2" X 4 1/2" X 3/16" (0.187")
 - a. With all closure trim pieces, clips, stops, framing and anchoring components to complete the door frames.

2.5. FRP PANEL DOORS

- A. Special-Lite SL-17 or Kawneer Flush Line FRP
- B. 0.120" thick FRP panel on EPS polyurethane insulated core and aluminum frame.
 - 1. One (1) single door 36" x 88"
 - 2. One (1) double door 72" x 88"

2.6. HARDWARE (PROVIDED BY HARDWARE SUPPLIER **NOT** DOOR MANUFACTURER)

- A. Keying:
 - 1. Exterior doors equipped with Von Duprin Panic Device and Primus Lock to match Unit 5 master.
- B. Product Application:
 - 1. One (1) single door Room 53 M.O. 40" x 88": Door 7' – 2" h.
 - a. Von Duprin 98 series panic hardware
 - b. Strike approximate to condition
 - c. Keying – Schlage Primus
 - d. Closer with no hold open
 - 2. One (1) set of double doors M.O. 88"h x 72"w verify. Install new panic devices, and closers, and hold open. Install new Primus cylinder in this set. Door 7' – 2" h.
 - a. Von Duprin 98 Series panic hardware with removeable mullion.
 - b. Strike, most appropriate heavy duty for application condition encountered.
 - c. Keying -- all locks new Schlage Primus – Unit 5 Standard
 - d. Closer with No hold open.

- C. Continuous geared hinges – all new doors.
 - 1. Select Products, Ltd. SL-11 Full Mortise
 - 2. Pemko Hinge V
 - 3. Hagar Roton
- D. Threshold - manufacturer recommended for application, ADA compliant, resistant to blowing rain – all doors.
 - 1. All doors to receive new aluminum thresholds.
- E. Closer
 - 1. LCN Smoothie, 4116 AVB aluminum finish, S-CNS arm
 - 2. **No** Hold-open
- F. Jamb / head weatherstrip – all exterior doors.
 - 1. Pemko 588D
 - 2. Or equal.
- G. Sill drip/sweep
 - 1. National Guard Products 101VA
 - 2. Pemko 3452A
 - 3. Reece 353A
 - 4. Or equal.
- H. Door stop wall, none existing – none new.
- I. Louvers – No louvers in any FRP door.

2.7. VISION LITES

- A. Factory Glazing: 1-inch glass insulating units.
- B. Lites in Exterior Doors: Allow for thermal expansion. Provide laminate or tempered glazing.
- C. Rectangular Lites:
 - 1. Size: 24" by 24: (As indicated on Drawings.
 - 2. Factory glazed with screw-applied aluminum stops anodized to match perimeter door rails.

3. EXECUTION

3.1. INSTALLATION

- A. Examine all surfaces to receive parts of the work specified herein. Verify all dimensions of in-place and subsequent construction. Installation of frames constitutes acceptance of the existing conditions.

1. Doors (#2 on Drawings) to remain with new Primus locks and lever latch set installed.
- B. All items shall be set as shown and shall be level, square, plumb, at proper elevations, and in alignment with other work.
- C. All joints shall be tightly sealed with elastomeric sealant in order to secure a watertight job and eliminate air leakage as much as possible. All materials shall be screwed in place using backing, masonry plugs or anchor straps as required.
1. Plastic anchors in masonry shall not be used. See Section 01055.
 2. Jamb and heads (for glazing frames or door frames) shall be anchored as follows:
 - a. 1/4" diameter cap screws at maximum 1'-4" o.c.
 - b. 5/16" diameter cap screws at maximum 2'-0" o.c.
 - c. 3/8" diameter cap screws at maximum 2'-0" o.c.
 - d. Minimum three (3) anchors per jamb segment.
 - e. First and last segment anchors shall not exceed 8" spacing from the end.
 - f. Anchor for 15 psf wind load, leeward/windward.
- D. Where moldings are joined, they shall be accurately cut and fitted to result in a tightly closed watertight joint.
- E. New door sills and thresholds shall be set in a bed of exterior grade sealant, full length and full width, watertight. See 07900, sealants.
- F. Frames anchored to masonry shall be spaced therefrom and finished.
1. Provide continuous Styrofoam rope backer. After backer insertion, depth of recess shall be equal to joint width.
 2. Provide exterior sealant in color to match frame materials. Strike sealant to a smooth uniform fillet.
- G. Thresholds shall be anchored with stainless steel flat head threaded cap screws into metal expansion anchors, set into full bed of exterior grade sealant.
- H. General: Install doors, frame and accessories according to Shop Drawings, manufacturer's data and as specified.
- I. Placing Frames: Set frames accurately in position, plumbed, aligned and braced securely until permanent anchors are set. After wall construction is completed remove temporary braces and spreaders, leaving surfaces smooth and undamaged.
1. New masonry construction, provide at least four (4) frame anchors per strike jamb and hinge jamb. Install mortise strike at BHMA/ANSI standard heights. Set frames and secure to adjacent

construction with stainless steel expansion bolts and masonry anchor devices.

3.2. ADJUSTING AND CLEANING

- A. Protection Removal: Immediately before final inspection, remove protective wrappings from doors and frames.
- B. Cleaning: Clean fiberglass door and frame assemblies in accordance with manufacturer's recommended procedure.

END 08400

1. GENERAL

1.1. WORK INCLUDED

- A. Remove four (4) 3' 8"h x 3'-0"w and four (4) 3' 8"h x 6'-0"w GERKIN Windows from Existing Room 48, 49, 50 & 52. Install these windows in new classrooms 54, 55, 56, and 57 as shown on drawings.
 - 1. These windows are heavy duty commercial windows installed in 2010 by McLean County Glass Co., 309/827-1600.

1.2. RELATED WORK

- A. Specified elsewhere:
 - 1. 07600 – Sheet Metal Flashing & Trim

1.3. TESTING

- A. Test Units
 - 1. Air, water and structural test unit sizes and configuration shall conform to requirements set forth in ANSI/AAMA 302.9-1977.
 - 2. Thermal and infiltration test unit sizes shall be 4'-0" X 6'-0". Test unit shall consist of a single typical vent.
- B. Test Procedures and Performance
 - 1. Windows conform to all ANSI/AAMA AP-C60 / HC55 performance tests.

1.4. QUALITY ASSURANCE

- A. The window manufacturer's letter of certification stating that the tested window meets or exceeds the referenced criteria for the appropriate ANSI/AAMA 101-88 window type was received in 2010.

1.5. DELIVERY, STORAGE AND HANDLING

- A. All materials shall be carefully handled upon removal at the project site. Do not stack directly on floor, provide cardboard shims, stack or store in a manner to avoid abrasion, warping or winding of the assembly. Keep covered.

2. PRODUCTS

2.1. MATERIALS

- A. Aluminum window systems shall be minimum 2-3/8" deep, X approximately 1½ " face width system. Nominal 0.1" primary wall thickness thermal break

window system for 1" glazing, weep to exterior, 6063-T5 alloy and temper, AAMA P.HC 60 minimum rating. All windows to be equipped with operable awning or hopper sash. All operable windows to be equipped with screens. Listing in this schedule does not supersede primary wall thickness or jamb depth requirements. Verify for each and adjust model selection if necessary.

1. Gerkin 5200 Series, C-60 / HC55, Sioux City, IA, phone 402/494-6000

B. Hardware: Description of existing windows:

1. Locking handles shall be cam type and manufactured from a white bronze alloy with a US25D brushed finish.
2. Operating Arms:
 - a. Projected Vents: Anderberg Series 301 4-bar stainless steel arms or equal.
 - b. Pivots: Pivot mechanism shall be extruded aluminum housing with a stainless steel pin.
3. Weatherstripping shall be Schlegel Q-Lon or equal.
4. Glass and Glazing shall be one inch (1") insulated glazing.
5. Thermal Barrier
 - a. Barrier material shall be poured-in-place two (2) part polyurethane. A non-structural thermal barrier is unacceptable.
6. Sealants, interior and exterior, shall be a one (1) part polyurethane color to be selected. Use rope where appropriate to conditions.
7. These eight (8) windows are presently installed in metal stud walls with EIFS on exterior side and gypsum board on inside. To install in new 14" masonry walls, provide GERKIN 2 3/8" subframe system for head and jambs – all windows. For sill provide the GERKIN subframe sill and install the extended sill flashing.

2.2. FABRICATION

A. General Description of existing windows:

1. Mechanical fasteners, welded components and hardware items shall not bridge thermal barriers. Thermal barriers shall align at all frame and sash corners.
2. Depth of frame and sash shall not be less than 2-3/8".

B. Frame

1. Frame components shall be mortised and tenoned. Other means of mechanical fastening, i.e., screws shall not be permitted.
2. Frame/sash design shall include integral drip, self-flashing operation, or surface applied extruded rain drip over each operable sash section.
3. At each location, provide an extruded sill flashing full frame depth with turn up plus drip out over brick.

C. Sash

1. All sash extrusions shall be tubular.
2. Each corner shall be mitered, reinforced with an extruded aluminum corner key, hydraulically crimped, and "cold welded" with epoxy adhesive.
3. Each sash shall have two (2) rows of weatherstripping installed in dovetail grooves in the sash extrusion.

D. Screens

1. Screen frames shall be extruded aluminum - mill finish.
2. Screen mounting holes in the window frame shall be factory drilled.
3. Screen mesh shall be stainless steel 18 X 14 mesh .011 wire diameter; available from McNichols Company, 1-800-237-3820 or equal.

E. Glazing

1. All shop glazed units shall be wet glazed with a silicone backbed compound (to be BE SCS-2511 or equal) and an extruded aluminum glazing bead with vinyl gasket.
2. All field glazed units shall be glazed with butyl tape, silicone cap seal (DC 795 or equal), extruded aluminum glazing bead, and a dense neoprene drive-in wedge.

3. EXECUTION

3.1. INSPECTION

A. Job Conditions

1. Verify dimensions clean tolerances, plumb and level. Provide a solid anchoring surface in accord with Manufacturer's recommendations.

3.2. INSTALLATION

A. Use only skilled tradesmen with work done in accord with approved shop drawings and specifications.

B. Plumb and align window faces in a single plane for each wall plane and

erect windows and materials square and true adequately anchored to maintain position permanently when subjected to normal thermal and building movement and specified window loads.

- C. Adjust windows for proper operation after installation.
 - 1. Check for open adequate weeps.
 - 2. Check for points that might allow water into framing or wall below window.
 - 3. Provide necessary flashing around windows to be compatible with EIFS wall system.

- D. Furnish and apply sealants with backer rope to provide a weathertight installation at all joints and intersections and at opening perimeters. Carefully follow sealant requirements in Section 07900 regarding type, applications, preparation and rope. Wipe off excess material and leave all exposed surfaces and joints clean and smooth.
 - 1. Use exterior grade, for inside and outside joints, color to match window system.
 - 2. Properly seal at sill and sill ends.
 - 3. Installation and window assembly to be infiltration tight.

3.3. ADJUSTING AND CLEANING

- A. After completion of window installation, windows shall be inspected, adjusted, put into working order and left clean, free of labels, dirt, etc. Protection from this point shall be responsibility of General Contractor.

END 08500

1. GENERAL

1.1. WORK INCLUDED

- A. General Contractor shall provide adequate and suitable hardware and accessories at all doors shown on the Drawings.
 - 1. Hardware for steel doors, Classroom to Corridor #58.1 and #58.2, Office to Corridor, etc.
 - 2. Thresholds where applicable. Four (4) Thresholds will be provided by this General Contractor, but will be installed by Carpet Contractor. Other interior thresholds as necessary.

1.2. PRODUCTS FURNISHED IN THIS CONTRACT BUT NOT SPECIFIED UNDER THIS SECTION

- A. Hollow Metal Work - 08100: Hardware Supplier shall furnish steel door, frame templates for frame preparation to Door Fabricators.
- B. Aluminum Doors & Frames -- Doors and hardware specified in Section 08400.

1.3. RELATED WORK

- A. Specified in other Sections:
 - 1. DIVISION 1 - GENERAL REQUIREMENTS
 - 2. 08100 - Hollow Metal Work
 - 3. 08400 - FRP Doors & Frames

1.4. REFERENCES

- A. ANSI A117.1 - Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People
- B. NFPA 80 - Fire Doors and Windows
- C. AWI - Architectural Woodwork Institute - Quality Standards
- D. NFPA 101 - Code for Safety to Life from Fire in Buildings and Structures
- E. NFPA 252 - Fire Tests of Door Assemblies.
- F. UL 10B - Fire Tests of Door Assemblies
- G. UL 305 - Panic Hardware
- H. Illinois School Code 175/185/180

1.5. SUBMITTALS

- A. Submit the following in accordance with 01340:
 - 1. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
 - 2. Shop Drawings: Indicate locations and mounting heights of each type of hardware.
- B. Submit manufacturer's parts lists and templates to Door Frames Fabricator.

1.6. OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of 01700 maintenance manuals showing parts and service procedures for all items of operable hardware.
- B. Maintenance Data: Included data on operating hardware lubrication requirements, and inspection procedures related to preventative maintenance.

1.7. QUALITY ASSURANCE

- A. Perform work in accordance with the following requirements:
 - 1. Installer shall be experienced in the installation and adjustment of selected hardware.
 - 2. Follow manufacturer's instructions.
 - 3. Adjust to operate smoothly, quietly and without binding.
 - 4. Damaged, scratched or incomplete hardware devices shall not be used.
- B. Certification: Proof of hardware inspection shall be provided to the Owner and Architect/Engineer. See 3.3 of this section.

1.8. QUALIFICATIONS

- A. Manufacturers: Company specializing in manufacturing the products specified in this section.
- B. Hardware Supplier: Firm specializing in supplying institutional door hardware at least three (3) years and approved by the manufacturer.

1.9. REGULATORY REQUIREMENTS

- A. Conform to Illinois Code #175, 185m 180, and NFPA as applicable for requirements applicable to fire rated doors and frames.

1.10. DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products per provisions of 01600. Package hardware items individually; label and identify each package with door opening code to match hardware schedule.

- B. The Supplier shall deliver the keys directly to the Owner. The General Contractor and the Architect/Engineer shall be furnished an acknowledgment receipt bearing the Owner signature.

1.11. WARRANTY

- A. 100% Labor and Materials - one (1) year warranty to Owner under provisions of 01740. Warranty shall cover latch sets and door closures.
- B. Extended Warranty: Parts, replacement, rebuilding, shop labor - excludes field labor to install.
 - 1. Latch/locksets - five (5) years
 - 2. Exit devices - five (5) years
 - 3. Closers - five (5) years

1.12. MAINTENANCE MATERIALS

- A. Provide maintenance materials under provisions of 01730.
- B. Provide and deliver to Owner two (2) sets of special wrenches and tools applicable to each different or special hardware component.

2. PRODUCTS

2.1. ACCEPTABLE MANUFACTURERS

- A. Hinges:
 - 1. Interior Application:
 - a. Hager BB1279, 4-1/2" x 4-1/2" US32D or US26D.
 - b. Lawrence BB4101, 4-1/2" x 4-1/2" US32D or US26D.
 - c. Stanley FB179, 4-1/2" x 4-1/2" US32D or US26D.
 - 2. Exterior Application: Full height geared hinges with Teflon load carrying bearings, heavy duty, finish to match door system. Non-removable in closed position.
 - a. Pemko Hinge
 - b. Hager Roton
 - c. Or equal
- B. Latchsets/Locksets: 2-3/4" backset, dead-locking spring bolts where keyed. Use vandal resistant breakaway lever handle in all exterior applications.
 - 1. Extra heavy-duty commercial grade, ANSI A156.2, Series 4000, Grade 1.
 - 2. Schlage D Series D53PD x US32D or US26D.
 - a. 5-3/4" lever radius x Rhodes trim with 2-9/16" diameter rose.

- b. The locksets with blank inside Rooms 50A, 50B and 50C **MUST BE INTERCONNECTED TO THE FIRE ALARM SYSTEM** so that these three doors will unlatch when the fire alarm is activated.
- C. Push-Pulls:
 - 1. Hiawatha Pull #535A 8", or equal, US32D or US26D. Mount pull in 3-1/2" x 16" x .1" thick push plates x US32D or US26D.
 - 2. Redstone Pull #178A (1" x 2-1/2" x 10") x US32D or US26D. Mount pull in 3-1/2" x 16" x .1" thick push plate x US32D or US26D.
 - 3. Hiawatha, or equal, push plates (kick plate stock) 10" x 24" x 18 gauge US32D.
 - 4. Russwin Pull #481, 9-1/4" x US32D or US26D.
- D. Cylinder Locks: Exterior areas to be keyed to Owner's Primus Schlage system to provide building keying coordinated with existing, master keying, match existing, grand master keying and individual keying as directed in conference with Owner prior to delivery, see 2.2.A.
 - 1. Interior locks shall be "C" Core.
- E. Closers:
 - 1. Normal closers, fully adjustable and applicable accessories with no hold open where specifically noted in Schedule, thumb (hand) turn operated hold-open all other locations. Adjustable delay action at all closers.
 - a. LCN 4100 Series
- F. Door Stops (Use wall stops wherever possible.):
 - 1. Wall Stops (mounted to mate pull, handle or knob device):
 - a. Hiawatha: R1326 ½ BL x US28D or US26D.
 - b. Ives: #401 x US 28D or US26D.
 - c. Glynn Johnson: #WB50MX x US28D or US26D.
 - d. Rockwood 400/403.
 - 2. Floor Stops (add spaces as applicable to door undercut)
 - a. Hiawatha: #1330A and #1330AE x AL or US32D finish.
 - b. Yale: #846RP and 847RP x US26D or US28D finish.
 - c. Russwin: #207, #207 ½ and #209 x AL or US26D.
 - d. Ives: #436 or #438 x AL or US26D.
- G. Thresholds:
 - 1. Aluminum Entrance Doors
 - a. Use door manufacturer's standard - accessible style.

2. Corridor to Classroom and Classroom carpet termination.
 - a. Pemko #1665A
 - b. At Colene Hoose Addition provide four (4) units to be installed by carpet layer.
- H. Door Bolts (with matching top and bottom strike): For the Mechanical Closet in Room 50C.
 1. Glynn Johnson or equal: Top and bottom GJ 1631/1632 UL rated for inactive leaf.
 2. IVES #FB358 provide two (2) for top and bottom of inactive leaf.
 - a. Strike, most appropriate heavy duty for application condition encountered.
 - b. Provide receptor for (hole) in floor and reinforce metal opening in head of metal frame.
 - c. Active leaf (3' x 7' door) shall have key lock only (dead bolt) no latch set.

2.2. KEYING

- A. Door Locks: New cylinders keyed differently, keyed alike, master keyed, and grand master keyed. Match existing building keying and master keying as directed by Owner.
 - a. Match Primus system for exterior
 - b. Schalage "C" cores for interior
- B. All cylinders shall be keyed and master keyed compatible with the existing building hardware system. Supply keys in the following quantities:
 1. Four (4) sets of individual cylinder keys.
 2. Four (4) master keys.
 3. Four (4) grand master keys.
 4. For keying questions call Kaine Hilt: 309/275-7418

2.3. FINISHES. Finishes are brushed steel/pewter color.

3. EXECUTION

3.1. EXAMINATION

- A. Verify site conditions under provisions of 00800.
- B. Verify that doors and frames are ready to receive work and dimensions are in accord with documents, shop drawings and manufacturer's instructions, as applicable.
- C. The Specifications and Drawings indicate hardware intent.

1. Door hardware omitted from the Schedule shall be fitted with hardware in accord with a similar door installation at no additional cost to the Owner.

3.2. INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions.
- B. Use templates provided by hardware item manufacturer.
- C. Mounting heights for hardware from finished floor to center line of hardware item:
 1. Locksets: 40"
 2. Push/Pull: 40"
 3. Dead Locks: 40"
 4. Exit Devices: 40"

3.3. FIELD QUALITY CONTROL. Hardware Consultant shall inspect installation and certify that hardware and installation has been furnished and installed in accordance with manufacturer's instructions and as specified.

3.4. ADJUSTING

- A. Adjust hardware for smooth operation.

3.5. PROTECTION OF FINISHED WORK

- A. Protect finished work under provisions of 01600.

3.6. SCHEDULE OF HARDWARE SETS

- A. Set A – this applies to Doors A on plan.
 1. 1½ pair hinges
 2. Corridor latch set (F109)
 3. Closer with no hold-open
 4. Threshold (carpet)
 5. Wall stop
 6. Doors:
 - a. 3'-0" x 7'-0" 14 ga.
 - b. Vison Glass 7" x 24"
 - c. Heavy Duty Louver 8"h x 24" w
- B. Set B – this applies to Door B on plan.
 1. 1½ pair hinges
 2. Passage latch (F75) ND 105
 3. Closer with no holds pen
 4. Door:

- a. 3'-0" x 7'-0" 14 ga.
 - b. No Vision Glass
 - c. No Lock.
 - d. Heavy Duty Louvers 8"h x 18" w

- C. Set C – this applies to Doors C on plans.
 - 1. 1½ pair hinges
 - 2. Entrance lock (F82) ND 50 PD
 - 3. Blank plate on interior
 - 4. Heavy Duty Louvers 8"h x 18"w
 - 5. Door:
 - a. 3'-0" x 7'-0" 14 ga.
 - b. Vision Glass 7" x 24"

- D. Set D applies to Door D on plan – see Section 08400 Aluminum Frames, FRP Doors, & Hardware.
 - 1. Continuous Hinges
 - 2. 24" x 24" glazing panel
 - 3. Von Duprin 98 series Panic Hardware.
 - 4. Card reader for bypassing key opening.

- E. Set E applies to double existing aluminum Entrance Door:
 - 1. No work on these doors.

- F. Set EX are existing doors and require no work.

- G. Set F applies to Mechanical Closet Doors in Room 50 C.
 - 1. 1 ½ pair hinges on active door 3'-0" x 7'-0"
 - 2. 1 ½ pair hinges on active door 2'-0" x 7'-0"
 - 3. Lockset only no latch
 - 4. Heavy duty louver
 - 5. No Vision Glass; no threshold
 - 6. Flush bolts as specified in this section: 2. Products. 2.1. Paragraph H with hole in frame & floor to receive bolt.

- H. Set G applies to Closet Room 51.1
 - 1. 1 ½ pair hinges
 - 2. Latch operated by key
 - 3. Closer
 - 4. No Vision glass, no threshold, no louvre

END 08700

1. GENERAL

1.1. DESCRIPTION

A. Work Included:

1. Contractor shall provide glass and glazing as shown on the Drawings and specified herein.
 - a. Provide tempered glazing in corridor doors.
 - b. Provide tempered glass in entry door and sidelights as required.

1.2. RELATED WORK

A. Specified elsewhere

1. DIVISION 0 - BIDDING & CONTRACT REQUIREMENTS
2. DIVISION 1 - GENERAL REQUIREMENTS
3. 07900 - Sealants & Caulks
4. 08100 Hollow Metal Work
5. 08400 - Aluminum Doors & Frames
6. 08700 - Door Hardware

1.3. QUALITY ASSURANCE

- A. Glass shall conform to Federal Specifications DD-G-451-C.
- B. Unless otherwise shown, conform to details and procedures of the "Glazing Manual" (Flat Glass Marketing Association).
- C. All glazing materials shall comply with State and Federal recommendations and the Illinois School Building Code.
 1. School CODE requires some interior building glazing to be wire glass unless otherwise designated specifically. Where wireglass is required in Code 175 and 185, we are specifying Firelite glazing.
- D. Comply with glass manufacturer's recommendations for annealed, heat treated or tempered depending on exposure conditions, edge shading, sun, etc.

1.4. SUBMITTALS

- A. Submit Manufacturer's Literature, including materials description and installation instructions for glazing inserts and glazing sealants.

2. PRODUCTS

2.1. MATERIALS

- A. Float or Plate Glass: PPG Industries, Libby-Owens-Ford Company, or ASG Industries, Inc.), Mid-American Glass, Inc., Davenport, IA. Thickness as shown on the drawings; tempered or laminated in doors and adjacent lights and where shown. Annealed heat strengthened or tempered as recommended by manufacturer solar/shade/thermal conditions.
- B. Tempered Glass: Comply with requirements of Consumer Products Safety Commission Regulation for Safety Glazing Materials 16 2FR 1201 Catalog I & II and GTA Specification G4-3-16. Minimum thickness shall be 3/16".
- C. Glazing compound, glazing tape, sealant, primary seal, secondary seal, spacers, etc.: All elements used in the factory and in the field shall be approved by the glazing Manufacturer as compatible.
- D. Laminated glass to meet ASTM C 1036-85 and ANSI 297.1-1984 and Consumer Product Safety Commission 16 CFR 1201, 1/4" minimum total thickness, 015" interlayer up to nine (9) square feet, .030" interlayer over 9 square feet.
- E. Insulated glass: Where called for shall be assembled of the required or noted glazing materials and thicknesses, ten (10) year manufacturer's guarantee against loss of seal and/or clouding.
 - 1. For all windows, use two (2) 1/4" grey low 'e' third surface units separated by 1/2" sealed air space.
 - 2. Use this product with tempered glass as required in north, east and west corridors.
 - 3. Use annealed, heat strengthened, or tempered as recommended by the insulated glass manufacturer for applications as occur for solar/shade/thermal stress irregularities.
 - 4. Always assume irregular shading pattern glazing due to seasonal sun incidence variation and possible future landscaping shadows.

3. EXECUTION

3.1. PREPARATION

- A. Examine all surfaces to receive the parts of the work specified herein. Verify all dimensions of in-place and subsequent construction. Application or installation of materials shall constitute acceptance of the related construction.

3.2. INSTALLATION

- A. Employ only experienced glazers who have had previous experience with the materials and systems being applied. Use the tools and equipment recommended by the Glass Manufacturer.

- B. Measure all openings and cut glass accurately to fit each opening. Provide a minimum edge clearance and bite on the glass as specified by FGMA. Tempered glass and wire glass shall not be seamed, nipped or abraded at the job site.
- C. Maintain a minimum temperature of 40 degrees F during glazing unless the Manufacturer of glazing materials specifically agrees to application of his materials at lower temperatures.
- D. Clean glazing stops and rabbets to receive glazing materials of all obstructions and deleterious substances that might impair the work. Remove protective coatings that might fail in adhesion or interfere with bond of sealants. Comply with the Manufacturer's instructions for final wiping of surfaces immediately before application of primer and glazing compounds or tapes. Wipe metal surfaces with approved cleaning solvent.
- E. Prime surfaces to receive glazing compounds in accordance with the Manufacturer's recommendations, using recommended primers.
- F. Inspect each piece of glass immediately before installation. Do not install pieces with significant impact damage at edges, scratches, or abrasion of faces, or any other evidence of damage.
- G. Locate setting blocks at the quarter points of sill but no closer than 6" to corner of glass. Use blocks of proper size to support the glass in accordance with Manufacturer's recommendations.
- H. Provide spacers for all glass to separate glass from stops, except where continuous gaskets or tape are required. Locate spacers 36" o.c. maximum inside and out, with a minimum of two (2) spacers per edge of glass. Provide thickness equal to the sealant or compound thickness shown. Provide width, as required for minimum of 3/8" bite on glass, at all four edges.
- I. Set glass in a manner that produces greatest possible degree of uniformity in appearance. Face all glass, which has dissimilar faces, with matching faces in the same direction. Set all glass with bow (if any) to exterior.
- J. Glazing materials from different sources shall not be used in the same joint system unless the Manufacturer of each material has stated IN WRITING that his material is fully compatible with the other material.
- K. Use masking tape or other suitable protection to limit coverage of glazing materials to the surfaces intended for sealants.
- L. Butt or lap ends of sealant tape in accordance with Manufacturer's recommendations.
- M. Tool exposed surfaces of glazing materials to provide a slight wash away from the glass. Install exposed tapes and gaskets with a slight protrusion above stops in the final compressed condition.

- N. Clean excess sealant or compound from glass and framing members immediately after application, using solvents or cleaners recommended by Manufacturers.
- O. Provide glass as follows:
 - 1. All interior glazing, comply with Safety Glazing Act, except as noted on plans, 1/4" diamond pattern wire glass in fire doors.
 - 2. Fire rated interior glazing sidelights and borrowed lights greater than 100 square inches to be ninety (90) minute fire rated glass.
 - 3. Exterior doors, laminated, insulated gray glass.

3.3. CURING, PROTECTION & CLEANING

- A. Cure sealants in accordance with the Manufacturer's instructions to attain maximum durability and adhesions to glass and framing as soon as possible.
- B. Protect glass from breakage immediately upon installation. Use streamers or ribbons suitably attached to framing and held free of the glass. Warning markings shall not be applied directly to the glass.
- C. Remove and replace glass which is broken, cracked, chipped or damaged in any way and from any source, including weather, vandalism and accidents during the construction period.
- D. Maintain glass in a reasonably clean condition during construction so that it will not become stained and will not contribute to deterioration of glazing materials.
- E. Clean glass surfaces when done.
- F. Wash and polish glass on both faces, not more than four days prior to date of substantial completion. Comply with instructions and recommendations of the Glass Manufacturer and Glazing Materials Manufacturer for cleaning in each case.

END 08800

1. GENERAL

1.1. WORK INCLUDES

A. Base Bid:

1. General Contractor:

- a. All new gypsum wallboard and any accessories as needed to complete the work as shown on the drawings and specified herein.
- b. Include metal casing around existing Window openings where gypsum board replaces windows in Rooms 48, 49, 50 and 52.

1.2. RELATED WORK

A. Specified elsewhere:

1. 05400 - Cold Formed Metal Framing
2. 07900 – Sealants & Caulks

1.3. QUALITY ASSURANCE

- A. Gypsum wallboard construction shall comply with all laws, ordinances, rules, regulations and orders of public authorities having jurisdiction over this part of the work.
- B. All materials shall be from a single manufacturer unless others are approved by the Architect/Engineer, to insure total unit responsibility. Installer shall be acceptable to the Manufacturer of the wallboard materials. All gypsum board installed shall be 5/8" fire rated (Type X.)

1.4. PRODUCT DELIVERY, STORAGE & HANDLING

A. Acceptance at site:

1. All materials shall be delivered to the job in their original, unopened containers or bundles; stored in a place providing protection from damage and exposure to the elements.
2. Damaged or otherwise unsuitable material, when so ascertained, shall be immediately removed from the job site.

B. Protection prior to installation:

1. Since the Owner will be occupying the building, storage of materials will be difficult. Coordinate deliveries to match use.
2. Protection must be provided by General Contractor against moisture, impact, etc.

1.5. SUBMITTALS. Submit product data in accordance with 01340.

2. PRODUCTS

2.1. ACCEPTABLE MANUFACTURERS

- A. Gypsum wallboard, joint compound, etc.
 - 1. U.S. Gypsum
 - 2. Gold Bond – National Gypsum Corp.
 - 3. G-P Gypsum Corp.
 - 4. Lafarge North America

- B. Adhesive
 - 1. Contech PL200
 - 2. DAP 4000
 - 3. Miracle Adhesives Corp. DSA-20
 - 4. Ohio Sealants Inc., Formula 38

2.2. MATERIALS

- A. Gypsum Drywall: All material to be 4' X 8' (or larger) X 5/8" thick UL rated.
 - 1. All wall applications of gypsum board to be "Fiberbond" or abuse resistant, hard faced gypsum board, compressed facing.
 - 2. This product to be used in all interior locations.
 - 3. All "outside" 90° Edges such as corner and door jambs shall have 3/4" radius edge.

- B. Paperless glass mat gypsum board 5/8" thick,.
 - 1. DensGlass
 - 2. This product to be used as exterior wall sheathing.

- C. Tape, Joint Compounds, Screws, Corner Edge Guards, etc.: Shall be manufactured by the manufacturer of the gypsum wall board or shall be manufactured to be compatible with all other system components.
 - 1. Paint ready. - DensGlass
 - 2. Mesh type at locations.

- D. Trim items
 - 1. Corner beads flush taping style, galvanized.
 - 2. Expansion joints, flush taping style, galvanized or PVC.
 - 3. Edge beads, taping style, galvanized, selected for condition.
 - 4. 3/4" round 90° corner.

2.3. ACCESSORY MATERIALS

- A. Screws: Type W and GWB; sized to suit thickness.
 - 1. Custom self-tapping screws along existing exterior wall.

- B. Corner Reinforcements, Casing Beads and Metal Trim: fabricated from 26-gauge galvanized sheet steel with perforated flanges, designed to receive joint compound.
- C. Joint Treatment Materials: ASTM C475-64 (1975).

3. EXECUTION

3.1. PREPARATION. Insure that studs are aligned and adequately braced so that resulting installation will be smooth and straight. Attachment shall be by screws ONLY, with spacing of screws per manufacturer's recommendations or these specifications whichever is more demanding.

3.2. INSTALLATION

A. Single or Double Layer Systems; Gypsum Panel Erection-Direct Attachment to metal studs and metal furring channels:

1. Place panels horizontally at right angles to framing, offset joints.
 - a. Position all ends centered on vertical framing members.
 - b. Use maximum practical lengths to minimize end joints.
 - c. Fit ends and edges closely, but not forced together. Stagger end joints in successive courses.
 - d. Place end joints on opposite sides of partitions on different studs.
 - e. When necessary, cut ends, edges and cutouts within the field of the panel in a workmanlike manner.
2. Screw fasteners in panel field first, work toward ends and edges.
 - a. Hold panel in place with firm contact and install screw fasteners at least 3/8" in from ends and edges.
 - b. Apply panels with power driven screws.
 - c. Attach gypsum panels to framing supports with 1-1/4" Type W screws at 8" o.c.

B. Wall systems shall employ 5/8" thick, impact resistant board unless noted otherwise.

1. Expansion joints neatly spaced at about 50" centers on long walls, select location for most efficient use.
2. Add expansion joints at site or during warranty where drywall cracking is anticipated or occurs due to installation conditions, structural framing, etc.

C. Accessories:

1. Round edge corner beads shall be installed on all exterior corners and at dissimilar materials, attached with suitable fasteners spaced 9" o.c. on both sides up to 60" above floor and shall be in single lengths unless corner exceeds standard stock lengths. Dimple set allowed only above 60".

2. Square edge metal trim shall be installed at all extruded edges and corners of wallboard, attached with suitable fasteners, spaced 9" o.c. and shall be in single full lengths unless application length exceeds standard stock lengths.
 3. Wallboard screws shall be applied with an electric driver. Screws shall be secured not less than 3/8" from ends and edges of wallboard for a uniform dimple not over 1/32" deep.
- D. Joint treatment compounds shall be mixed according to the Manufacturer's directions and applied as follows:
1. All "V" grooves formed by abutting eased radial edges of wallboard shall be filled flush with plane of taper with pre-fill compound. Excess compound beyond the "V" groove shall be wiped clean leaving a flat joint for taping.
 - a. Reinforcing tape shall be applied immediately, centered over joint, seated into compound.
 - b. A skim coat shall follow immediately, but shall not function as a fill or second coat.
 - c. Tape shall be properly folded and embedded in all angles to provide a true angle.
 - d. Tape all corner and edge beads with tape fully embedded into compound.
 2. After taping compound has hardened, topping compound shall be applied, filling board taper flush with surface.
 - a. Fill coat shall cover tape and feather out slightly beyond taper.
 - b. On joints with no taper, fill coat shall cover tape and feather out at least 6" on either side of tape.
 - c. Sanding or wet wiping shall be done after material has hardened.
 3. A finishing coat of taping compound shall be spread evenly over and extending slightly beyond fill coat on all joints and feathered to a smooth, uniform finish.
 - a. Over tapered edges, finished joint shall not protrude beyond plane or surface.
 - b. All taped angles shall receive a finish coat to cover tape and taping compound, and provide a true angle.
 - c. Sanding or wet wiping shall be done after final application of compound to provide a smooth surface, ready for decoration. Use wet wiping in all occupied areas.
 4. Fastener depressions shall have at least two (2) coats of taping compound, leaving all depressions level with surface plane. Sand or wet wipe fastener depressions after each application hardens.
 5. Taping compound shall be applied to all bead and trim and shall be feathered out from ground to plane of surface.

- a. When hardened, this shall be followed by two (2) coats of taping compound applied separately and allowed to dry between coats.
 - b. Each coat shall extend slightly beyond previous coat.
- 6. Joints concealed from sight shall be fire taped - smoothing shall not be required.
 - 7. Apply joint sealants as appropriate at edge beads to dissimilar materials and expansion beads.
 - 8. Walls in Rooms 50A, 50B, and 50C may have Finish Level 3. Prime wall. Ceiling in Room 50A, 50B, and 50C have Finish Level 4. Where gypsum board is installed on both sides of the removed windows in Rooms 48, 49, 50C and 52 shall have Finish Level 4.

3.3. FINISHING. All exposed gypsum board installation shall receive finish coating per finish schedule.

A. See Section 09900 - Finish Coatings.

FINISH LEVEL MATRIX

Finishing Level	Final Appearance	How to Achieve Result		
		Joints & Interior Angles	Accessories & Fasteners	Surface
5	Entire surface covered with a) SHEETROCK Brand Primer Surfacer (Tuff-Hide) or b) Skim coat of compound and ready to prime before decorating with gloss, semigloss or enamels or enamel paint.	As on Level 4	As in Level 4	SHEETROCK Brand Primer Surfacer (Tuff-Hide) or skin coat and prime with CGC First Coat, Synko Brand Pre-Coat before painting or texturing
4	No marks or ridges. Ready for priming, followed by wallcoverings, flat paints or light textures.	Two separate coats of compound over Level 2	Three separate coats of compound	Joints filled and smoothed again. Shall be primed with CGC First Coat before painting or texturing.
3	No marks or ridges. Ready for priming, to be followed by heavy textures.	One separate coat of compound over Level 2	Two separate coats of compound	Joints filled and smooth. Shall be prime with CGC First Coat before painting or texturing
2	Tool marks and ridges okay. Thin coating of compound covers tape; one coat compound over fastener heads.	Tape embedded in compound and immediately wiped to leave a thin coating of compound over tape	One coat of compound	Free of excess compound
1	Tool marks and ridges acceptable.	Tape embedded in compound.	Optional – One coat of compound	Free of excess compound
0	Unfinished	None		

3.4. CLEAN UP. Remove all sanding dust and any excess or spilled material from all surfaces.

END 09250

1. GENERAL

1.1. WORK INCLUDES

- A. Base Bid: Provide acoustical ceiling work as shown on the Drawings and specified herein.
 - 1. Install new grid and 2 X 2 panels in Rooms 54, 55, 56, 57, 58, 58.1, 58.2, and 51. Rooms 52.1 and 53 will have partial new ceiling. Rooms 50A, 50B, and 50C will have gypsum bond ceiling.

1.2. RELATED WORK

- A. Specified elsewhere
 - 1. 01055 – Anchorage & Fastenings
 - 2. 05580 – Sheet Metal Fabrications
 - 3. 09250 – Gypsum Wallboard
 - 4. 16511 - Lighting

1.3. QUALITY ASSURANCE

- A. Acoustical material shall conform with the following minimum requirements:
 - 1. Sound Absorption: ASTM CA23-66, NRC .50-.60.
 - 2. Sound Attenuation: AIMA, Test I-II, 35-39 range.
 - 3. Light Reflectance: ASTM C 523-68, .70-.74. (LR-1).
 - 4. Flame Spread:
 - a. Materials shall neither ignite nor flame when inserted into a furnace heated to and maintained at 1200 degrees F. for a period of five (5) minutes.
 - b. Additionally, interior finish or decorative materials applied to ceiling surfaces and ceiling materials shall not be permitted if they give off smoke or gases more dense or more toxic than given off by untreated wood or untreated paper under comparable exposure to heat or flame.
 - 5. Fire rated materials: Underwriter's Laboratories, Inc. Design P-202 RC13-1 Hour except spring clips are not required.
 - 6. **Humidity resistance and mold resistance.**

1.4. SUBMITTALS

- A. Required:
 - 1. Manufacturer's Literature: Materials description and recommended installation and maintenance instructions.

1.5. DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the project site in Manufacturer's unopened containers clearly indicating Manufacturer's name, brand, type, style, size, color, texture and other identifying information.
- B. Store materials in a dry location, off the ground and in a manner to prevent damage, deterioration, and intrusion of foreign matter. Replace materials, which have been damaged or are otherwise unsuitable promptly.

2. PRODUCTS

2.1. MATERIALS

- A. Acoustical Tile: Fissured surface, mineral fiber tile, fire code rated, 24" X 24" X 5/8", square edged, one (1) hour UL rated in assembly also meeting ASTM E-84 and ASTM E-119 of material certified to contain no asbestos.
 - 1. USG
 - 2. Conwed Corp.
 - 3. Celotex Corp. – Fine Fissured
 - 4. Armstrong
 - a. Humidity rated non-sag 100 deg. F./90% R.H.
 - b. Fine fissured, match existing building for directional or non-directional style.
 - c. STC Range 4-44
 - d. LR1 (75% minimum)
 - e. R thermal value = 1.36
 - f. 1 hour UL rated
 - g. Physically compatible with one (1) hour rated suspension system.
- B. Suspended Grillage
 - 1. Hangers: Minimum 12-gauge, soft annealed, steel wire, galvanized. See paragraph F. below.
 - 2. Provide support at 48" on center along main runners.
 - a. Provide necessary sub-framing where needed to achieve 48" support spacing under ducts, openings, etc.
- C. Snap Grid System
 - 1. One (1) hour rated type grid, hold-down clips are not required.
 - 2. Main Runners: 3/4" high, minimum 0.020" thick steel sheet formed runner with outstanding leg at top and tee shape at bottom.
 - 3. Splines: Flat, steel minimum 11/16" wide, 0.020" thick.
 - 4. Clips: Steel wire clips to hold main runner to carrying channels.
 - 5. White face finish

- D. Metal Wall Moldings: Galvanized sheet steel, angles or channels, minimum 0.020" thick, chemically cleaned, bonderized and finished with snap on white aluminum face finish, ASTM C 636-76.
- E. #12 Eyelet Head Screws: Length as needed for wire hanger anchors.
- F. Hanging wire #10 gauge galvanized soft annealed wire.

3. EXECUTION

3.1. PREPARATION

- A. Examine all surfaces to receive the parts of work specified herein.
- B. Verify all dimensions of in-place and subsequent construction. Application or; installation of materials constitutes acceptance of the supporting construction.

3.2. INSTALLATION OF MECHANICAL SUSPENSION SYSTEMS

- A. Install suspension system in accord with ASTM C636-76 and current AIMA recommended procedures.
- B. Unless otherwise shown or recommended closer by the system's manufacturer, install hangers to construction above a maximum four feet (4') o.c. in rows four feet (4') apart.
 - 1. All hangers shall hang in plumb position.
 - 2. Supporting runners typically shall run perpendicular to the structural members.
- C. Extend wire hangers downward.
 - 1. At proper elevation wrap hangers around carrying channels and secure each hanger with at least three (3) turns.
 - 2. Hanger wires shall be vertical. Wires installed at a diagonal to reach a structural member shall be balanced with diagonal ties in the opposite direction to brace the grid against side loading.
- D. Coordinate spacing of hangers, carrying channels, runners and moldings with the location of electrical fixtures and other items occurring in or on the ceiling.
 - 1. The ceiling lighting fixture locations shall determine the ceiling grid pattern, (see Drawings).
 - 2. Provide hanger wires to structure for cross runners around light fixtures. Each fixture shall have a minimum of four (4) tie wires within eight inches (8") of each fixture corner.
- E. Rooms 52.1 and 53: Install new 2' x 2' grid up to existing plaster soffit. No new lights in these areas.

3.3. INSTALLATION OF TILE

- A. Installation of acoustical materials shall be done under temperature and relative humidity conditions that will exist when the building is occupied. Building shall be closed in and operating on permanent equipment such that temperature and humidity will be maintained at a constant and normal level.
- B. The entire installation shall be free of damage of any sort at the completion of the Contract. All system sections deflecting in excess of 1/240th of the span or length shall be replaced.
- C. At a time and following installation the building shall be kept at a constant temperature and DOOR TO EXTERIOR KEPT CLOSED, ventilating system functional, filters in place.

3.4. CLEANING AND PROTECTION

- A. Upon completion of the work remove all unused materials, debris, containers and equipment from the project site. Clean and repair floors, walls and other surfaces that have been stained, marred or otherwise damaged by work under this section.
- B. Protect acoustical ceilings during the construction period so that they will be without any indication or deterioration or damage at the time of acceptance by the Owner.

END 09500

1. GENERAL

1.1. DESCRIPTION

- A. General Contractor shall furnish all labor and materials necessary to complete composite applied flooring in areas noted.
 - 1. Floors in Rooms 58, 58.1, 58.2, 51, 50A, 50B, 50C & 53 will receive seamless finish.

1.2. QUALITY ASSURANCE

- A. All materials and mixes shall comply with applicable ASTM Specifications as follows:
 - 1. Color: Min. twelve (12) pre-blended standard colors, from color blends available.
 - a. Hardness @ 24 hours Shore D ASTM D224070/65
 - b. Comprehensive Strength ASTM C57911,000 psi
 - c. Tensile Strength
 - ASTM C307 1,800 psi
 - ASTM D638 6,000 psi
 - d. Abrasion Resistance
 - ASTM D 4060, CS-17 Wheel 70-90 mgs lost
 - e. Flexural Strength
 - ASTM C580 3,500 psi
 - ASTM D790 10,000 psi
 - f. Adhesion
 - ACI 503R 100%concrete failure
 - g. Flammability Self-extinguishing
 - h. Resistance to elevated temperatures. No slip or flow at required temperature of 158 deg. F.
- B. The Product Manufacturer shall approve all base floors as suitably prepared for receiving applied floor materials.
 - 1. Problem areas identified by the floor finish contractor will need to be ground by General Contractor or as designated by the General Contractor.

1.3. PRODUCT HANDLING

- A. Transport all materials to job site in Manufacturer's labeled containers.

1.4. WARRANTY

- A. The Product Manufacturer shall exercise power of approval of installers.
 - 1. Installers shall have applied similar flooring products on at least five (5) prior projects.
- B. The Product Manufacturer shall warrant the finished installation for a period of three (3) years following Substantial Completion of the project.
 - 1. Abuse to the installation counter to use and maintenance recommendations (1.3.A.3 above) excepted.
- C. The Contractor shall warrant the installation for a period of two (2) years following Substantial Completion date.
 - 1. Abuse of the installation counter to use and maintenance recommendations (1.3.A.3. above) excepted.

2. PRODUCTS

2.1. MATERIALS

- A. Floor system
 - 1. Ceramic Carpet #554, General Polymers, Cincinnati, OH
 - 2. Selby Selbatwede 41, Ballersby, CO
 - 3. Quartz Epoxy Tnemec, Series 222 with Deco Clear.
 - 4. Epoxy Quartz BC by Florock.
 - 5. Or equal, approved prior to bidding.
- B. Base system
 - 1. Trowel applied seamless base system, coved.
 - 2. Compatible with floor system for seamless system.
- C. System shall be approximately 1/8" thick system, with incorporated colored quartz aggregates with 100% solid epoxy resin and chemical sealant grout plus seal coats.
 - 1. Resistance to wear, staining and chemicals.
 - 2. Provide fiberglass scrim on all existing and repaired concrete floors.
- D. System components
 - 1. Crack Filler / Reinforcer
 - 2. Universal Penetrating Primer
 - 3. Epoxy Resin Glaze as binder resin.
 - 4. Trafficote Filler as required.
 - 5. 3M OR 5900 Estes Colored Quartz Aggregate
 - 6. Novo-Flo Chemical Resistant Grout

7. Two (2) seal coats Novo-Flo Chemical Resistant Epoxy Satin
 8. 1/8" standing 'J' mold X min. 5/8" horizontal leg at all expansion and division joints / .05 aluminum
 9. Urethane top coat suitable for best resistance to urine staining
- E. Finish to be selected, lightly non-slip easy to mop.

3. EXECUTION

3.1. PREPARATION

- A. Provide removal of all existing floor systems where applicable.
- B. Provide cleaning and etching of all existing base concrete flooring – application ready.
 1. Secure Product Manufacturer's approval of application ready base floors.
 2. Concrete surface shall have been abrasive blasted and chemically etched to remove all contaminants and laitance.
 - a. The surface profile shall be equal to 40-60-grid sandpaper.
 3. Fill and apply surface reinforcement at cracks or provide divider strips.
 4. The Product Manufacturer shall certify, by letter to the Architect, that substrate floors are application-ready.
- C. Substrate temperature shall be 50-90 deg. F. and a min. of 10 deg. above dew point.
- D. Adhere and mechanically anchor 2.1.C.7, 'J' molds and transition strips to concrete floor.

3.2. APPLICATION

- A. Materials shall be applied via squeegee and/or roller strictly in compliance with the Manufacturer's recommended installation procedures.

3.3. PROTECTION

- A. Provide and maintain protection of installed finished flooring during remaining construction period.
 1. Contractor shall provide barricades to protect the work area from every form of abuse during the installation processes and the final seal coats.
- B. Protect completed system from traffic and physical abuse for seventy-two (72) hours.

3.4. MSDS – MATERIAL SAFETY DATA SHEETS

3.5. CLEAN UP

- A. Upon completion of work, thoroughly inspect the entire installation.
 - 1. Remove and repair all defective work and replace with perfect materials.
 - 2. Remove all rubbish, debris, containers and all excess materials from site.
 - 3. Leave premises Owner occupancy ready.

END 09 6700

1. GENERAL

1.1. WORK INCLUDED

- A. General Contractor shall install carpet in Rooms 54, 55, 56 and 57.
- B. Install 4” rubber straight base in Rooms 54, 55, 56 and 57.
- C. Install thresholds under door to Room 58. See Section 08700, 2. Products:
2.1.G.b.

1.2. RELATED WORK

- A. Specified elsewhere:
 - 1. Section 09670 - Seamless Floor
 - 2. Section 08700 - Door Hardware

1.3. INDUSTRY STANDARDS

- A. Installation must follow Carpet and Rug Institute (CRI) Installation Standards.
 - 1. These instructions relate to the specified carpet tile and the specified cushion back tile.

2. PRODUCTS

2.1. CARPET

- A. Bentley Mills, City of Industry, CA, ph. 800-423-4709 or 312-802-6991
 - 1. Style: Tagline 4TNT0 SMASH HIT #408105 24” x 24” tiles with NexStep Cushion Back.
 - a. This selection is a Fast Track quick shop product.

2.2. WALL BASE

- A. ROPPE Rubber Base
 - 1. Style: 4” No Toe Base with ribbed back
 - 2. Color: Black #00
 - 3. Or approved (by Architect) equal

2.3. ADHESIVE

- A. Use adhesive recommended by carpet manufacturer and rubber base manufacturer.

2.4. RESERVE MATERIAL

- A. Allow 5% additional material to be left with owner for repair

3. EXECUTION

3.1. CARPET PATTERN

- A. Install Carpet Tiles in Monolithic pattern over new concrete floor.

3.2. CONCRETE SUB-FLOOR

- A. All new concrete must be fully cured, clean and dry. All concrete floors must comply with moisture and alkalinity requirements prior to proceeding with installation. The concrete should be free of curing or parting agents that interfere with the bonding of the adhesive. Whenever a powdery surface is encountered, like lightweight concrete, a sealer compatible with the adhesive, such as XL Brands Encore Prelude, must be used to provide a suitable surface for direct glue installation
- B. Level the floor to the standards outlined in the American Concrete Institute specifications for Concrete Building ACI 301 in regards to trowel finish and finishing tolerance. Leveling compounds must be Portland-based cement Contact Bentley at 800.423.4079. Please note: Incompatible adhesives, solvent-based materials, and other contaminants should be removed or encapsulated with such product as XL Brands TriSeal Adhesive Residue Encapsulator prior to installation of carpet.

3.3. CONCRETE MOISTURE

- A. Concrete floors, even with adequate curing time, can present an unacceptable moisture condition by allowing excessive amounts of moisture vapor to pass through to the surface.
- B. Test Conditions
 - 1. Accurate testing of concrete floors requires the building to be fully enclosed and the air conditioning and heating system should function to a level similar to that expected with the space is occupied.
- C. Calcium Chloride
 - 1. The test must be administered in strict adherence to the specifications of the ASTM F1869 test procedure. Moisture emissions must not exceed five (5) pounds or less per 1,000 square feet for 24 hours. If the test results are higher than five pounds, do not proceed with the installation until subsequent testing demonstrates the emission rate is five pounds or less. Chemical pH of the slab must also be determined.

D. Relative Humidity and Chemical pH of Slab

1. The test must be administered in strict adherence to the specifications of ASTM Standard F2170. Moisture levels in the concrete sub-floor must be 80 percent or less before proceeding.
2. Once levels have been determined to be 80 percent or less, then the chemical pH of the concrete sub-floor should also be tested. In the event of a discrepancy between calcium chloride test results and the results for relative humidity testing, the decision on whether to remediate or correct excessive vapor emission should be based on results from relative humidity testing. Relative humidity testing will take precedence over calcium chloride testing when both test are performed on the same project.

3.4. CHEMICAL PH

- A. All concrete floors, old or new, should be tested for alkalinity by using an alkalinity test kit, a pH Test Probe or pH Test Meter. The slab should have an alkalinity level ranging from 7.0 to 9.0 to be suitable for installation.

3.5. CONDITIONING CARPET

- A. Let the carpet breathe prior to installation. All carpet should be rough cut and dry laid or spread out prior to installation in the area to be installed.
- B. The amount of time necessary for conditioning will depend upon temperature extremes during storage. Ideally, the carpet should be allowed to condition in the space to be carpeted for 24 hours whenever possible.

3.6. FULL SPREAD ADHESIVE

- A. Once the floor has been properly prepared as detailed in CRI Carpet Installation Standard 2011, a full spread method is most important in preventing lateral shifting and ensuring the successful installation of Bentley carpet tile. Full spread simply means that the entire area to receive carpet tile should be covered only with Bentley HealthBond 2300 pressure sensitive adhesive. Use a 3/4-inch paint roller. Expect a spread rate between 35-40 yards per gallon.

3.7. CENTERING/SQUARING

- A. Divide the room into four quadrants and snap a chalk line. Make sure quadrants meet at right angles. Take care to keep perimeter carpet tile cuts larger than half size or 9.84 inches (25 cm). Arrows are printed on the back of carpet tiles, showing pile direction. For monolithic installation, make sure arrows point in the same direction throughout the installation.
- B. In order to spread adhesive throughout the room and allow for a single set-up time. An additional perpendicular line should be established and squared from the center line of the room to run through doorways.

END 09680

1. GENERAL

1.1. WORK INCLUDES – BASE BID

- A. Contractor shall provide all painting work as set forth on the Drawings, in these Specifications and as necessary for the completion of the work. All new equipment and surfaces not receiving a specified finish shall be painted. See Drawings and drawing notes.
- B. Paint walls in 54, 55, 56, 57, 58, 58.1, 58.2, 51, 50A, 50B and 50C. Paint CMU walls and repaired EIFS walls in Rooms 53 and 52.1.
 - 1. The Existing EIFS walls will be painted on both sides where windows were removed and openings covered with gypsum board.
- C. Stain wood window trim and apply two (2) coats of polyurethane.
 - 1. See Detail on Drawings
- D. Paint metal doors and frames as indicated on Finish Schedule.

1.2. RELATED REQUIREMENTS

- A. Specified elsewhere
 - 1. DIVISION 0 - Bidding & Contract Requirements
 - 2. DIVISION 1 - General Requirements
 - 3. DIVISION 6 - Wood
 - 4. DIVISION 7 - Thermal & Moisture Protection
 - 5. DIVISION 8 - Doors & Windows
 - 6. Section 09250 - Gypsum Wallboard

1.3. QUALITY ASSURANCE

- A. Supplier shall verify appropriateness of paint systems/surface preparation and modify as approved by Architect to properly achieve finished result.
- B. Materials shall be as specified and shall be delivered to the job in unopened, labeled containers.
- C. Applicators shall be skilled in the application system employed.
- D. Application: No thinning of materials will be allowed, except as specifically recommended by the Paint Manufacturer's written data to facilitate application.
- E. Special Requirements: The written instructions of the Paint Manufacturer shall be carefully adhered to for all surface preparation, priming, application techniques, environmental conditions and drying conditions.

- F. The surface temperature shall be 50 degrees F. minimum, dry, free of dust, dirt or any bond-breaking substance prior to the paint application.
- G. Protect all surrounding surfaces from paint and the painting operations. CLEAN UP ALL PAINT SPATTER OR OVERSPRAY.
- H. Factory-primed surfaces shall be properly prepared to receive field coatings. Repair chips and nicks in factory primer before proceeding.
- I. Provide all surface preparation, treatments, and all primers needed to comply with the Paint Manufacturer's recommendations. The Contractor shall seek the Paint Manufacturer recommendations and shall be responsible for compatibility of the specified coatings and receiving surface preparation.
- J. Wherein these Specifications require successive coats of finishing materials, the A/E shall be notified of completion of each coating application prior to application of a successive coating. Failure to notify the Architect for on site observation of each coating prior to a successive coating application shall disallow acceptance of the successive coating.

2. PRODUCTS

2.1. MATERIAL

- A. Flame Spread - All paint finishes shall meet the following flame spread requirements:
 - 1. Flame Resistance: Materials shall neither ignite nor flame when inserted into a furnace heated to and maintained at 1200 degrees F. for a period of five minutes.
 - 2. Submit Paint Manufacturer's WRITTEN certification that products used on this project meet or exceed requirements 1.1.D.1. above. Certification shall include submittal or current test data proving product is noncombustible, as defined per 1.1.D.1 above.
- B. It is the intent to use each Manufacturer's premium grade commercial finishes. Adjust selections accordingly.
- C. Galvanized or Aluminum
 - 1. Select appropriate zinc chromate or zinc dust primer.
- D. Block Filler: Vinylized Latex Block Filler
 - 1. Sherwin Williams ProMar Block Filler B25W25 Series
 - 2. Glidden Ultra Hide 5317 Series.
 - 3. MAB Architectural Block Filler 956-257.
 - 4. Benjamin Moore Moorecraft Block Filler 145-00.
 - 5. Tnemec Series 54-562 Masonry Filler.
 - 6. Pittsburgh Speedhide Block Filler #6-7.

- E. Latex Primers (Interior – on new gypsum board walls and CMU Walls)
 - 1. Sherwin Williams ProMar 200/B23W200
 - 2. Glidden Spred Primer Sealer Y3416 Series.
 - 3. MAB Fresh Kote 037 Line.
 - 4. Benjamin Moore Latex O.D. Prime Seal 201-00.
 - 5. Tnemec Series 51-792 Sealer.
 - 6. Pittsburgh Speedhide Primer Sealer #6-2.
 - 7. Or as specifically recommended by the Manufacturer for the proposed finish coat.

- F. Latex Semi
 - 1. MAB Rich Lux 023
 - 2. Porter H-Hide 109
 - 3. Benjamin Moore Regal Aquaglo 333
 - 4. Pittsburgh Wallhide
 - 5. DeVoe WonderTone 37

- G. Latex Eggshell (interior Classrooms walls) Owner will choose either 'G' or 'H')
 - 1. MAB Rich Lux 028
 - 2. Porter Hi-Hide 389
 - 3. Benjamin Moore Moorecraft 186
 - 4. Pittsburg Wall Hide
 - 5. DeVoe WonderTone 34

- H. Epoxy Egg Shell
 - 1. Sherwin Williams pre catalyzed Epoxy #B73 – 2 coats. This product used in Rooms 50C, 50B, 50A, 50C, 51, 54, 55, 56, 57, 58, 58.1 and 58.2.

- I. Latex Semi-Gloss Finish (Interior metal)
 - 1. Sherwin Williams DTM Acrylic CTG
 - 2. MAB DTM M29
 - 3. Benjamin Moore DTM M29
 - 4. Pittsburgh 7-374

- J. Gloss Latex (60% @ 60 degrees F.):
 - 1. DTM Products, similar to semi-gloss specification.

- K. Sanding Sealer for natural finishes - use Manufacturer's recommended sanding sealer or thin urethane varnish as appropriate.

- L. Varnish - Polyurethane satin or "hand rubbed" finish.
 - 1. Sherwin Williams A67 Series
 - 2. Glidden Satin Polyurethane.

3. MAB Rich Lux Satin Polyester.
4. Benjamin Moore Impervo Satin 414.
5. Pittsburgh REZ Polyurethane #77-9.

3. EXECUTION

3.1. SURFACE CONDITIONS

- A. Inspect all surfaces for defects prior to starting finishing operations and notify the appropriate persons to make suitable repair and corrections. Be responsible for all rework of finish systems made necessary by application to improperly prepared surfaces.
- B. As painting operations proceed inspect for chips, abrasions, mortar slobbers, pitch strikes, cracks and hot spots. All defects that are evident shall be repaired and repainted.
- C. Touch up marred or worn factory primers before painting. Wash down metal with mineral spirits or approved cleaner to assure bond.
- D. PROVIDE PRIMERS IN ALL LOCATIONS APPROPRIATE FOR MATERIAL BASE AND MATERIAL EXPOSURE.
- E. Protect all surrounding work from damage.
- F. Sand surfaces that are not smooth prior to applying succeeding coats.

3.2. WORKMANSHIP

- A. Quality workmanship is required. Only skilled mechanics shall be employed to ensure the very best workmanship. Materials to be applied by craftsmen shall be applied only by those familiar with the specific products involved.
- B. Each coat called for shall be applied to achieve 100% coverage of the surface and materials shall be applied as recommended by the Paint Manufacturer.
- C. One coat shall be considered to completely cover the material being finished such that the surface, including all voids and indentations such as in wood or concrete block, no longer retains the color of the surface material but only that of the finish applied. The cover achieved will be subject to the approval of the Architect/Engineer in all cases.
 1. Every applied coat shall be allowed to dry before subsequent coats are applied.
- D. For finishes similar in color to the material or for finishes with little or no pigments, such as varnish, the coats shall be of adequate thickness to meet the approved requirements assuming that the surface and finish were of complementary colors. The cover achieved will be subject to the approval of the Architect/Engineer in all cases.

- E. In the process of painting surfaces, caution shall be used to avoid discontinuity in the finish surface texture or appearance such as at lap joints, corners, etc.
- F. All materials shall be applied under 100 F.C. illumination. Materials shall be uniformly spread without runs or sags.
- G. All coating called for shall be applied in back of all fixtures, cabinets and tackboards before said items are secure in place.

3.3. STORAGE

- A. Flammable materials storage should be kept to a minimum of currently-in-use materials only. Overnight storage shall not be allowed in the building.

3.4. APPLICATION

- A. Application rates that are specified in these Specifications shall be considered as minimum rates but shall not supersede the coverage requirements specified herein or the recommendations of the Paint Manufacturer.
- B. It is the intent that all finish coating systems specified (excluding primer only) present a finished uniform appearance, free of lap marks, color variation, sheen variation and irregularities. Provide additional coats as needed to accomplish this finish intent.
- C. Application shall be per the following schedule except that, in no case, shall materials be applied over a base preparation not in accordance with the Paint Manufacturer's specifications. See Drawing Notes and Room Finish Schedule for finishing directions.
- D. Interior masonry and gypsum board walls
 - 1. Apply block filler to masonry
 - 2. Clean all dust off gypboard walls and prime one (1) coat.
 - 3. Masonry and gypboard wall – apply two (2) coats.
 - 4. Steel doors and frames – clean and check factory primer – apply two (2) coats DTM.
 - 5. Wood trim – clean and apply two (2) coats polyurethane.

END 09900

1. GENERAL

1.1. WORK INCLUDES

- A. Bid as Alternate.
- B. Surface padding system for floors, walls, doors and frames of calming spaces (not ceilings).
- C. System shall consist of field-applied surfacer, covered with padding material and a protective top coat of high-build liquid vinyl.

1.2. RELATED SECTIONS

- A. Specified elsewhere:
 - 1. 01030 - Alternates
 - 2. 09250 - Gypsum Wallboard
 - 3. 09900 - Painting

1.3. PERFORMANCE AND DESIGN REQUIREMENTS

- A. Provide surface padding system which isolates children from hard surfaces within the scheduled area.
 - 1. Padded surface system shall resist chipping and peeling.
 - 2. Padded surface system shall be easy to clean.
 - 3. Padded surface system shall be water-repellent, impervious to oil, urine and salt.

1.4. QUALITY ASSURANCE

- A. Comply with governing codes and regulations.
- B. Applicator Qualifications: Application shall be performed by an applicator with a minimum of 5 years experience in the successful fabrication and installation of detention surface padding system.
- C. Deliver, handle and store materials in accordance with manufacturer's instructions.
- D. Surface burning characteristics of detention surface system when tested in accordance with UL Standard 723 (ASTM E84) must be equal to or less than:
 - 1. Flame Spread Index 10
 - 2. Fuel Contributed 10
 - 3. Smoke Developed 160
- E. Compression Deflection (ASTM D 1056) 4 psi @ 25% deflection.

- F. Acute Oral Toxicity Test..... Non Toxic
- G. Fungus Resistant (ASTM G-21-90)..... 0 (Completely resistant)
- H. CSS 12-100-1 Corner Test..... Pass

1.5. SUBMITTALS

- A. Get material on job as fast as possible.

1.6. WARRANTY

- A. New Installations: A padded surface installed must be guaranteed impenetrable by organic human body parts for a period of three years from date of manufacturer's installation approval for use. Should penetration occur, the damage will be repaired or the surface replaced at the manufacturer's option.
- B. Conditions: This guarantee does not apply to damage caused by non-organic human body parts, nor damage resulting from use prior to completion of final curing. This product is **not intended to** replace established management practices, but to supplement those practices, while allowing for a greater degree of protection against client self-injury.
- C. Maintenance Information: Submit, for Owner's use, information regarding the proper care and maintenance of detention surface padding system.

2. PRODUCTS

2.1. MANUFACTURER

- A. Provide detention padded surface system fabricated by:
 - 1. Padded Surfaces by B&E, 888/243-8788 or 317/243-2233, Fax 317/248-2832. mark@paddedsurfaces.com.
 - 2. Gold Medal Safety Padding / Marathon Engineering, Tel: 239/303-7378 or 209/754-51211 wskala@marathonengcorp.com.
 - 3. Or equal approved prior to bidding.

2.2. MATERIALS

- A. Foam Sheets: MFSiltec-500
 - 1. Features
 - a. Nonflammable, nontoxic, and inherently durable.
 - b. A nonconductive foam polymer with excellent cushioning, fire blocking, thermal insulating and acoustic/vibration dampening properties.

- c. Structurally resilient with low compression set and 100% memory.
- d. Continuous operating temperature range: -70 to +500 degrees F.
- e. MFSiltec is odorless, tasteless and non-corrosive.

2. Specifications:

- a. ASTM D 3674 & E 162.....Pass
- b. UL-94V-O
- c. California Technical Bulletin 117Pass
- d. FMVSS 302.....Pass
- e. ASTM E662 (Flaming Code)Ds @ 1.5min. <50
- f. ASTM E662 (Non-Flaming Mode).....Ds @ 4 min.<100
- g. Bombardier SMP 800-CPass
- h. ASTM D573.....Pass

- 3. Compression Set, % ASTM D-1056 22 hrs. @ 100 C 5%
- 4. Compression Deflection, psi @ 25% 4 psi.
- 5. Tensile Strength, psi 25 psi minimum
- 6. Elongation, %..... 60% minimum
- 7. Water Absorption, %..... 10% maximum
- 8. Thermal Conductivity k Factor 0.30 (BTU in/hr/ft./F)

B. Reinforcing Mesh: Kevlar bullet resistant material

- 1. Tensile Strength (Average)25,000 psi
- 2. Elongation at break10%

C. Encapsulate: High-build liquid vinyl of consistency to permit spray or field application.

D. Color choice – Blue

E. Adhesive: Type compatible with the materials to be adhered.

3. EXECUTION

3.1. EXAMINATION

A. Examine areas and conditions under which detention surface padding system is to be applied. Verify that substrate is in proper condition for installation of system. Do not proceed with installation until satisfactory conditions have been corrected.

B. The following surfaces will not be covered.

- 1. Doors and frames.
- 2. Floors.
- 3. Air outlets and diffusers for ventilation.
- 4. Lighting fixtures and fixture lenses.

5. Security wall and ceiling mounted call button stations and security cameras.

3.2. PREPARATION

- A. Verify that ambient temperatures will be within range required by manufacturer for successful installation and curing of system
- B. Verify that work of other trades are complete and will not adversely affect curing and protection of detention surface padding system.

3.3. INSTALLATION ON WALLS AND FLOORS

- A. Cover specified areas with Kev-Koat padded material system.
- B. Apply protective top coat to encapsulate entire padded surface. Color; Blue.
- C. If the application is new construction a sixty day curing time is necessary for the concrete floor.
- D. Temperature must be 60 degrees Fahrenheit at time of installation and maintained for the duration of the construction period and 30 day cure time.
- E. At penetrations of padding system for plumbing fixtures, air diffusers, lighting fixtures and security devices, coordinate with requirements of the respective trades for correct mounting.
- F. A 30-day cure time is required before rooms with detention surface padding can be utilized. Use prior to the 30-day cure time will void the 3 year warranty.

3.4. DOOR PADDING PANEL FABRICATION

- A. Fabricate components to comply with performance and design requirements specified and in accordance with approved shop drawings.
- B. Door padding panels shall be composed of Kev-Koat padded material system adhered to a $\frac{3}{4}$ " thick fire-resistant plywood backing board.
- C. Provide openings for glazed observation openings and food slots.

3.5. CLEANING AND PROTECTION

- A. Touch up damage.
- B. Clean work area of debris associated with installation.
- C. Surface can be cleaned with a mild, non-abrasive liquid detergent.

END 11190

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Plumbing demolition.
 - 1. Domestic water piping

1.02 RELATED REQUIREMENTS

- A. Additional requirements for alterations work.
- B. Section 22 1005 - Plumbing Piping

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Materials and equipment for patching and extending work: As specified in individual sections.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify field measurements and piping arrangements are as shown on Drawings.
- B. Verify that abandoned piping and equipment serve only abandoned facilities.
- C. Demolition drawings are based on casual field observation and existing record documents.
- D. Report discrepancies to Architect before disturbing existing installation.
- E. Beginning of demolition means installer accepts existing conditions.

3.02 PREPARATION

- A. Disconnect Plumbing systems in walls, floors, and ceilings to be removed.
- B. Existing Plumbing System: Maintain existing system in service until coordinated with Owner for length of out of service. Disable system only to make switchovers and connections. Minimize outage duration.
 - 1. Obtain permission from Owner at least 24 hours before partially or completely disabling system.

3.03 DEMOLITION AND EXTENSION OF EXISTING PLUMBING WORK

- A. Remove, relocate, and extend existing installations to accommodate new construction.
- B. Remove abandoned piping to source of supply.
- C. Remove exposed abandoned piping, including abandoned piping above accessible ceiling finishes. Cut piping flush with walls and floors, and patch surfaces.
- D. Remove piping as noted.
- E. Repair adjacent construction and finishes damaged during demolition and extension work.
- F. Maintain access to existing Plumbing installations that remain active. Modify installation or provide access panel as appropriate.
- G. Extend existing installations using materials and methods as specified.
- H. Cut concrete floors to install new drains and vents. Install new concrete to complete work.

3.04 CLEANING AND REPAIR

- A. Clean and repair existing materials and equipment that remain or that are to be reused.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Piping insulation.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- B. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 DELIVERY, STORAGE, AND HANDLING

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

1.05 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: www.certainteed.com.
 - 2. Johns Manville Corporation: www.jm.com.
 - 3. Knauf Insulation: www.knaufusa.com.
 - 4. Owens Corning Corporation: www.ocbuildingspec.com.

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. 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.
- C. 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.

3.03 SCHEDULES

- A. See Drawings

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe, pipe fittings, specialties, and connections for piping systems.
 - 1. Domestic water.
 - 2. Pipe hangers and supports.

1.02 REFERENCE STANDARDS

- A. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2009.
- B. NSF 61 - Drinking Water System Components - Health Effects; 2014 (Errata 2015).
- C. NSF 372 - Drinking Water System Components - Lead Content; 2011.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
- C. Project Record Documents: Record actual locations of piping and valves.

1.04 QUALITY ASSURANCE

- A. Perform work in accordance with applicable codes.
- B. Valves: Manufacturer's name and pressure rating marked on valve body.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.02 DOMESTIC WATER PIPING, ABOVE GRADE

- A. See drawings for Piping Material Schedule.

2.03 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.
 - 2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
 - 3. Trapeze Hangers: Welded steel channel frames attached to structure.
 - 4. Vertical Pipe Support: Steel riser clamp.

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 with flanges or unions.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- C. Install piping to maintain headroom, conserve space, and not interfere with use of space.
- D. Group piping whenever practical at common elevations.
- E. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.

3.03 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Prior to starting work, verify system is complete, flushed and clean.

3.04 SCHEDULES

- A. See Drawings

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Water heaters.
- B. Water storage tanks.
- C. Pumps.
 - 1. Circulators.

1.02 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittals procedures.
- B. Product Data:
 - 1. Provide dimension drawings of water heaters indicating components and connections to other equipment and piping.
 - 2. Indicate pump type, capacity, power requirements.
 - 3. Provide certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.
 - 4. Provide electrical characteristics and connection requirements.
- C. Project Record Documents: Record actual locations of components.
- D. Operation and Maintenance Data: Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.
- E. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- F. Project Record Documents: Record actual locations of components.

1.03 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. Identification: Provide pumps with manufacturer's name, model number, and rating/capacity identified by permanently attached label.
- C. Performance: Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, operate within 25 percent of midpoint of published maximum efficiency curve.

1.04 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty for domestic water heaters.

PART 2 PRODUCTS

2.01 WATER HEATER MANUFACTURERS

- A. A.O. Smith Water Products Co: www.hotwater.com.
- B. Bock Water Heaters, Inc: www.bockwaterheaters.com.
- C. Rheem Manufacturing Company: www.rheem.com.

2.02 COMMERCIAL GAS FIRED WATER HEATERS

- A. Type: Automatic, natural gas-fired, vertical storage.
- B. Performance:
- C. Tank: Glass lined welded steel ASME labeled; multiple flue passages, 4 inch diameter inspection port, thermally insulated with minimum 2 inches glass fiber, encased in corrosion-resistant steel jacket; baked-on enamel finish; floor shield and legs.
- D. Accessories: Provide:
 - 1. Water Connections: Brass.
 - 2. Dip tube: Brass.

3. Drain Valve.
4. Anode: Magnesium.

2.03 DOMESTIC HOT WATER STORAGE TANKS

- A. Manufacturers:
 1. A.O. Smith Water Products Co: www.hotwater.com.
 2. Bock Water Heaters, Inc: www.bockwaterheaters.com.
 3. Wessels Company: www.westank.com.
- B. Tank: Welded steel, ASME labelled for working pressure of 125 psig, steel support saddles, tappings for accessories, threaded connections of stainless steel, access manhole.
- C. Openings: Up to 3 inches, copper-silicone threaded; over 4 inches, flanged; flanged collar for heat exchanger; manway fitting.
- D. Accessories: Tank drain, water inlet and outlet, thermometer range of 40 to 200 degrees F, ASME pressure relief valve suitable for maximum working pressure.

2.04 IN-LINE CIRCULATOR PUMPS

- A. Manufacturers:
 1. Armstrong Pumps Inc: www.armstrongpumps.com.
 2. ITT Bell & Gossett: www.bellgossett.com.
 3. SIHI Group: www.sterlingsihi.com.
- B. Casing: Bronze, rated for 125 psig working pressure, with stainless steel rotor assembly.
- C. Impeller: Bronze.
- D. Shaft: Alloy steel with integral thrust collar and two oil lubricated bronze sleeve bearings.
- E. Seal: Carbon rotating against a stationary ceramic seat.
- F. Drive: Flexible coupling.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install plumbing equipment in accordance with manufacturer's instructions, as required by code, and complying with conditions of certification, if any.
- B. Coordinate with plumbing piping and related fuel piping work to achieve operating system.
- C. Domestic Water Storage Tanks:
 1. Provide steel pipe support, independent of building structural framing members.
 2. Clean and flush prior to delivery to site. Seal until pipe connections are made.
- D. Pumps:
 1. Ensure pumps 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.

3.02 SCHEDULES

- A. As indicated on plans.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall-Hung Multi-Station Lavatory Units

1.02 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ASME A112.18.1 - Plumbing Supply Fittings; 2012.
- C. ASSE 1070 - Performance Requirements for Water Temperature Limiting Devices; 2004.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- E. IAPMO Z124 - Plastic Plumbing Fixtures; 2012.
- F. NSF 61 - Drinking Water System Components - Health Effects; 2014 (Errata 2015).
- G. NSF 372 - Drinking Water System Components - Lead Content; 2011.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.
- C. Manufacturer's Instructions: Indicate installation methods and procedures.
- D. Maintenance Data: Include fixture trim exploded view and replacement parts lists.
- E. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.04 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty for electric water cooler.

PART 2 PRODUCTS

2.01 GENERAL

- A. Potable Water Systems: Provide plumbing fittings and faucets that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.02 WALL-HUNG MULTI-STATION LAVATORY UNITS:

- A. Description: Rectilinear, level-surface deck, seamless and integral elongated basin, with stainless steel enclosed pedestal cabinet.
- B. Deck and Bowl Material: Fabricate from molded engineered stone material consisting of natural quartz, granite, and other minerals in a matrix of thermoset acrylic modified bio-based polyester resin and meeting requirements of IAPMO Z124.
- C. Surface Burning Characteristics: Smoke developed index less than 450, and flame spread index less than 25, Class A, when tested in accordance with ASTM E84.
- D. Number of Wash Stations: two or three.
- E. Soap Dispenser:
 - 1. Deck-mounted, sensor-operated, chrome-plated plastic, with LED battery and soap level indicators, battery box and batteries and 27 ounce (798 ml) bottle of 1000 shot soap.
- F. Water Supply: Thermostatic mixing valve assembly.
- G. Color: As selected by Architect from manufacturer's full line.
- H. Faucet Drilling: 4 inch (100 mm) centerset drilling.
- I. Sensor-Operated Faucets:
 - 1. High profile metering faucet with infrared and external temperature control.

2. Vandal-resistant meeting requirements of ASME A112.18.1 and ADA Standards compliant.
 3. Body: Polished chrome plated commercial solid cast brass, with 4 inch (102 mm) centerset mounting with anti-rotation trim plate.
 4. Tempered Water Supply: ADA Standards compliant lever on faucet body.
 5. Aerator: Flow rate of 0.5 gal/min at an operating range of 20 to 80 psi.
 6. Sensor Module: Water conserving, vandal-resistant adjustable sensor unit with timing turn-off delay and stationary object automatic timed cutoff, with battery diagnostic light, serviceable from above deck.
 7. Power Supply: Battery-operated single faucet with 6V lithium battery and single 115 VAC plug-in adapter.
- J. Access Panel: Stainless steel.
- K. Support Frame: Wall mounted, heavy gage, stainless steel.
- L. Manufacturers:
1. See plumbing fixture schedule.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.
- B. Verify that electric power is available and of the correct characteristics.
- C. Confirm that millwork is constructed with adequate provision for the installation of counter top lavatories and sinks.

3.02 PREPARATION

- A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.03 INSTALLATION

- A. Install each fixture with trap, easily removable for servicing and cleaning.
- B. Provide chrome plated rigid or flexible supplies to fixtures with loose key stops, reducers, and escutcheons.
- C. Install components level and plumb.
- D. Install and secure fixtures in place with wall supports and bolts.
- E. Solidly attach water closets to floor with lag screws. Lead flashing is not intended hold fixture in place.

3.04 INTERFACE WITH WORK OF OTHER SECTIONS

- A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

3.05 ADJUSTING

- A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.06 CLEANING

- A. Clean plumbing fixtures and equipment.

3.07 PROTECTION

- A. Protect installed products from damage due to subsequent construction operations.
- B. Repair or replace damaged products before Date of Substantial Completion.

3.08 SCHEDULES

- A. As indicated in plumbing fixture schedule on plans.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. HVAC demolition.
 - 1. Exhaust Fans
 - 2. Equipment
 - 3. Ductwork
 - 4. Piping

1.02 RELATED REQUIREMENTS

- A. Additional requirements for alterations work.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Materials and equipment for patching and extending work: As specified in individual sections.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify field measurements and duct arrangements are as shown on Drawings.
- B. Verify that abandoned ductwork and equipment serve only abandoned facilities.
- C. Demolition drawings are based on casual field observation .
- D. Report discrepancies to Architect before disturbing existing installation.
- E. Beginning of demolition means installer accepts existing conditions.

3.02 PREPARATION

- A. Disconnect HVAC systems in walls, floors, and ceilings to be removed.
- B. Existing HVAC System: Maintain existing system in service until codinated with Owner for length of out of service. Disable system only to make switchovers and connections. Minimize outage duration.
 - 1. Obtain permission from Owner at least 24 hours before partially or completely disabling system.

3.03 DEMOLITION AND EXTENSION OF EXISTING HVAC WORK

- A. Remove, relocate, and extend existing installations to accommodate new construction.
- B. Remove abandoned ductwork to source of supply.
- C. Remove exposed abandoned ductwork, including abandoned ductwork above accessible ceiling finishes. Cut ductwork flush with walls and floors, and patch surfaces.
- D. Disconnect abandoned air outlets and inlets and remove. Remove abandoned air outlets and inlets if ductwork servicing them is abandoned and removed. Provide blank covers for abandoned air outlets and inlets that are not removed.
- E. Remove exhaust fans as noted.
- F. Remove piping as noted.
- G. Repair adjacent construction and finishes damaged during demolition and extension work.
- H. Maintain access to existing HVAC installations that remain active. Modify installation or provide access panel as appropriate.
- I. Extend existing installations using materials and methods as specified.

3.04 CLEANING AND REPAIR

- A. Clean and repair existing materials and equipment that remain or that are to be reused.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 REFERENCE STANDARDS

- A. ASME B40.100 - Pressure Gauges and Gauge Attachments; 2013.
- B. ASTM E1 - Standard Specification for ASTM Liquid-in-Glass Thermometers; 2014.
- C. UL 393 - Indicating Pressure Gauges for Fire-Protection Service; Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide list that indicates use, operating range, total range and location for manufactured components.
- C. Project Record Documents: Record actual locations of components and instrumentation.

1.04 FIELD CONDITIONS

- A. Do not install instrumentation when areas are under construction, except for required rough-in, taps, supports and test plugs.

PART 2 PRODUCTS

2.01 PRESSURE GAGES

- A. Pressure Gages: ASME B40.100, UL 393 drawn steel case, phosphor bronze bourdon tube, rotary brass movement, brass socket, with front recalibration adjustment, black scale on white background.

2.02 PRESSURE GAGE TAPPINGS

- A. Gage Cock: Tee or lever handle, brass for maximum 150 psi.

2.03 DIAL THERMOMETERS

- A. Thermometer: ASTM E1, stainless steel case, adjustable angle with front recalibration, bimetallic helix actuated with silicone fluid damping, white with black markings and black pointer hermetically sealed lens, stainless steel stem.
 - 1. Size: 3 inch diameter dial.
 - 2. Lens: Clear glass.

2.04 THERMOMETER SUPPORTS

- A. Socket: Brass separable sockets for thermometer stems with or without extensions as required, and with cap and chain.

2.05 TEST PLUGS

- A. Test Plug: 1/4 inch or 1/2 inch brass fitting and cap for receiving 1/8 inch outside diameter pressure or temperature probe with neoprene core for temperatures up to 200 degrees F.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install gages and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.
- C. Adjust gages and thermometers to final angle, clean windows and lenses, and calibrate to zero.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Pipe markers.
- D. Ceiling tacks.

1.02 REFERENCE STANDARDS

- A. ASTM D709 - Standard Specification for Laminated Thermosetting Materials; 2016.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide manufacturers catalog literature for each product required.
- C. Project Record Documents: Record actual locations of tagged valves.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

- A. Air Handling Units: Nameplates.
- B. Control Panels: Nameplates.
- C. Major Control Components: Nameplates.
- D. Piping: Pipe markers.
- E. Pumps: Nameplates.
- F. Thermostats: Nameplates.
- G. Valves: Tags and ceiling tacks where located above lay-in ceiling.
- H. Water Treatment Devices: Nameplates.

2.02 NAMEPLATES

- A. Manufacturers:
 - 1. Advanced Graphic Engraving, LLC: www.advancedgraphicengraving.com.
 - 2. Kolbi Pipe Marker Co: www.kolbipipemarkers.com.
 - 3. Seton Identification Products, a Tricor Direct Company: www.seton.com.
- B. Letter Color: White.
- C. Letter Height: 1/4 inch.
- D. Background Color: Black.
- E. Plastic: Conform to ASTM D709.

2.03 TAGS

- A. Manufacturers:
 - 1. Advanced Graphic Engraving: www.advancedgraphicengraving.com.
 - 2. Brady Corporation: www.bradycorp.com.
 - 3. Kolbi Pipe Marker Co: www.kolbipipemarkers.com.
 - 4. Seton Identification Products, a Tricor Company: www.seton.com.
- B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.

2.04 PIPE MARKERS

- A. Manufacturers:
 - 1. Brady Corporation: www.bradycorp.com.
 - 2. Kolbi Pipe Marker Co: www.kolbipipemarkers.com.
 - 3. MIFAB, Inc: www.mifab.com.

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4. Seton Identification Products, a Tricor Company: www.seton.com.
- B. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
- C. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
- D. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

2.05 CEILING TACKS

- A. Manufacturers:
 1. Craftmark: www.craftmarkid.com.
- B. Description: Steel with 3/4 inch diameter color coded head.
- C. Color code as follows:
 1. HVAC Equipment: Yellow.
 2. Fire Dampers and Smoke Dampers: Red.
 3. Heating/Cooling Valves: Blue.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 INSTALLATION

- A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Install plastic pipe markers in accordance with manufacturer's instructions.
- D. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- E. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
- F. Use tags on piping 3/4 inch diameter and smaller.
 1. Identify service, flow direction, and pressure.
 2. Install in clear view and align with axis of piping.
 3. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 REFERENCE STANDARDS

- A. AABC MN-1 - AABC National Standards for Total System Balance; 2002.
- B. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems; 2008.
- C. NEBB (TAB) - Procedural Standards for Testing Adjusting and Balancing of Environmental Systems; 2015, Eighth Edition.
- D. SMACNA (TAB) - HVAC Systems Testing, Adjusting and Balancing; 2002.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
 - 1. Submit to Architect.
 - 2. Submit six weeks prior to starting the testing, adjusting, and balancing work.
 - 3. Include certification that the plan developer has reviewed the contract documents, the equipment and systems, and the control system with the Architect and other installers to sufficiently understand the design intent for each system.
 - 4. Include at least the following in the plan:
 - a. List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
 - b. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
 - c. Identification and types of measurement instruments to be used and their most recent calibration date.
 - d. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
 - e. Final test report forms to be used.
 - f. Expected problems and solutions, etc.
 - g. Details of how TOTAL flow will be determined; for example:
 - 1) Air: Sum of terminal flows via control system calibrated readings or via hood readings of all terminals, supply (SA) and return air (RA) pitot traverse, SA or RA flow stations.
 - 2) Water: Pump curves, circuit setter, flow station, ultrasonic, etc.
 - h. Confirmation of understanding of the outside air ventilation criteria under all conditions.
 - i. Method of verifying and setting minimum outside air flow rate will be verified and set and for what level (total building, zone, etc.).
 - j. Procedures for formal deficiency reports, including scope, frequency and distribution.
- C. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
 - 1. Revise TAB plan to reflect actual procedures and submit as part of final report.
 - 2. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect and for inclusion in operating and maintenance manuals.
 - 3. Include actual instrument list, with manufacturer name, serial number, and date of calibration.

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4. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
5. Units of Measure: Report data in I-P (inch-pound) units only.
6. Include the following on the title page of each report:
 - a. Name of Testing, Adjusting, and Balancing Agency.
 - b. Address of Testing, Adjusting, and Balancing Agency.
 - c. Telephone number of Testing, Adjusting, and Balancing Agency.
 - d. Project name.
 - e. Project location.
 - f. Project Architect.
 - g. Project Engineer.
 - h. Project Contractor.
 - i. Report date.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Perform total system balance in accordance with one of the following:
 1. AABC MN-1, AABC National Standards for Total System Balance.
 2. ASHRAE Std 111, Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems.
 3. NEBB Procedural Standards for Testing Adjusting Balancing of Environmental Systems.
 4. SMACNA (TAB).
- B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.
- C. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with the authorities having jurisdiction.
- D. TAB Agency Qualifications:
 1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
 2. Having minimum of three years documented experience.
 3. Certified by one of the following:
 - a. AABC, Associated Air Balance Council: www.aabchq.com; upon completion submit AABC National Performance Guaranty.
 - b. NEBB, National Environmental Balancing Bureau: www.nebb.org.
 - c. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute: www.tabbcertified.org.
- E. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.

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.

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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 PREPARATION

- A. Hold a pre-balancing meeting at least one week prior to starting TAB work.
1. Require attendance by all installers whose work will be tested, adjusted, or balanced.

3.04 ADJUSTMENT TOLERANCES

- A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.
- B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.
- C. Hydronic Systems: Adjust to within plus or minus 10 percent of design.

3.05 RECORDING AND ADJUSTING

- A. Field Logs: Maintain written logs including:
1. Running log of events and issues.
 2. Discrepancies, deficient or uncompleted work by others.
 3. Contract interpretation requests.
 4. Lists of completed tests.
- B. Ensure recorded data represents actual measured or observed conditions.
- C. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- D. Mark on the drawings the locations where traverse and other critical measurements were taken and cross reference the location in the final report.
- E. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- F. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

3.06 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.
- B. Measure air quantities at air inlets and outlets.
- C. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.
- D. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.
- E. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.
- F. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.
- G. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.

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- H. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.
- I. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.

3.07 WATER SYSTEM PROCEDURE

- A. Adjust water systems to provide required or design quantities.
- B. Use calibrated Venturi tubes, orifices, or other metered fittings and pressure gages to determine flow rates for system balance. Where flow metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.
- C. Verify specified flow to Heat pumps then open circuit setters completely

3.08 SCOPE

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

3.09 MINIMUM DATA TO BE REPORTED

- A. Electric Motors:
 - 1. Manufacturer.
 - 2. Model/Frame.
 - 3. HP/BHP.
 - 4. Phase, voltage, amperage; nameplate, actual, no load.
 - 5. RPM.
- B. Pumps:
 - 1. Identification/number.
 - 2. Manufacturer.
 - 3. Size/model.
 - 4. Design flow rate, pressure drop, BHP.
 - 5. Actual flow rate, pressure drop, BHP.
 - 6. Discharge pressure.
 - 7. Suction pressure.
 - 8. Total operating head pressure.
- C. Air Moving Equipment:
 - 1. Location.
 - 2. Manufacturer.
 - 3. Model number.
 - 4. Serial number.
 - 5. Arrangement/Class/Discharge.
 - 6. Air flow, specified and actual.
 - 7. Return air flow, specified and actual.
 - 8. Outside air flow, specified and actual.
 - 9. Total static pressure (total external), specified and actual.
 - 10. Inlet pressure.
 - 11. Discharge pressure.
- D. Return Air/Outside Air:
 - 1. Identification/location.
 - 2. Design air flow.
 - 3. Actual air flow.

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4. Design return air flow.
 5. Actual return air flow.
 6. Design outside air flow.
 7. Actual outside air flow.
- E. Exhaust Fans:
1. Location.
 2. Manufacturer.
 3. Model number.
 4. Serial number.
 5. Air flow, specified and actual.
- F. Duct Traverses:
1. System zone/branch.
 2. Duct size.
 3. Area.
 4. Design velocity.
 5. Design air flow.
 6. Test velocity.
 7. Test air flow.
 8. Duct static pressure.
- G. Air Distribution Tests:
1. Air terminal number.
 2. Room number/location.
 3. Terminal type.
 4. Terminal size.
 5. Design velocity.
 6. Design air flow.
 7. Test (final) velocity.
 8. Test (final) air flow.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Duct insulation.
- B. Duct Liner.
- C. Insulation jackets.

1.02 RELATED REQUIREMENTS

- A. Section 23 0553 - Identification for HVAC Piping and Equipment.
- B. Section 23 3100 - HVAC Ducts and Casings: Glass fiber ducts.

1.03 REFERENCE STANDARDS

- A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.
- C. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2010.
- D. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014.
- E. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material); 2012.
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- G. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.
- H. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

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 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: www.knaufinsulation.com.

2. Johns Manville: www.jm.com.
 3. Owens Corning Corporation: www.ocbuildingspec.com.
- B. Vapor Barrier Jacket:
1. Kraft paper with glass fiber yarn and bonded to aluminized film.

2.03 GLASS FIBER, RIGID

- A. Manufacturer:
1. Knauf Insulation: www.knaufinsulation.com.
 2. Johns Manville: www.jm.com.
 3. Owens Corning Corporation: www.ocbuildingspec.com.
- B. Insulation: ASTM C612; rigid, noncombustible blanket.
1. 'K' Value: 0.24 at 75 degrees F, when tested in accordance with ASTM C518.

2.04 JACKETS

- A. Aluminum Jacket: ASTM B209 (ASTM B209M).

2.05 DUCT LINER

- A. Manufacturers:
1. Knauf Insulation: www.knaufinsulation.com.
 2. Johns Manville: www.jm.com.
 3. Owens Corning Corporation: www.ocbuildingspec.com.
- B. Insulation: Non-corrosive, incombustible glass fiber complying with ASTM C1071; flexible blanket, rigid board, and preformed round liner board; impregnated surface and edges coated with poly vinyl acetate polymer, acrylic polymer, or black composite.
1. Fungal Resistance: No growth when tested according to ASTM G21.
 2. Minimum Noise Reduction Coefficients:
 - a. 1/2 inch Thickness: 0.30.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that ducts have been tested before applying insulation materials.
- B. Verify that surfaces are clean, foreign material removed, and dry.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Insulated ducts conveying air below ambient temperature:
1. Provide insulation with vapor barrier jackets.
 2. Finish with tape and vapor barrier jacket.
 3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
 4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.
- C. Insulated ducts conveying air above ambient temperature:
1. Provide with or without standard vapor barrier jacket.
 2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.
- D. External Duct Insulation Application:
1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
 2. Secure insulation without vapor barrier with staples, tape, or wires.
 3. Install without sag on underside of duct. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift duct off trapeze hangers and insert spacers.
 4. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
 5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.

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Section 23 0713 - DUCT INSULATION

- E. Duct and Plenum Liner Application:
 - 1. Adhere insulation with adhesive for 90 percent coverage.
 - 2. Seal and smooth joints. Seal and coat transverse joints.
 - 3. Seal liner surface penetrations with adhesive.
 - 4. Duct dimensions indicated are net inside dimensions required for air flow. Increase duct size to allow for insulation thickness.

3.03 SCHEDULES

- A. See Duct Insulation Schedule on Drawings.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Equipment insulation.
- B. Covering.
- C. Breeching insulation.

1.02 RELATED REQUIREMENTS

- A. Section 23 0553 - Identification for HVAC Piping and Equipment.
- B. Section 23 2113 - Hydronic Piping: Placement of hangers and hanger inserts.
- C. Section 23 2114 - Hydronic Specialties.

1.03 REFERENCE STANDARDS

- A. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2014.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- C. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 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 and approved by manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
- B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.06 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 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A. Manufacturer:
 - 1. Aeroflex USA, Inc: www.aeroflexusa.com.
 - 2. Armacell LLC: www.armacell.us.
 - 3. K-Flex USA LLC: www.kflexusa.com.
- B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 3, in sheet form.
 - 1. Minimum Service Temperature: Minus 40 degrees F.
 - 2. Maximum Service Temperature: 220 degrees F.
 - 3. Connection: Waterproof vapor barrier adhesive.
- C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that equipment has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Factory Insulated Equipment: Do not insulate.
- C. Exposed Equipment: Locate insulation and cover seams in least visible locations.
- D. Apply insulation close to equipment by grooving, scoring, and beveling insulation. Fasten insulation to equipment with studs, pins, clips, adhesive, wires, or bands.
- E. Fill joints, cracks, seams, and depressions with bedding compound to form smooth surface. On cold equipment, use vapor barrier cement.
- F. Insulated equipment containing fluids below ambient temperature; insulate entire system.
- G. Nameplates and ASME Stamps: Bevel and seal insulation around; do not insulate over.
- H. Equipment Requiring Access for Maintenance, Repair, or Cleaning: Install insulation so it can be easily removed and replaced without damage.

3.03 SCHEDULE

- A. Ground Source System
 - 1. Pump Bodies:
 - 2. Air Separators:
 - 3. Expansion Tanks:

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 09 9123 - Interior Painting: Painting insulation jacket.
- C. Section 23 2113 - Hydronic Piping: Placement of hangers and hanger inserts.

1.03 REFERENCE STANDARDS

- A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.
- C. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2014.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- E. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 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 and approved by manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

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

1.06 FIELD CONDITIONS

- A. Maintain ambient conditions required by manufacturers of each product.
- B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER

- A. Manufacturers:
 - 1. Johns Manville Corporation: www.jm.com.
 - 2. Knauf Insulation: www.knaufinsulation.com.
 - 3. Owens Corning Corporation: www.ocbuildingspec.com.

2.03 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A. Manufacturer:
 - 1. Aeroflex USA, Inc: www.aeroflexusa.com.
 - 2. Armacell LLC: www.armacell.us.
 - 3. K-Flex USA LLC: www.kflexusa.com.
- B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 3; use molded tubular material wherever possible.

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Section 23 0719 - HVAC PIPING INSULATION

1. Minimum Service Temperature: Minus 40 degrees F.
2. Maximum Service Temperature: 220 degrees F.
3. Connection: Waterproof vapor barrier adhesive.

2.04 JACKETS

- A. Aluminum Jacket: ASTM B209 (ASTM B209M) formed aluminum sheet.
 1. Thickness: 0.016 inch sheet.
 2. Finish: Smooth.
 3. Joining: Longitudinal slip joints and 2 inch laps.
 4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Exposed Piping: Locate insulation and cover seams in least visible locations.
- C. Insulated pipes conveying fluids below ambient temperature; insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
- D. Inserts and Shields:
 1. Application: Piping 1-1/2 inches diameter or larger.
 2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
 3. Insert location: Between support shield and piping and under the finish jacket.
 4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
- E. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 07 8400.
- F. Heat Traced Piping: Insulate fittings, joints, and valves with insulation of like material, thickness, and finish as adjoining pipe. Size large enough to enclose pipe and heat tracer. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

3.03 SCHEDULE

- A. Ground Source Supply & Return
 1. Ground Source Water
 - a. 1" Fiberglass with ASJ Viton Fittings

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Hydronic system requirements.
- B. Pipe hangers and supports.
- C. Unions, flanges, mechanical couplings, and dielectric connections.
- D. Valves:
 - 1. Ball valves.
 - 2. Butterfly valves.
 - 3. Check valves.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 22 0719 - Plumbing Piping Insulation.
- C. Section 23 0719 - HVAC Piping Insulation.
- D. Section 23 2114 - Hydronic Specialties.
- E. Section 23 2500 - HVAC Water Treatment: Pipe cleaning.

1.03 REFERENCE STANDARDS

- A. ASME B31.9 - Building Services Piping; 2014.
- B. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers; 1992 (Reapproved 2014).
- C. ASTM F1476 - Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications; 2007 (Reapproved 2013).
- D. AWWA C606 - Grooved and Shouldered Joints; 2015.
- E. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2009.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate the installation of piping with size, location and installation of service utilities.
- B. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.
 - 1. Schedule in advance with Middleton Associates Inc. to review proposed routing.
- C. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data:
 - 1. Include data on pipe materials, pipe fittings, valves, and accessories.
 - 2. Indicate valve data and ratings.
- C. Project Record Documents: Record actual locations of piping and valves.

1.06 QUALITY ASSURANCE

- A. Provide all grooved joint couplings, fittings, valves, specialties, and grooving tools from a single manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary protective coating on cast iron and steel valves.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.08 FIELD CONDITIONS

- A. Do not install underground piping when bedding is wet or frozen.

PART 2 PRODUCTS

2.01 HYDRONIC SYSTEM REQUIREMENTS

- A. Comply with ASME B31.9 and applicable federal, state, and local regulations.
- B. Piping: Provide piping, fittings, hangers and supports as required, as indicated, and as follows:
 - 1. Where more than one piping system material is specified, provide joining fittings that are compatible with piping materials and ensure that the integrity of the system is not jeopardized.
 - 2. Use non-conducting dielectric connections whenever jointing dissimilar metals.
 - 3. Grooved mechanical joints may be used in accessible locations only.
 - a. Accessible locations include those exposed on interior of building, in pipe chases, and in mechanical rooms, aboveground outdoors, and as approved by Architect.
 - b. Use rigid joints unless otherwise indicated.
 - 4. Provide pipe hangers and supports in accordance with ASME B31.9 or MSS SP-58 unless indicated otherwise.
- C. Pipe-to-Valve and Pipe-to-Equipment Connections: Use flanges, unions, or grooved couplings to allow disconnection of components for servicing; do not use direct welded, soldered, or threaded connections.
- D. Valves: Provide valves where indicated:
 - 1. For throttling, bypass, or manual flow control services, use globe, ball, or butterfly valves.
 - 2. In heating water, chilled water, or condenser water systems, butterfly valves may be used interchangeably with gate and globe valves.

2.02 PIPE HANGERS AND SUPPORTS

- A. Provide hangers and supports that comply with MSS SP-58.
 - 1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
- B. In grooved installations, use rigid couplings with offsetting angle-pattern bolt pads or with wedge shaped grooves in header piping to permit support and hanging in accordance with ASME B31.9.

2.03 UNIONS, FLANGES, MECHANICAL COUPLINGS, AND DIELECTRIC CONNECTIONS

- A. Unions for Pipe 2 Inches and Less:
- B. Flanges for Pipe 2 Inches and Greater:
- C. Mechanical Couplings for Grooved and Shouldered Joints: Two or more curved housing segments with continuous key to engage pipe groove, circular C-profile gasket, and bolts to secure and compress gasket.
 - 1. Dimensions and Testing: In accordance with AWWA C606.
 - 2. Mechanical Couplings: Comply with ASTM F1476.
 - 3. Bolts and Nuts: Hot dipped galvanized or zinc-electroplated steel.
 - 4. When pipe is field grooved, provide coupling manufacturer's grooving tools.

2.04 BALL VALVES

- A. Up To and Including 2 Inches:
 - 1. Bronze one piece body, chrome plated brass ball, teflon seats and stuffing box ring, lever handle with balancing stops, solder ends with union.

2.05 BUTTERFLY VALVES

- A. Body: Cast or ductile iron with resilient replaceable EPDM seat, wafer, lug, or grooved ends, extended neck.
- B. Disc: Construct of aluminum bronze, chrome plated ductile iron, stainless steel, ductile iron with EPDM encapsulation, or Buna-N encapsulation.
- C. Operator: 10 position lever handle.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Prepare pipe for grooved mechanical joints as required by coupling manufacturer.
- C. Remove scale and dirt on inside and outside before assembly.
- D. Prepare piping connections to equipment using jointing system specified.
- E. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.
- F. After completion, fill, clean, and treat systems. Refer to Section 23 2500 for additional requirements.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Pipe Routing:
 - 1. Conceal all piping unless specifically indicated to be exposed.
 - 2. Unless dimensioned, piping routing indicated is diagrammatic.
 - 3. When piping destination is indicated and routing is not shown, determine exact routing required.
- C. Route piping in orderly manner, parallel to building structure, and maintain gradient.
- D. Install piping to conserve building space and to avoid interfere with use of space.
- E. Group piping whenever practical at common elevations.
- F. Slope piping and arrange to drain at low points.
- G. Pipe Hangers and Supports:
 - 1. Install in accordance with ASME B31.9, ASTM F708, or MSS SP-58.
 - 2. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 - 3. Place hangers within 12 inches of each horizontal elbow.
 - 4. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 - 5. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
 - 6. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
 - 7. Provide copper plated hangers and supports for copper piping.
 - 8. Prime coat exposed steel hangers and supports. Refer to Section 09 9123. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
- H. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 22 0719.

3.03 SCHEDULES

- A. See piping material schedule on drawings.
- B. Hanger Spacing for Copper Tubing.

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Section 23 2113 - HYDRONIC PIPING

1. 1/2 inch and 3/4 inch: Maximum span, 5 feet; minimum rod size, 1/4 inch.
 2. 1 inch: Maximum span, 6 feet; minimum rod size, 1/4 inch.
 3. 1-1/2 inch and 2 inch: Maximum span, 8 feet; minimum rod size, 3/8 inch.
- C. Hanger Spacing for Steel Piping.
1. 1/2 inch, 3/4 inch, and 1 inch: Maximum span, 7 feet; minimum rod size, 1/4 inch.
 2. 1-1/4 inches: Maximum span, 8 feet; minimum rod size, 3/8 inch.
 3. 1-1/2 inches: Maximum span, 9 feet; minimum rod size, 3/8 inch.
 4. 2 inches: Maximum span, 10 feet; minimum rod size, 3/8 inch.
 5. 2-1/2 inches: Maximum span, 11 feet; minimum rod size, 3/8 inch.
 6. 3 inches: Maximum span, 12 feet; minimum rod size, 3/8 inch.
 7. 4 inches: Maximum span, 14 feet; minimum rod size, 1/2 inch.
- D. Hanger Spacing for Plastic Piping.
1. 1/2 inch: Maximum span, 42 inches; minimum rod size, 1/4 inch.
 2. 3/4 inch: Maximum span, 45 inches; minimum rod size, 1/4 inch.
 3. 1 inch: Maximum span, 51 inches; minimum rod size, 1/4 inch.
 4. 1-1/4 inches: Maximum span, 57 inches; minimum rod size, 3/8 inch.
 5. 1-1/2 inches: Maximum span, 63 inches; minimum rod size, 3/8 inch.
 6. 2 inches: Maximum span, 69 inches; minimum rod size, 3/8 inch.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Expansion tanks.
- B. Air vents.
- C. Air separators.
- D. Strainers.
- E. Suction diffusers.
- F. Pressure-temperature test plugs.
- G. Relief valves.
- H. Pressure reducing valves.
- I. Glycol system.

1.02 RELATED REQUIREMENTS

- A. Section 23 2113 - Hydronic Piping.
- B. Section 23 2500 - HVAC Water Treatment: Pipe cleaning.

1.03 REFERENCE STANDARDS

- A. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1 - Rules for Construction of Pressure Vessels; 2015.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate the installation of Hydronic Specialties with size, location and installation of service utilities.
- B. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product data for manufactured products and assemblies required for this project. Include component sizes, rough-in requirements, service sizes, and finishes. Include product description, model and dimensions.
- C. Manufacturer's Installation Instructions: Indicate hanging and support methods, joining procedures.
- D. Project Record Documents: Record actual locations of Hydronic Specialties.
- E. Maintenance Data: Include installation instructions, assembly views, lubrication instructions, and replacement parts list.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Glycol Solution: One container, 10 gallon size.

1.06 QUALITY ASSURANCE

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

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- C. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.01 EXPANSION TANKS

- A. Construction: Welded steel, tested and stamped in accordance with ASME BPVC-VIII-1; supplied with National Board Form U-1, rated for working pressure of 125 psi, with flexible EPDM diaphragm or bladder sealed into tank, and steel support stand.
- B. Accessories: Pressure gage and air-charging fitting, tank drain; precharge to 12 psi.
- C. Automatic Cold Water Fill Assembly: Pressure reducing valve, reduced pressure double check back flow preventer, test cocks, strainer, vacuum breaker, and valved by-pass.

2.02 AIR VENTS

- A. Manual Type: Short vertical sections of 2 inch diameter pipe to form air chamber, with 1/8 inch brass needle valve at top of chamber.
- B. Float Type:
 - 1. Cast iron body and cover, float, bronze pilot valve mechanism suitable for system operating temperature and pressure; with isolating valve.

2.03 AIR SEPARATORS

- A. Centrifugal Air Separators/Strainers:
 - 1. Steel, tested and stamped in accordance with ASME BPVC-VIII-1; for 125 psi operating pressure, with integral bronze strainer, tangential inlet and outlet connections, and internal stainless steel air collector tube.

2.04 STRAINERS

- A. See flow diagram on drawings.

2.05 SUCTION DIFFUSERS

- A. See flow diagram on drawings.
- B. Fitting: Angle pattern, cast-iron body, threaded for 2 inch and smaller, flanged for 2-1/2 inch and larger, rated for 175 psi working pressure, with inlet vanes, cylinder strainer with 3/16 inch diameter openings, disposable 5/32 inch mesh strainer to fit over cylinder strainer, 20 mesh start up screen, and permanent magnet located in flow stream and removable for cleaning.

2.06 PRESSURE-TEMPERATURE TEST PLUGS

- A. Construction: Brass body designed to receive temperature or pressure probe with removable protective cap, and Neoprene rated for minimum 200 degrees F.
- B. Application: Use extended length plugs to clear insulated piping.

2.07 RELIEF VALVES

- A. Bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labelled.

2.08 PRESSURE REDUCING VALVES

- A. Operation: Automatically feeds make-up water to the hydronic system whenever pressure in the system drops below the pressure setting of the valve. Refer to Section 23 2113.
- B. Materials of Construction:
 - 1. Valve Body: Constructed of bronze, cast iron, brass, or iron.
 - 2. Internal Components: Construct of stainless steel or brass.
- C. Connections:
 - 1. NPT threaded: 0.50 inch, 0.75 inch, or line size inch.
 - 2. Soldered: 0.50 inch, or line size inch.
- D. Provide integral check valve and strainer.
- E. Maximum Inlet Pressure: 100 psi.
- F. Maximum Fluid Temperature: 180 degrees F.

G. Operating Pressure Range: Between 10 psi and 25 psi.

2.09 GLYCOL SYSTEM

A. See flow diagram on drawings.

2.10 SEE DRAWINGS

A. Glycol Solution:

1. Inhibited propylene glycol and water solution mixed [15] percent glycol - [85] percent water.
Add other chemical inhibitors to protect system piping and components as needed.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install specialties in accordance with manufacturer's instructions.
- B. Where large air quantities can accumulate, provide enlarged air collection standpipes.
- C. Provide manual air vents at system high points and as indicated.
- D. For automatic air vents in ceiling spaces or other concealed locations, provide vent tubing to nearest drain.
- E. Provide air separator on suction side of system circulation pump and connect to expansion tank.
- F. Provide valved drain and hose connection on strainer blow down connection.
- G. Clean and flush glycol system before adding glycol solution. Refer to Section 23 2500.
- H. Feed glycol solution to system through make-up line with pressure regulator, venting system high points. Set to fill at 12 psi and fill system to 30 psi
- I. Perform tests determining strength of glycol and water solution and submit written test results. Add chemical inhibitors to protect system piping and components as needed.

3.02 MAINTENANCE

- A. See Section 01 7000 - Execution Requirements, for additional requirements relating to maintenance service.
- B. Provide service and maintenance of glycol system for one year from date of Substantial Completion at no extra charge to Owner.
- C. Perform monthly visits to make glycol fluid concentration analysis on site with refractive index measurement instrument. Report findings in detail in writing, including analysis and amounts of glycol or water added.
- D. Explain corrective actions to Owner's maintenance personnel in person.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. System lubricated circulators.

1.02 RELATED REQUIREMENTS

- A. Section 23 0716 - HVAC Equipment Insulation.
- B. Section 23 0719 - HVAC Piping Insulation.
- C. Section 23 2113 - Hydronic Piping.
- D. Section 23 2114 - Hydronic Specialties.
- E. Section 26 2717 - Equipment Wiring: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. UL 778 - Standard for Motor-Operated Water Pumps; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide certified pump curves showing performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable. Include electrical characteristics and connection requirements.
- C. Manufacturer's Installation Instructions: Indicate hanging and support requirements and recommendations.
- D. Operation and Maintenance Data: Include installation instructions, assembly views, lubrication instructions, and replacement parts list.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacture, assembly, and field performance of pumps, with minimum three years of documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. GRUNDFOS.
- B. WILO

2.02 HVAC PUMPS - GENERAL

- A. Provide pumps that operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.
- B. Products Requiring Electrical Connection: Listed and classified by UL or testing agency acceptable to Authority Having Jurisdiction as suitable for the purpose specified and indicated.

2.03 SYSTEM LUBRICATED CIRCULATORS

- A. Type: Horizontal shaft, single stage, direct connected with multiple speed wet rotor motor for in-line mounting, for 140 psi maximum working pressure, 230 degrees F maximum water temperature.

PART 3 EXECUTION

3.01 PREPARATION

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

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide access space around pumps for service. Provide no less than minimum space recommended by manufacturer.

3.03 SCHEDULES

- A. Pumps:
 - 1. See drawings

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Materials.
 - 1. System cleaner.
 - 2. Closed system treatment (water).
- B. By-pass (pot) feeder.
- C. Solution tanks.
- D. Side-stream filtration equipment.

1.02 RELATED REQUIREMENTS

- A. Section 01 6000 - Product Requirements: Owner furnished treatment equipment.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide chemical treatment materials, chemicals, and equipment including electrical characteristics and connection requirements.
- C. Shop Drawings: Indicate system schematic, equipment locations, and controls schematics, electrical characteristics and connection requirements.
- D. Manufacturer's Field Reports: Indicate start-up of treatment systems when completed and operating properly. Indicate analysis of system water after cleaning and after treatment.
 - 1. Provide Field Report documenting System Purging
- E. Project Record Documents: Record actual locations of equipment and piping, including sampling points and location of chemical injectors.
- F. Operation and Maintenance Data: Include data on chemical feed pumps, agitators, and other equipment including spare parts lists, procedures, and treatment programs. Include step by step instructions on test procedures including target concentrations.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Sufficient chemicals for treatment and testing during required maintenance period.
 - 3. Test kits.
 - 4. Portable glycol refractometer.

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. Company shall have local representatives with water analysis laboratories and full time service personnel.
- B. Installer Qualifications: Company specializing in performing the type of work specified in this section, and approved by manufacturer.

1.05 REGULATORY REQUIREMENTS

- A. Conform to applicable code for addition of non-potable chemicals to building mechanical systems and to public sewage systems.
- B. Products Requiring Electrical Connection: Listed and classified by UL as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Nalco, an Ecolab Company: www.nalco.com.
- B. Earthwise Environmental (Matt Born 309-475-9010).
- C. Garret-Callahan: www.garrattcallahan.com

2.02 MATERIALS

- A. System Cleaner:
- B. Closed System Treatment (Water):

2.03 BY-PASS (POT) FEEDER

- A. Manufacturers:
 - 1. Neptune, a brand of the Dover Company: www.neptune1.com.

2.04 SOLUTION TANKS

- A. Manufacturers:
 - 1. Armstrong.
 - 2. Advantage.
- B. See Drawings for system.
- C. Provide a complete automatic glycol / make-up water fill system. The unit shall consist of a base, tank (steel or polyethylene) with removable lid, fill vent opening, observable fluid level indicator scale (gallons), Y-Strainers, isolation valves, triple combination shut off (non-slam check, calibrated balance valves, open drip proof motor, pump, motor contactor, digital pressure controls, interconnecting piping, low level safety shut down, remote alarm contacts, indicator light, pressure gauge, and single point power connection.

2.05 SIDE-STREAM FILTRATION SYSTEM

- A. Manufacturers:
 - 1. Cuno.
 - 2. Neptune Water Systems: www.neptunewatersys.com.
 - 3. Vector Industries, Inc.: www.vector-industries.com.
- B. Single or Multi Cartridge type Side Stream Filter, (Filter / Feeders are acceptable if flow rate can be achieved).
 - 1. Description: Floor or wall mounting Stainless Steel housing for removing particles from water.
 - a. Single or Multi Filter Cartridges: Wound polypropylene media with a tin core, 0-20 micron rating, and a maximum temperature rating of 200 deg F; sized to properly fit the filter vessel. The minimum flow rate shall be the greatest of 5% of system pump flow rate or filtration of the entire system volume every 4 hours/25 GPM. Pressure drop through clean filters shall not exceed 2 psig. Filter cartridges shall be furnished in a quantity sufficient for six (6) complete changes of the filter vessel. Filter cartridges shall be changed when the pressure drop across the filter vessel exceeds 6 psig as shown on gauges installed in system.

PART 3 EXECUTION

3.01 PREPARATION

- A. Systems shall be operational, filled, started, and vented prior to cleaning. Use water meter to record capacity in each system.
- B. Place terminal control valves in open position during cleaning.
- C. Verify that electric power is available and of the correct characteristics.

3.02 CLEANING SEQUENCE

- A. System Purging see drawings Closed Well / Single Pipe Loop - Schematic Diagram.
- B. Before purging starts CM Engineering, Inc. shall be notified at least 24 hours in advance.
 - 1. Heat Exchanger System Purging / Cleaning
 - a. The heat exchanger piping system shall be flushed and purged with a water velocity of two feet per second, for a minimum of 30 minutes (until the water flow is free of any debris).
 - b. The building system cleaning shall be completed separately of the well field system.
 - 2. Building system piping cleaning

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Section 23 2500 - HVAC WATER TREATMENT

- a. All grease, dirt, oil, and metallic oxides shall be removed from all closed recirculation systems.
 - b. Each system in its entirety shall be cleaned (including all existing systems).
 - c. Equipment shall be provided to meter the water, mix and inject the cleaning solution into the system.
 - d. Mechanical Contractor shall inform the Water Treatment Contractor of all system materials of construction, to insure chemical cleaner compatibility.
 - e. Circulate cleaning agent as supplied by, and at the strength recommended by the Water Treatment Contractor, wetting all metal surfaces and flush from the system at completion.
 - f. Supervision will be provided by the Water Treatment Contractor.
3. The lines shall be left filled with clean water and then pressure tested.
- C. Provide Field Report documenting System Purging.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. See Drawings Closed Well / Single Pipe Loop - Schematic Diagram.

3.04 CLOSED SYSTEM TREATMENT

- A. Provide one bypass feeder on each system. Install isolating and drain valves and necessary piping. Install around balancing valve downstream of circulating pumps unless indicated otherwise.
- B. Introduce closed system treatment through bypass feeder when required or indicated by test.
- C. Chemicals shall be as recommended by water-treatment manufacturer, compatible with glycol, piping system components and connected equipment. Chemical treatment shall consist of a liquid non-chromate corrosion inhibitor for the protection of both ferrous and non-ferrous metals. Inhibitor shall be compatible with propylene and ethyl glycol types of antifreeze, and shall not be detrimental to non-metallic materials such as pump packing and valve seals. Corrosion Inhibitors for Closed Water Systems: Sodium nitrite-borax-azole, Silica-Sn-borax-azole or molybdate-borax-azole to protect copper and brass and minimize dielectric pitting of steel. Maintain 1,000 ppm nitrite, 50ppm Silica/Sn or 100 ppm molybdate. Adjust borax content to keep correct pH (9.0-10.0). The quantity of inhibitor furnished shall be that needed for the initial filling of the system(s), plus 10% of that amount.
- D. Glycol:
 1. Propylene glycol: HVAC grade, containing corrosion inhibitors and environmental stabilizer additives.
 - a. Industrial/automotive/marine glycol shall NOT be used in any HVAC application.
 - b. Glycol solution is to be 15% by volume.
 - c. If phosphate inhibitor is used, entire system MUST BE DEIONIZED.

3.05 CLOSEOUT ACTIVITIES

- A. Training: Train Owner's personnel on operation and maintenance of chemical treatment system.
 1. Provide minimum of two hours of instruction for two people.
 2. Have operation and maintenance data prepared and available for review during training.
 3. Conduct training using actual equipment after treated system has been put into full operation.
- B. Provide Test Report of "Freezing Point of Solution" as required drawings Closed Well / Single Pipe Loop - Schematic Diagram.
- C. Provide test kits as required and portable glycol refractometer to Owner.
 1. Submit written documentation as to when and who represented the Owner for training and received test kits and refractometer.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal ductwork.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 23 0593 - Testing, Adjusting, and Balancing for HVAC.
- C. Section 23 0713 - Duct Insulation: External insulation and duct liner.
- D. Section 23 3300 - Air Duct Accessories.
- E. Section 23 3600 - Air Terminal Units.
- F. Section 23 3700 - Air Outlets and Inlets.

1.03 REFERENCE STANDARDS

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- B. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.
- C. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005 (Rev. 2009).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for duct materials.
- C. Shop Drawings: Indicate duct fittings, particulars such as gages, sizes, welds, and configuration prior to start of work for HVAC DUCTS AND CASINGS systems.
- D. 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. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum five years of experience.
- B. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum five years of experience.

1.06 FIELD CONDITIONS

- A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.
- B. Maintain temperatures within acceptable range during and after installation of duct sealants.

PART 2 PRODUCTS

2.01 DUCT ASSEMBLIES

- A. Regulatory Requirements: Construct ductwork to NFPA 90A standards.
- B. Ducts: Galvanized steel, unless otherwise indicated.
- C. Low Pressure Supply (Heating Systems): 1/2 inch w.g. pressure class, galvanized steel.
- D. Low Pressure Supply (System with Cooling Coils): 1/2 inch w.g. pressure class, galvanized steel.
- E. Return and Relief: 1/2 inch w.g. pressure class, galvanized steel.
- F. General Exhaust: 1/2 inch w.g. pressure class, galvanized steel.
- G. Outside Air Intake: 1/2 inch w.g. pressure class, galvanized steel.
- H. Transfer Air and Sound Boots: 1/2 inch w.g. pressure class, fibrous glass.

2.02 MATERIALS

- A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.

2.03 DUCTWORK FABRICATION

- A. Fabricate and support in accordance with SMACNA (DCS) and as indicated.
- B. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- C. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- D. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA (DCS).

2.04 MANUFACTURED DUCTWORK AND FITTINGS

- A. Flexible Ducts: Black polymer film supported by helically wound spring steel wire.
 - 1. UL labeled.
 - 2. Insulation: Fiberglass insulation with polyethylene vapor barrier film.
 - 3. Pressure Rating: 4 inches WG positive and 0.5 inches WG negative.
 - 4. Maximum Velocity: 4000 fpm.
 - 5. Temperature Range: Minus 20 degrees F to 175 degrees F.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install, support, and seal ducts in accordance with SMACNA (DCS).
- B. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- C. Flexible Ducts: Connect to metal ducts with adhesive.
- D. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.
- E. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- F. Connect diffusers or light troffer boots to low pressure ducts directly or with 5 feet maximum length of flexible duct held in place with strap or clamp.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Air turning devices/extractors.
- B. Backdraft dampers - metal.
- C. Backdraft dampers - fabric.
- D. Combination fire and smoke dampers.
- E. Duct access doors.
- F. Duct test holes.
- G. Fire dampers.
- H. Flexible duct connections.
- I. Smoke dampers.
- J. Volume control dampers.

1.02 RELATED REQUIREMENTS

- A. Section 23 3100 - HVAC Ducts and Casings.
- B. Section 23 3600 - Air Terminal Units: Pressure regulating damper assemblies.

1.03 REFERENCE STANDARDS

- A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.
- B. NFPA 92 - Standard for Smoke Control Systems; 2015.
- C. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005 (Rev. 2009).
- D. UL 33 - Safety Heat Responsive Links for Fire-Protection Service; Current Edition, Including All Revisions.
- E. UL 555 - Standard for Fire Dampers; Current Edition, Including All Revisions.
- F. UL 555S - Standard for Smoke Dampers; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide for shop fabricated assemblies including volume control dampers. Include electrical characteristics and connection requirements.
- C. Project Record Drawings: Record actual locations of access doors and test holes.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Fusible Links: One of each type and size.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect dampers from damage to operating linkages and blades.

PART 2 PRODUCTS

2.01 AIR TURNING DEVICES/EXTRACTORS

- A. Multi-blade device with blades aligned in short dimension; steel construction; with individually adjustable blades, mounting straps.

2.02 BACKDRAFT DAMPERS - METAL

- A. Gravity Backdraft Dampers, Size 18 by 18 inches or Smaller, Furnished with Air Moving Equipment: Air moving equipment manufacturer's standard construction.

2.03 BACKDRAFT DAMPERS - FABRIC

- A. Fabric Backdraft Dampers: Factory-fabricated.
 - 1. Blades: Neoprene coated fabric material.
 - 2. Birdscreen: 1/2 inch nominal mesh of galvanized steel or aluminum.
 - 3. Maximum Velocity: 1000 fpm (5 m/sec) face velocity.

2.04 COMBINATION FIRE AND SMOKE DAMPERS

- A. Fabricate in accordance with NFPA 90A, UL 555, UL 555S, and as indicated.
- B. Provide factory sleeve and collar for each damper.
- C. Operators: UL listed and labelled spring return pneumatic type suitable for operation on 0-20 psig instrument air. Provide end switches to indicate damper position. Locate damper operator on interior of duct and link to damper operating shaft.
- D. Normally Open Smoke Responsive Fire Dampers: Curtain type, closing upon actuation of electro thermal link, flexible stainless steel blade edge seals to provide constant sealing pressure, stainless steel springs with locking devices to ensure positive closure for units mounted horizontally.
- E. Electro Thermal Link: Fusible link melting at 165 degrees F; 120 volts, single phase, 60 Hz; UL listed and labeled.

2.05 DUCT ACCESS DOORS

- A. Fabricate in accordance with SMACNA (DCS) and as indicated.

2.06 DUCT TEST HOLES

- 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.

2.07 FIRE DAMPERS

- A. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.
- B. Horizontal Dampers: Galvanized steel, 22 gage, 0.0299 inch frame, stainless steel closure spring, and lightweight, heat retardant non-asbestos fabric blanket.
- C. Curtain Type Dampers: Galvanized steel with interlocking blades. Provide stainless steel closure springs and latches for horizontal installations. Configure with blades out of air stream except for 1.0 inch pressure class ducts up to 12 inches in height.
- D. Multiple Blade Dampers: 16 gage, 0.0598 inch galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, 1/8 by 1/2 inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock.
- E. Fusible Links: UL 33, separate at 160 degrees F with adjustable link straps for combination fire/balancing dampers.

2.08 FLEXIBLE DUCT CONNECTIONS

- A. Fabricate in accordance with SMACNA (DCS) and as indicated.
- B. Flexible Duct Connections: Fabric crimped into metal edging strip.
 - 1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz per sq yd.
- C. Maximum Installed Length: 14 inch.

2.09 SMOKE DAMPERS

- A. Fabricate in accordance with NFPA 90A and UL 555S, and as indicated.

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Section 23 3300 - AIR DUCT ACCESSORIES

- B. Dampers: UL Class 1 airfoil blade type smoke damper, normally open automatically operated by pneumatic actuator.
- C. Electro Thermal Link: Fusible link melting at 165 degrees F; 120 volts, single phase, 60 Hz; UL listed and labeled.

2.10 VOLUME CONTROL DAMPERS

- A. Fabricate in accordance with SMACNA (DCS) and as indicated.
- B. Single Blade Dampers: Fabricate for duct sizes up to 6 by 30 inch.
 - 1. Blade: 24 gage, 0.0239 inch, minimum.
- C. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 by 72 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
 - 1. Blade: 18 gage, 0.0478 inch, minimum.
- D. Quadrants:
 - 1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.
 - 2. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.
 - 3. Where rod lengths exceed 30 inches provide regulator at both ends.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). Refer to Section 23 3100 for duct construction and pressure class.
- B. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.
- C. Provide duct test holes where indicated and required for testing and balancing purposes.
- D. Provide fire dampers, combination fire and smoke dampers, and smoke dampers at locations indicated, where ducts and outlets pass through fire rated components, and where required by Authorities Having Jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.
- E. Install smoke dampers and combination smoke and fire dampers in accordance with NFPA 92.
- F. Demonstrate re-setting of fire dampers to Owner's representative.
- G. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.
- H. At equipment supported by vibration isolators, provide flexible duct connections immediately adjacent to the equipment.
- I. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.
- J. Provide balancing dampers on high velocity systems where indicated. Refer to Section 23 3600 - Air Terminal Units.
- K. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Diffusers.
- B. Registers/grilles.
- C. Louvers.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

- A. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating; 2012.
- B. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Inlets; 2006 (R2011).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.
- C. Project Record Documents: Record actual locations of air outlets and inlets.

1.05 QUALITY ASSURANCE

- A. Test and rate air outlet and inlet performance in accordance with ASHRAE Std 70.
- B. Test and rate louver performance in accordance with AMCA 500-L.

1.06 QUALITY ASSURANCE

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

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Price Industries: www.price-hvac.com.
- B. Titus: www.titus-hvac.com.

2.02 LOUVERS

- A. Type: 4 inch deep with blades on 45 degree slope with center baffle and return bend, heavy channel frame, 1/2 inch square mesh screen over exhaust and 1/2 inch square mesh screen over intake.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.

3.02 AIR OUTLET AND INLET SCHEDULE

- A. See drawings.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Energy recovery units.
- B. Casing.
- C. Fans.
- D. Total energy wheel.
- E. Filters.
- F. Dampers.
- G. Vibration isolation.
- H. Roof curbs.
- I. Power and controls.
- J. Accessories.

1.02 REFERENCE STANDARDS

- A. AMCA 500-D - Laboratory Methods of Testing Dampers for Rating; 2012.
- B. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating; 2012.
- C. AHRI 1060 I-P - Performance Rating of Air-to-Air Exchangers for Energy Recovery Ventilation Equipment; 2014.
- D. ASHRAE Std 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size; 2012, with 2015 amendments.
- E. ASHRAE Std 84 - Method of Testing Air to Air Heat/Energy Exchangers; 2013.
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's installation instruction, product data, and engineering calculations.
- C. Closeout Submittals: Submit manufacturer's operation and maintenance instructions.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. Firm regularly engaged in manufacturing energy recovery units..
 - 2. Products in satisfactory use in similar service for not less than five years.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store in manufacturer's unopened packaging.
- B. Store products to be installed indoors in dry, heated area.

1.06 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Warranty energy recovery wheel to be free from defects in material and workmanship for 3 years under circumstances of normal use.
- C. Warranty dessicant core to be free from defects in material and workmanship for 5 years under circumstances of normal use.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Energy Recovery Ventilators:
 - 1. Semco Inc.: www.semcohvac.com.

2.02 ENERGY RECOVERY DESIGN CRITERIA

- A. See Drawings

2.03 ENERGY RECOVERY UNITS

- A. Energy Recovery Units: Dessicant wheel type; prefabricated packaged system designed by manufacturer.
 - 1. Access: Hinged and/or screwed access panels on front.
 - 2. Framing: Sheet metal insulated framing and panels.

2.04 CASING

- A. Wall, Floor, and Roof Panels:
 - 1. Construction: 1 inch thick, double wall box construction, with formed edges of exterior wall overlapping formed edges of interior wall.
 - 2. Exterior Wall: Galvanized steel sheet.
 - 3. Insulation:
 - a. 1 inch insulated fiberglass.
 - b. Panel Cores: Fiberglass
 - c. Flame Spread Index (FSI): 25 or less, when tested in accordance with ASTM E84 or UL 723.
 - d. Smoke Developed Index (SDI): 50, maximum, when tested in accordance with ASTM E84 or UL 723.
 - 4. Roof Panel: Weatherproof.
 - 5. Coating: Polyurethane enamel.
- B. Access Panels: Provide access to components through a large, tightly sealed and easily removable panel.
- C. Doors:
 - 1. Construct doors of same construction and thickness as wall panels.
 - 2. As required.
- D. Weather Hood: Provide on fresh air inlet and exhaust air outlet; removable for access.
 - 1. Fresh Air Weather Hood: Maintain a face velocity less than 340 feet/min.

2.05 FANS

- A. Provide separate fans for exhaust and supply blowers.
- B. Fans:
 - 1. Forward curved direct drive with inverter speed control
- C. Housings: 12 gage, 0.1046 inch aluminized steel with plenums integral to general housing and constructed to Class 1 fan standards.
- D. Motors:
 - 1. Motors: Open drip proof.
 - 2. Efficiency: High.
 - 3. Speed: Single.
 - 4. Control: Variable Frequency Drive.
 - 5. Fan Motor: UL listed and labeled.
- E. Drives:
 - 1. Fans: Belt driven.
 - 2. As scheduled

2.06 TOTAL ENERGY WHEEL

- A. Wheel: Transfer heat and humidity from one air stream to the other with minimum carryover of the exhaust air into the supply air stream.
- B. Sensible Recovery Efficiency: See Drawings.
- C. Latent Recovery Efficiency: See Drawings.
- D. Wheel Effectiveness: Rated in accordance with ASHRAE Std 84 and AHRI 1060 I-P.
- E. Flame Spread Index (FSI): 25 or less, when tested in accordance with ASTM E84 or UL 723.
- F. Smoke Developed Index (SDI): 50 or less, when tested in accordance with ASTM E84 or UL 723.
- G. Energy Recovery Wheel Media Face:
 - 1. Desiccant coated aluminum
- H. Rotor:
 - 1. Type: Non-segmented hygroscopic aluminum wheel.
 - 2. Rotor Matrix: Corrosion resistant aluminum alloy composed of alternating corrugated and flat, continuously wound layers of uniform widths.
- I. Desiccant:
 - 1. Type: 3A.
- J. Drive:
 - 1. Drive: Tensioned drive with full perimeter link style belt.

2.07 FILTERS

- A. Efficiency: See Drawings MERV.
- B. Exhaust and Fresh Air Streams: See Drawings filters constructed to meet ASHRAE Std 52.2.
- C. Mount 1/2 inches thick permanent aluminum washable type filter in the outside air hood and in the return plenum air.

2.08 DAMPERS

- A. Exhaust Back-Draft Damper: Factory installed, galvanized steel.
 - 1. High performance, backdraft dampers suitable for application in HVAC systems with velocities to 3000 feet per minute.
 - 2. Louvers, Dampers, and Shutters: AMCA 500-D and AMCA 500-L.
 - 3. Damper Capacity: Demonstrate damper capacity to withstand HVAC system operating conditions.
 - 4. Fabrication:
 - a. Frame: 20 gage, 0.0359 inch, 3 inch roll formed galvanized steel channel with rear flange, prepunched mounting holes, and welded corner clips for maximum rigidity.
 - b. Blades:
 - 1) Style: Single-piece, overlap frame.
 - 2) Material: Roll formed 28 gage, 0.0149 inch galvanized steel.
 - 3) Width: Maximum 6 inches.
- B. Return Air Damper:
 - 1. Factory installed, adjustable volume control, opposed blade damper for regulating airflow, based on external static pressure.
 - 2. Return Air Damper: Structural hat channels, reinforced at corners.
 - 3. Roll-formed Frames: Structurally superior to 13 gage, 0.0897 inch U-channel frames.
 - 4. Blades: Single skin, 16 gage, 0.0598 inch.
- C. Motorized Dampers: Provide motorized dampers at outside air inlet, exhaust air outlet, and supply air outlet.
 - 1. Type: Motorized two position parallel blade damper with blade seals.
 - 2. Motorized Damper: Roll-formed structural hat channels, reinforced at the corners,
 - 3. Blades: Single skin, 16 gage, 0.0598 inch.

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- D. Motorized Louvers:
 - 1. Type: Motorized two position parallel blade louver with drainable blades, blade seals, and jamb seals
 - 2. Adjustable louver:
 - a. Fabrication: Mullion style.
 - 1) Frame:
 - (a) Material: Extruded aluminum, Alloy 6063-T5.
 - 2) Blades:
 - (a) Style: Horizontal, adjustable, drainable.
 - (b) Material: Formed aluminum, Alloy 6063-T5.

2.09 VIBRATION ISOLATION

- A. Vibration Isolation: Provide whole unit vibration isolation with the energy recovery unit assembly.
- B. Construct with appropriately-sized, seismic-rated, corrosion-resistant captive-spring isolators.

2.10 ROOF CURBS

- A. Curbs: Provide full perimeter roof curb fabricated from 10 gage, 0.1345 inch aluminized steel.
 - 1. Curbs: Knock-down type.
 - 2. Provide flat for roof deck.

2.11 POWER AND CONTROLS

- A. Motor Control Panels: UL listed.
- B. Include necessary motor starters, fuses, transformers and overload protection according to NFPA 70.
- C. Install wiring in accordance with NFPA 70.

2.12 ACCESSORIES

- A. Variable speed drives
- B. Carbon Dioxide Sensor shipped loose for field installation for speed control of ERU.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that structure is ready for installation of unit, that openings in deck for ductwork, if required, are correctly sized and located, and that mechanical and electrical utilities supplying unit are of correct capacities and are accessible.

3.02 INSTALLATION

- A. Provide openings for suitable ductwork connection.

3.03 SYSTEM STARTUP

- A. Provide services of manufacturer's authorized representative to provide start up of unit.

3.04 CLEANING

- A. Clean filters, air plenums, interior and exposed-to-view surfaces prior to Substantial Completion.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Water-source heat pumps.
- B. Controls.

1.02 RELATED REQUIREMENTS

- A. Section 23 3100 - HVAC Ducts and Casings.
- B. Section 26 2717 - Equipment Wiring: Electrical characteristics and wiring connections and installation and wiring of thermostats and other controls components.

1.03 REFERENCE STANDARDS

- A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.
- B. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2015.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.
- C. Manufacturer's Instructions: Indicate rigging, assembly, and installation instructions.
- D. Project Record Documents: Record actual locations of components and connections.
- E. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.
- F. Warranty: Submit manufacturers warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Filters: One for each unit.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum five years of experience.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum 3 years of experience and approved by manufacturer.

1.06 WARRANTY

- A. Provide five year manufacturers warranty for compressors, parts only.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Vertical Stack Style Heat pumps:
 - 1. Climatemaster:
 - 2. Whalen
 - 3. Daikin
- B. Vertical, Horizontal, and Console Style Heat pumps:
 - 1. Water Furnace
 - 2. Climatemaster
 - 3. Daikin

2.02 SYSTEM DESIGN

- A. Water Source Heatpump Heating and Cooling Units: Self-contained, packaged, matched factory-engineered and assembled, pre-wired indoor units; UL listed.

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B. Performance Requirements: See Drawings for additional requirements.

2.03 ACCESSORY EQUIPMENT

- A. Room Thermostat: Wall-mounted, electric solid state microcomputer based room thermostat with remote sensor to maintain temperature setting; low-voltage; with following features:
1. Automatic switching from heating to cooling.
 2. Preferential rate control to minimize overshoot and deviation from setpoint.
 3. Short cycle protection.
 4. Thermostat Display:
 - a. Actual room temperature.
 - b. Programmed temperature.
 - c. System Mode Indication: Heating, Cooling, Fan Auto, Off, and On, Auto or On, Off.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrates are ready for installation of units and openings are as indicated on shop drawings.
- B. Verify that proper power supply is available and in correct location.
- C. Verify that proper fuel supply is available for connection.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions and requirements of local authorities having jurisdiction.
- B. Install in accordance with NFPA 90A and NFPA 90B.

3.03 SCHEDULE

- A. See drawings

END OF SECTION

DIVISION 23 - HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)
Section 23 8128 - VERTICAL UNIT VENTILATOR WATER SOURCE HEAT PUMPS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Water-source heat pumps.
- B. Controls.

1.02 REFERENCE STANDARDS

- A. ARI Compliance: Test and rate water-source heat pumps in accordance with ARI Standard 320 "Water-Source Heat Pumps". Provide ARI Certification.
- B. ASHRAE Std 15 - Safety Standard for Refrigeration Systems; American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.; 2010 (ANSI/ASHRAE Std 15).
- C. ASHRAE Std 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings; American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.; 2010, Including All Addenda (ANSI/AHSRAE/
- D. ASHRAE Std 13256-1 Water-source Heat Pumps - Testing and Rating for Performance - Part 1: Water-to-air and Brine-to-air Heat Pumps (ANSI/ARI/ASHRAE ISO), 1998
- E. NFPA 70 "National Electrical Code".
- F. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; National Fire Protection Association; 2012.
- G. NFPA 90B - Standard for the Installation of Warm Air Heating and Air Conditioning Systems; National Fire Protection Association; 2012.
- H. UL 207 - Refrigerant-Containing Components and Accessories, Nonelectrical; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. See Section 01-3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.
 - 1. Wiring Diagrams: Submit manufacturer's electrical requirements for power supply wiring to water-source heat pumps. Submit manufacturer's ladder-type wiring diagrams for interlock and control wiring required for final installation of water-source heat pumps and controls. Clearly differentiate between portions of wiring that are factory-installed and portions to be field-installed.
- C. Shop Drawings: Indicate assembly, required clearances, and location and size of field connections.
- D. Manufacturer's Instructions: Indicate rigging, assembly, and installation and start up instructions.
- E. Project Record Documents: Record actual locations of components and connections.
- F. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, trouble shooting maintenance guide and repair data, and parts listing.
- G. Warranty: Submit manufacturers warranty and ensure forms have been filled out in Prospect Heights School District 23 s name and registered with manufacturer.
- H. Maintenance Materials: Furnish the following for Prospect Heights School District 23's use in maintenance of project.
 - 1. Extra Filters: One of each type and size.

1.04 QUALITY ASSURANCE

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

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Section 23 8128 - VERTICAL UNIT VENTILATOR WATER SOURCE HEAT PUMPS

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Handle water-source heat pumps and components carefully to prevent damage, breaking, denting and scoring. Do not install damaged water-source heat pumps or components; replace with new.
- B. Store water-source heat pumps and components in clean dry place. Protect from weather, dirt, fumes, water, construction debris, and physical damage.
- C. Comply with manufacturer's rigging and installation instructions for unloading water-source heat pumps, and moving units to final location for installation

1.06 WARRANTY

- A. See Section 01-7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturers warranty for compressors and motor, sealed system components and all functional parts.
 - 1. Warranty on Motor / Compressor: Provide written warranty, signed by manufacturer, agreeing to replace/repair, within warranty period, motors/compressors with inadequate or defective materials and workmanship, including leakage, breakage, improper assembly, or failure to perform as required; provided manufacturer's instructions for handling, installing, protecting, and maintaining units have been adhered to during warranty period. Replacement is limited to component replacement only, and does not include labor for removal and reinstallation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Airedale a Modine Company: www.airedaleusa.com
- B. Bard Manufacturing Company: www.bardhvac.com
- C. Change'Air Products and Services Ltd.: www.changeair.com

2.02 INDOOR UNIT

- A. Performance
 - 1. System selection shall be based on ratings in accordance with ISO Standard 13256-1-98 Certified Water-to-Air and Brine-to-Air Heat Pumps, which include watt allowance for water pumping. Cooling capacities and heating capacities shall be as indicated.
 - a. Total cooling capacity of the heat pumps shall be Btu/Hour with minimum EER at 90F wet and total heating capacity shall be Btu/Hour with minimum COP at 40F EWT. Rated fluid flow rate is GPM and rated airflow is CFM.
 - b. Acoustical performance shall be quiet operation. The room dbA shall be less than 38 at 10' from the unit.
- B. Cabinet
 - 1. Constructed of 20 gauge pre-painted or vinyl laminated galvanized gray painted steel. Tamper resistant fasteners are provided for access panels. Unit includes built-in rollers for each installation into wall sleeve and removal for service if necessary. Hinged, lockable front panel for filter service and access to primary functional electrical controls.
- C. Insulation
 - 1. Cabinet is fully insulated with foil covered, high density fiberglass insulation with sealed edge treatment and special sound deadening insulation material in the compressor section. All insulation is designed to resist mold and mildew growth and facilitate ease of cleaning.
- D. Compressor
 - 1. All models shall use a high efficiency scroll compressor for maximum efficiency and reliability. The compressor shall be covered by a five year part warranty. The refrigeration circuit shall be equipped with factory installed high and low pressure controls. The scroll compressor does not require a crankcase heater or accumulator. The refrigeration control shall be a factory installed TXV.

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2. The Compressor section of the heat pump cabinet shall be treated with sound deadening material to minimize noise within the occupied space from the heat pump unit.
- E. Liquid Line Filter Drier
 1. All models shall have a liquid line filter drier as standard equipment.
- F. Coaxial Water Coil
 1. All models shall have a copper coaxial water coil that is fully insulated and have 1-inch FPT water piping connections.
- G. Copper Tube / Aluminum Fin Evaporator Coil
 1. All models shall have an evaporator coil with grooved copper tubing and enhanced aluminum fins for maximum heat transfer and high-energy efficiency.
- H. Condensate Drain System
 1. Condensate shall be removed from the unit by connections located in the back or side of the unit. The evaporator and condenser coils shall have separate drain pans constructed of stainless steel to eliminate corrosion. The lower unit base serves as a secondary drain pan.
- I. Indoor Blower Motor
 1. The indoor blower motor shall be a variable speed (ECM) type to produce the same rated air flow from 0 to 0.8 inch WC of external static pressure at low sound levels. The motor is to be self adjusting to provide proper rated airflow at high static pressures without user adjustment or wiring changes by the user. The motor shall be programmed for 20-second ramp up and 60-second down rate for quiet, smooth starting and stopping.
- J. Electrical Components
 1. Are easily accessible for routine inspection and maintenance through front access panels. Circuit breaker standard on all 208/230V models. Circuit breaker access is through lockable access panel. Lock and key provided as standard equipment.
- K. Control Circuit
 1. The internal control circuit shall consist of a current limiting 24VAC type transformer. A compressor control module shall be used to provide the following system protection features built-in off-delay time adjustable from 30 seconds to 5 minutes 2-minute on- delay if power interrupt; 120-second bypass for low pressure control, and both soft and manual lockouts for high and low pressure controls.
- L. Refrigerant Pressure Controls
 1. All models shall have both high and low pressure controls as standard. Two low- pressure controls shall be included and factory installed. One shall be set for fresh water applications and the other for protected (antifreeze) closed systems. The factory wired switch shall be set for antifreeze solution.
- M. Refrigerant Service Ports
 1. High and low-side service access ports shall be located in the filter compartment for easy service access.
- N. Service Features
 1. The unit shall include a diagnostic light to indicate when service is required:
 - a. System Service - shall detect high or low pressure control operation.

2.03 ACCESSORY EQUIPMENT

- A. Air Filters
 1. All heat pumps will be provided with:
 - a. MERV 8 Pleated Filters
- B. Wet Rotor Circulator Pumps
 1. Type: Horizontal shaft, single stage, direct connected, wet rotor circulator for in-line mounting, system lubricated, for 125 psi maximum working pressure.
 2. Casing: Cast iron, with flanged pump connections.
 3. Impeller: Non-ferrous keyed to shaft.

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- 4. Options - provide with:
 - a. Isolation Flanges.
- C. Space Controls
 - 1. Unit to be provided with Robert Shaw 300-202 two-stage adjustable electronic thermostat. The thermostat shall be unit mounted and be set up to accept an occupancy signal from the room lighting system such that the unit operates in the occupied mode when the lights are on within the classroom.

PART 3 EXECUTION

3.01 EXAMINATION

- A. General: Examine areas and conditions under which water-source heat pumps are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.
- B. Verify that substrates are ready for installation of units and openings are as indicated on shop drawings.
- C. Verify that proper power supply is available and in correct location.
- D. Verify that proper fuel supply is available for connection.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions and requirements of local authorities having jurisdiction.
- B. Install in accordance with NFPA 90A and NFPA 90B.
- C. General: Install water-source heat pumps in accordance with manufacturers installation instructions. Install units plumb and level, firmly anchored in locations indicated, and maintain manufacturer's recommended clearances.
- D. Electrical Wiring: Install electrical devices furnished by manufacturer but not specified to be factory-mounted. Furnish copy of manufacturer's wiring diagram submittal to Electrical Installer.
 - 1. Verify that electrical wiring installation is in accordance with manufacturer's submittal and installation requirements of Division-26 sections. Do not proceed with equipment start-up until wiring installation is acceptable to equipment Installer.

3.03 SYSTEM STARTUP

- A. Prepare and start equipment. Adjust for proper operation.
- B. Start-up equipment, in accordance with manufacturer's start-up instructions. Replace damaged or malfunctioning controls and equipment.

3.04 CLOSEOUT ACTIVITIES

- A. Demonstrate operation to McLean County Unit School District #5's maintenance personnel.
 - 1. Test controls and demonstrate compliance with requirements.
 - 2. Provide services of manufacturer's technical representative for 1-half day to instruct Owner's personnel in operation and maintenance of water-source heat pumps.
 - a. Schedule training with McLean County Unit School District #5, provide at least 7-day notice to Contractor and Middleton Associates Inc. of training date.
- B. Replace filters as required that have been used during for construction.
- C. Furnish to McLean County Unit School District #5, with receipt, the following spare parts:
 - 1. parts for each water-source heat pump:
 - a. Two (2) sets filter media.

3.05 SCHEDULE

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

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical demolition.

1.02 RELATED REQUIREMENTS

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Materials and equipment for patching and extending work: As specified in individual sections.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify field measurements and circuiting arrangements are as shown on Drawings.
- B. Verify that abandoned wiring and equipment serve only abandoned facilities.
- C. Demolition drawings are based on casual field observation and existing record documents.
- D. Report discrepancies to Architect before disturbing existing installation.
- E. Beginning of demolition means installer accepts existing conditions.

3.02 PREPARATION

- A. Disconnect electrical systems in walls, floors, and ceilings to be removed.
- B. Coordinate utility service outages with utility company.
- C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.
- D. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Minimize outage duration.
 - 1. Obtain permission from Owner at least 24 hours before partially or completely disabling system.
- E. Existing Fire Alarm System: Maintain existing system in service until new system is accepted. Disable system only to make switchovers and connections. Minimize outage duration.
 - 1. Notify Owner before partially or completely disabling system.
 - 2. Notify local fire service.
 - 3. Make notifications at least 24 hours in advance.
 - 4. Make temporary connections to maintain service in areas adjacent to work area.
- F. Existing Telephone System: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Minimize outage duration.
 - 1. Notify Owner at least 24 hours before partially or completely disabling system.
 - 2. Notify telephone utility company at least 24 hours before partially or completely disabling system.
 - 3. Make temporary connections to maintain service in areas adjacent to work area.

3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

- A. Perform work for removal and disposal of equipment and materials containing toxic substances regulated under the Federal Toxic Substances Control Act (TSCA) in accordance with applicable federal, state, and local regulations. Applicable equipment and materials include, but are not limited to:
 - 1. PCB-containing electrical equipment, including transformers, capacitors, and switches.
 - 2. PCB- and DEHP-containing lighting ballasts.
 - 3. Mercury-containing lamps and tubes, including fluorescent lamps, high intensity discharge (HID), arc lamps, ultra-violet, high pressure sodium, mercury vapor, ignitron tubes, neon, and incandescent.

- B. Remove, relocate, and extend existing installations to accommodate new construction.
- C. Remove abandoned wiring to source of supply.
- D. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.
- E. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets that are not removed.
- F. Repair adjacent construction and finishes damaged during demolition and extension work.
- G. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.

3.04 CLEANING AND REPAIR

- A. See Section 01 7419 - Construction Waste Management and Disposal for additional requirements.
- B. Clean and repair existing materials and equipment that remain or that are to be reused.
- C. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Single conductor building wire.
- B. Wiring connectors.
- C. Electrical tape.
- D. Wire pulling lubricant.
- E. Cable ties.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 26 0526 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.

1.03 REFERENCE STANDARDS

- A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013.
- B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011.
- C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010 (Reapproved 2014).
- D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2014).
- E. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape; 2010.
- F. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- G. NEMA WC 70 - Nonshielded Power Cable 2000 V or Less for the Distribution of Electrical Energy; 2009.
- H. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.
- I. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.
- K. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.
- L. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.
- M. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.
- N. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
 - 2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
 - 3. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.05 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

1.07 FIELD CONDITIONS

- A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F, unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Architect and obtain direction before proceeding with work.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

- A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.
- B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
- D. Comply with NEMA WC 70.
- E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
- F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
- G. Conductor Material:
 - 1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
 - 2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
 - 3. Tinned Copper Conductors: Comply with ASTM B33.
- H. Minimum Conductor Size:
 - 1. Branch Circuits: 12 AWG.
 - a. Exceptions:
 - 1) 20 A, 120 V circuits longer than 75 feet: 10 AWG, for voltage drop.
 - 2) 20 A, 120 V circuits longer than 150 feet: 8 AWG, for voltage drop.
- I. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- J. Conductor Color Coding:
 - 1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
 - 2. Color Coding Method: Integrally colored insulation.
 - 3. Color Code:
 - a. Equipment Ground, All Systems: Green.

2.03 SINGLE CONDUCTOR BUILDING WIRE

- A. Description: Single conductor insulated wire.
- B. Conductor Stranding:
 - 1. Feeders and Branch Circuits:
 - a. Size 10 AWG and Smaller: Solid.
 - b. Size 8 AWG and Larger: Stranded.

- C. Insulation Voltage Rating: 600 V.
- D. Insulation:
 - 1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.

2.04 WIRING CONNECTORS

- A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.
- B. Connectors for Grounding and Bonding: Comply with Section 26 0526.
- C. Wiring Connectors for Terminations:
 - 1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
 - 2. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.
- D. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.

2.05 WIRING ACCESSORIES

- A. Electrical Tape:
 - 1. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.
- B. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.
- C. Cable Ties: Material and tensile strength rating suitable for application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that interior of building has been protected from weather.
- B. Verify that work likely to damage wire and cable has been completed.
- C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.
- D. Verify that field measurements are as shown on the drawings.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.03 INSTALLATION

- A. Circuiting Requirements:
 - 1. Unless dimensioned, circuit routing indicated is diagrammatic.
 - 2. When circuit destination is indicated and routing is not shown, determine exact routing required.
 - 3. Arrange circuiting to minimize splices.
 - 4. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
 - 5. Maintain separation of wiring for emergency systems in accordance with NFPA 70.
- B. Install products in accordance with manufacturer's instructions.
- C. Install conductors and cable in a neat and workmanlike manner in accordance with NECA 1.
- D. Installation in Raceway:

Section 26 0519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
 2. Pull all conductors and cables together into raceway at same time.
 3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
 4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.
- E. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.
- F. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
1. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conductors and cables to lay on ceiling tiles.
- G. Install conductors with a minimum of 12 inches of slack at each outlet.
- H. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.
- I. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.
- J. Make wiring connections using specified wiring connectors.
1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
 2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
 3. Do not remove conductor strands to facilitate insertion into connector.
 4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
- K. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
- L. Insulate ends of spare conductors using vinyl insulating electrical tape.
- M. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.
- N. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.3.2. The insulation resistance test is required for all conductors. The resistance test for parallel conductors listed as optional is not required.
- D. Correct deficiencies and replace damaged or defective conductors and cables.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Grounding and bonding requirements.
- B. Conductors for grounding and bonding.
- C. Connectors for grounding and bonding.

1.02 RELATED REQUIREMENTS

- A. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.
- B. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System; 2012.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- C. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Verify exact locations of underground metal water service pipe entrances to building.
 - 2. Coordinate the work with other trades to provide steel reinforcement complying with specified requirements for concrete-encased electrode.
 - 3. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not install ground rod electrodes until final backfill and compaction is complete.

1.05 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

- A. Existing Work: Where existing grounding and bonding system components are indicated to be reused, they may be reused only where they are free from corrosion, integrity and continuity are verified, and where acceptable to the authority having jurisdiction.
- B. Do not use products for applications other than as permitted by NFPA 70 and product listing.
- C. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.
- D. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- E. Grounding System Resistance:

Section 26 0526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Architect. Precipitation within the previous 48 hours does not constitute normally dry conditions.
 2. Grounding Electrode System: Not greater than 5 ohms to ground, when tested according to IEEE 81 using "fall-of-potential" method.
 3. Between Grounding Electrode System and Major Electrical Equipment Frames, System Neutral, and Derived Neutral Points: Not greater than 0.5 ohms, when tested using "point-to-point" methods.
- F. Grounding Electrode System:
1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
 - a. Provide continuous grounding electrode conductors without splice or joint.
 - b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
 2. Metal Underground Water Pipe(s):
 - a. Provide connection to underground metal domestic and fire protection (where present) water service pipe(s) that are in direct contact with earth for at least 10 feet at an accessible location not more than 5 feet from the point of entrance to the building.
 - b. Provide bonding jumper(s) around insulating joints/pipes as required to make pipe electrically continuous.
 - c. Provide bonding jumper around water meter of sufficient length to permit removal of meter without disconnecting jumper.
 3. Metal Building or Structure Frame:
 - a. Provide connection to metal building or structure frame effectively grounded in accordance with NFPA 70 at nearest accessible location.
 4. Concrete-Encased Electrode:
 - a. Provide connection to concrete-encased electrode consisting of not less than 20 feet of either steel reinforcing bars or bare copper conductor not smaller than 4 AWG embedded within concrete foundation or footing that is in direct contact with earth in accordance with NFPA 70.
 5. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.
- G. Bonding and Equipment Grounding:
1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
 2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
 3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
 4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
 5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
 6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.
 7. Provide bonding for interior metal piping systems in accordance with NFPA 70. This includes, but is not limited to:
 - a. Metal water piping where not already effectively bonded to metal underground water pipe used as grounding electrode.
 - b. Metal gas piping.

- H. Communications Systems Grounding and Bonding:
 - 1. Provide intersystem bonding termination at service equipment or metering equipment enclosure and at disconnecting means for any additional buildings or structures in accordance with NFPA 70.

2.02 GROUNDING AND BONDING COMPONENTS

- A. General Requirements:
 - 1. Provide products listed, classified, and labeled as suitable for the purpose intended.
 - 2. Provide products listed and labeled as complying with UL 467 where applicable.
- B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 0526:
 - 1. Use insulated copper conductors unless otherwise indicated.
 - a. Exceptions:
 - 1) Use bare copper conductors where installed underground in direct contact with earth.
 - 2) Use bare copper conductors where directly encased in concrete (not in raceway).
- C. Connectors for Grounding and Bonding:
 - 1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
 - 2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
 - 3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that work likely to damage grounding and bonding system components has been completed.
- B. Verify that field measurements are as shown on the drawings.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install grounding and bonding system components in a neat and workmanlike manner in accordance with NECA 1.
- C. Make grounding and bonding connections using specified connectors.
 - 1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
 - 2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
 - 3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
 - 4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 - 5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- D. Identify grounding and bonding system components in accordance with Section 26 0553.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.13.

Section 26 0526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

- D. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.
- E. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Support and attachment components for equipment, conduit, cable, boxes, and other electrical work.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Concrete equipment pads.
- B. Section 26 0534 - Conduit: Additional support and attachment requirements for conduits.
- C. Section 26 0536 - Cable Trays for Electrical Systems: Additional support and attachment requirements for cable tray.
- D. Section 26 5100 - Interior Lighting: Additional support and attachment requirements for interior luminaires.

1.03 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2013.
- D. MFMA-4 - Metal Framing Standards Publication; 2004.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
 - 2. Coordinate the work with other trades to provide additional framing and materials required for installation.
 - 3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
 - 4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
 - 5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 03 3000.

1.05 QUALITY ASSURANCE

- A. Comply with NFPA 70.
- B. Comply with applicable building code.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

- A. General Requirements:
 - 1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.

2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported with a minimum safety factor of 2. Include consideration for vibration, equipment operation, and shock loads where applicable.
4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
 - a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
 - b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
 1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
 2. Conduit Clamps: Bolted type unless otherwise indicated.
- C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.
- D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
 1. Comply with MFMA-4.
- E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
- F. Anchors and Fasteners:
 1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as shown on the drawings.
- B. Verify that mounting surfaces are ready to receive support and attachment components.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install support and attachment components in a neat and workmanlike manner in accordance with NECA 1.
- C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- D. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
- E. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
- F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- G. Equipment Support and Attachment:
 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.

Section 26 0529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

- 4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- H. Conduit Support and Attachment: Also comply with Section 26 0534.
- I. Cable Tray Support and Attachment: Also comply with Section 26 0536.
- J. Interior Luminaire Support and Attachment: Also comply with Section 26 5100.
- K. Secure fasteners according to manufacturer's recommended torque settings.
- L. Remove temporary supports.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect support and attachment components for damage and defects.
- C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- D. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical metallic tubing (EMT).
- B. Conduit fittings.
- C. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 26 0526 - Grounding and Bonding for Electrical Systems.
 - 1. Includes additional requirements for fittings for grounding and bonding.
- C. Section 26 0529 - Hangers and Supports for Electrical Systems.

1.03 REFERENCE STANDARDS

- A. ANSI C80.3 - American National Standard for Steel Electrical Metallic Tubing (EMT); 2005.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- C. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2012.
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.
- F. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.
- G. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate minimum sizes of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
 - 2. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
 - 3. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.
 - 4. Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.
 - 5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

1.05 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

- A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.
- B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.
- C. Concealed Within Hollow Stud Walls: Use galvanized steel rigid metal conduit.

- D. Concealed Above Accessible Ceilings: Use galvanized steel rigid metal conduit or electrical metallic tubing (EMT).
- E. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit.
- F. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit.
 - 1. Locations subject to physical damage include, but are not limited to:
 - a. Where exposed below 8 feet, except within electrical and communication rooms or closets.
 - b. Where exposed below 20 feet in gym.
- G. Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit.
- H. Connections to Vibrating Equipment:
 - 1. Dry Locations: Use flexible metal conduit.
 - 2. Maximum Length: 6 feet unless otherwise indicated.

2.02 CONDUIT REQUIREMENTS

- A. Existing Work: Where existing conduits are indicated to be reused, they may be reused only where they comply with specified requirements, are free from corrosion, and integrity is verified by pulling a mandrel through them.
- B. Fittings for Grounding and Bonding: Also comply with Section 26 0526.
- C. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.
- D. Provide products listed, classified, and labeled as suitable for the purpose intended.
- E. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 FLEXIBLE METAL CONDUIT (FMC)

- A. Description: NFPA 70, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.
- B. Fittings:
 - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.

2.04 ELECTRICAL METALLIC TUBING (EMT)

- A. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
- B. Fittings:
 - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.
 - 3. Connectors and Couplings: Use compression (gland) or set-screw type.
 - a. Do not use indenter type connectors and couplings.

2.05 ACCESSORIES

- A. Pull Strings: Use nylon cord with average breaking strength of not less than 200 pound-force.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as shown on drawings.
- B. Verify that mounting surfaces are ready to receive conduits.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.

- B. Install conduit in a neat and workmanlike manner in accordance with NECA 1.
- C. Conduit Routing:
 - 1. Conceal all conduits unless specifically indicated to be exposed.
- D. Conduit Support:
 - 1. Secure and support conduits in accordance with NFPA 70 and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.
 - 2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
 - 3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
- E. Connections and Terminations:
 - 1. Use suitable adapters where required to transition from one type of conduit to another.
 - 2. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
 - 3. Secure joints and connections to provide maximum mechanical strength and electrical continuity.
- F. Penetrations:
 - 1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
 - 2. Make penetrations perpendicular to surfaces unless otherwise indicated.
 - 3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
 - 4. Conceal bends for conduit risers emerging above ground.
 - 5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.
 - 6. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
 - 7. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty. Include proposed locations of penetrations and methods for sealing with submittals.
 - 8. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.
- G. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
 - 1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
 - 2. Where conduits are subject to earth movement by settlement or frost.
- H. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:
 - 1. Where conduits pass from outdoors into conditioned interior spaces.
 - 2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.
- I. Provide grounding and bonding in accordance with Section 26 0526.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Correct deficiencies and replace damaged or defective conduits.

3.04 CLEANING

- A. Clean interior of conduits to remove moisture and foreign matter.

3.05 PROTECTION

- A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.
- B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.

1.02 RELATED REQUIREMENTS

- A. Section 08 3100 - Access Doors and Panels: Panels for maintaining access to concealed boxes.
- B. Section 26 0529 - Hangers and Supports for Electrical Systems.
- C. Section 26 0534 - Conduit:
 - 1. Conduit bodies and other fittings.
 - 2. Additional requirements for locating boxes to limit conduit length and/or number of bends between pulling points.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.
- C. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2012.
- D. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; 2013.
- E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- H. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- I. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.
- J. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
 - 4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
 - 5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
 - 6. Coordinate the work with other trades to preserve insulation integrity.
 - 7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
 - 8. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.05 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS

2.01 BOXES

- A. General Requirements:
 - 1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
 - 2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
 - 3. Provide products listed, classified, and labeled as suitable for the purpose intended.
 - 4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
 - 5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

- B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
 - 1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
 - 2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
 - 3. Use suitable concrete type boxes where flush-mounted in concrete.
 - 4. Use suitable masonry type boxes where flush-mounted in masonry walls.
 - 5. Use raised covers suitable for the type of wall construction and device configuration where required.
 - 6. Use shallow boxes where required by the type of wall construction.
 - 7. Do not use "through-wall" boxes designed for access from both sides of wall.
 - 8. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
 - 9. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
 - 10. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
 - 11. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes.

- C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
 - 1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
 - 2. NEMA 250 Environment Type, Unless Otherwise Indicated:
 - a. Indoor Clean, Dry Locations: Type 1, painted steel.
 - b. Outdoor Locations: Type 3R, painted steel.
 - 3. Junction and Pull Boxes Larger Than 100 cubic inches:
 - a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as shown on drawings.
- B. Verify that mounting surfaces are ready to receive boxes.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.

- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Box Locations:
 - 1. Locate boxes to be accessible. Provide access panels in accordance with Section 08 3100 as required where approved by the Architect.
 - 2. Locate junction and pull boxes as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 26 0534.
- E. Box Supports:
 - 1. Secure and support boxes in accordance with NFPA 70 and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.
 - 2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
- F. Install boxes plumb and level.
- G. Flush-Mounted Boxes:
 - 1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
 - 2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
 - 3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.
- H. Install boxes as required to preserve insulation integrity.
- I. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- J. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.
- K. Close unused box openings.
- L. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.
- M. Provide grounding and bonding in accordance with Section 26 0526.

3.03 CLEANING

- A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

3.04 PROTECTION

- A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical identification requirements.
- B. Identification nameplates and labels.
- C. Wire and cable markers.
- D. Voltage markers.
- E. Warning signs and labels.

1.02 RELATED REQUIREMENTS

- A. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.

1.03 REFERENCE STANDARDS

- A. ANSI Z535.2 - American National Standard for Environmental and Facility Safety Signs; 2011.
- B. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels; 2011.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. UL 969 - Marking and Labeling Systems; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.
- B. Sequencing:
 - 1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.
 - 2. Do not install identification products until final surface finishes and painting are complete.

1.05 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.

1.06 FIELD CONDITIONS

- A. Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

- A. Existing Work: Unless specifically excluded, identify existing elements to remain that are not already identified in accordance with specified requirements.
- B. Identification for Equipment:
 - 1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
 - a. Panelboards:
 - 1) Identify power source and circuit number. Include location when not within sight of equipment.
 - 2) Use typewritten circuit directory to identify load(s) served for panelboards with a door.
 - 3) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.
 - 2. Service Equipment:
 - a. Use identification nameplate to identify each service disconnecting means.
 - b. Use identification nameplate at each piece of service equipment to identify the available fault current and the date calculations were performed.

3. Emergency System Equipment:
 - a. Use identification nameplate or voltage marker to identify emergency system equipment in accordance with NFPA 70.
 - b. Use identification nameplate at each piece of service equipment to identify type and location of on-site emergency power sources.
 4. Use identification label to identify overcurrent protective devices for branch circuits serving fire alarm circuits. Identify with text "FIRE ALARM CIRCUIT".
- C. Identification for Conductors and Cables:
1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 0519.
 2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

- A. Identification Nameplates:
1. Materials:
 2. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.
- B. Identification Labels:
1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
 2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.
- C. Format for Equipment Identification:
1. Minimum Size: 1 inch by 2.5 inches.
 2. Legend:
 - a. Equipment designation or other approved description.
 3. Text: All capitalized unless otherwise indicated.
 4. Minimum Text Height:
 - a. Equipment Designation: 1/2 inch.
 5. Color:
 - a. Normal Power System: White text on black background.
- D. Format for Receptacle Identification:
1. Minimum Size: 3/8 inch by 1.5 inches.
 2. Legend: Power source and circuit number or other designation indicated.
 3. Text: All capitalized unless otherwise indicated.
 4. Minimum Text Height: 3/16 inch.
 5. Color: Black text on clear background.
- E. Format for Fire Alarm Device Identification:
1. Minimum Size: 3/8 inch by 1.5 inches.
 2. Legend: Designation indicated and device zone or address.
 3. Text: All capitalized unless otherwise indicated.
 4. Minimum Text Height: 3/16 inch.
 5. Color: Red text on white background.

2.03 WIRE AND CABLE MARKERS

- A. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.
- B. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.
- C. Legend: Power source and circuit number or other designation indicated.

- D. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.
- E. Minimum Text Height: 1/8 inch.
- F. Color: Black text on white background unless otherwise indicated.

2.04 VOLTAGE MARKERS

- A. Markers for Conduits: Use factory pre-printed self-adhesive vinyl, self-adhesive vinyl cloth, or vinyl snap-around type markers.
- B. Minimum Size:
- C. Legend:
- D. Color: Black text on orange background unless otherwise indicated.

2.05 WARNING SIGNS AND LABELS

- A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.
- B. Warning Signs:
 - 1. Materials:
 - 2. Minimum Size: 7 by 10 inches unless otherwise indicated.
- C. Warning Labels:
 - 1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
 - 2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
 - 3. Minimum Size: 2 by 4 inches unless otherwise indicated.

PART 3 EXECUTION

3.01 PREPARATION

- A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
 - 1. Surface-Mounted Equipment: Enclosure front.
 - 2. Flush-Mounted Equipment: Inside of equipment door.
 - 3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
 - 4. Elevated Equipment: Legible from the floor or working platform.
 - 5. Branch Devices: Adjacent to device.
 - 6. Interior Components: Legible from the point of access.
 - 7. Conductors and Cables: Legible from the point of access.
- C. Install identification products centered, level, and parallel with lines of item being identified.
- D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.
- E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

END OF SECTION

PART 2 PRODUCTS

1.01 LIGHTING CONTROL DEVICES - GENERAL REQUIREMENTS

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless specifically indicated to be excluded, provide all required conduit, wiring, connectors, hardware, components, accessories, etc. as required for a complete operating system.
- C. Products for Switching of Electronic Ballasts/Drivers: Tested and rated to be suitable for peak inrush currents specified in NEMA 410.

1.02 OCCUPANCY SENSORS

- A. Manufacturers:
 - 1. Basis of design: Wattstopper (see plans for models)
 - 2. Acuity
 - 3. Hubbell
 - 4. Lutron
- B. All Occupancy Sensors:
 - 1. Description: Factory-assembled commercial specification grade devices for indoor use capable of sensing both major motion, such as walking, and minor motion, such as small desktop level movements, according to published coverage areas, for automatic control of load indicated.
 - 2. Sensor Technology:
 - a. Passive Infrared (PIR) Occupancy Sensors: Designed to detect occupancy by sensing movement of thermal energy between zones.
 - b. Ultrasonic Occupancy Sensors: Designed to detect occupancy by sensing frequency shifts in emitted and reflected inaudible sound waves.
 - c. Passive Infrared/Ultrasonic Dual Technology Occupancy Sensors: Designed to detect occupancy using a combination of both passive infrared and ultrasonic technologies.
 - 3. Provide LED to visually indicate motion detection with separate color LEDs for each sensor type in dual technology units.
 - 4. Operation: Unless otherwise indicated, occupancy sensor to turn load on when occupant presence is detected and to turn load off when no occupant presence is detected during an adjustable turn-off delay time interval.
 - 5. Turn-Off Delay: Field adjustable, with time delay settings up to 30 minutes.
 - 6. Sensitivity: Field adjustable.
 - 7. Compatibility (Non-Dimming Sensors): Suitable for controlling incandescent lighting, low-voltage lighting with electronic and magnetic transformers, fluorescent lighting with electronic and magnetic ballasts, and fractional motor loads, with no minimum load requirements.
- C. Wall Switch Occupancy Sensors:
 - 1. All Wall Switch Occupancy Sensors:
 - a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with a field of view of 180 degrees, integrated manual control capability, and no leakage current to load in off mode.
 - b. Manual-Off Override Control: When used to turn off load while in automatic-on mode, unit to revert back to automatic mode after no occupant presence is detected during the delayed-off time interval.
 - c. Finish: Match finishes specified for wiring devices in Section 26 2726, unless otherwise indicated.
 - 2. Passive Infrared/Ultrasonic Dual Technology Wall Switch Occupancy Sensors: Capable of detecting motion within an area of 900 square feet.
- D. Wall Dimmer Occupancy Sensors:
 - 1. General Requirements:

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- a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with a field of view of 180 degrees, integrated dimming control capability , and no leakage current to load in off mode.
 - b. Dimmer: Solid-state with continuous full-range even control following square law dimming curve, integral radio frequency interference filtering, power failure preset memory, air gap switch accessible without removing wall plate, and listed as complying with UL 1472; type and rating suitable for load controlled.
 - c. Finish: Match finishes specified for wiring devices in Section 26 2726, unless otherwise indicated.
- E. Ceiling Mounted Occupancy Sensors:
1. All Ceiling Mounted Occupancy Sensors:
 - a. Description: Low profile occupancy sensors designed for ceiling installation.
 2. Passive Infrared (PIR) Ceiling Mounted Occupancy Sensors:
 - a. Extended Range Sensors: Capable of detecting motion within an area of 1,200 square feet at a mounting height of 9 feet, with a field of view of 360 degrees.
 3. Ultrasonic Ceiling Mounted Occupancy Sensors:
 - a. Extended Range Sensors: Capable of detecting motion within an area of 2,000 square feet at a mounting height of 9 feet.
 4. Passive Infrared/Ultrasonic Dual Technology Ceiling Mounted Occupancy Sensors:
 - a. Extended Range Sensors: Capable of detecting motion within an area of 1,200 square feet at a mounting height of 9 feet, with a field of view of 360 degrees.
- F. Directional Occupancy Sensors:
1. All Directional Occupancy Sensors: Designed for wall or ceiling mounting, with integral swivel for field adjustment of motion detection coverage.
 - a. Unless otherwise indicated or required to control the load indicated on the drawings, provide low voltage units, for use with separate compatible accessory power packs.
 2. Passive Infrared/Ultrasonic Dual Technology Directional Occupancy Sensors: Capable of detecting motion within a distance of 40 feet at a mounting height of 10 feet.
- G. Power Packs for Low Voltage Occupancy Sensors:
1. Description: Plenum rated, self-contained low voltage class 2 transformer and relay compatible with specified low voltage occupancy sensors for switching of line voltage loads.
 2. Provide quantity and configuration of power and slave packs with all associated wiring and accessories as required to control the load indicated on the drawings.
 3. Input Supply Voltage: Dual rated for 120/277 V ac.
 4. Load Rating: As required to control the load indicated on the drawings.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Power distribution panelboards.
- B. Lighting and appliance panelboards.
- C. Overcurrent protective devices for panelboards.

1.02 RELATED REQUIREMENTS

- A. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- B. Section 26 0529 - Hangers and Supports for Electrical Systems.
- C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 26 0573 - Power System Studies: Additional criteria for the selection and adjustment of equipment and associated protective devices specified in this section.

1.03 REFERENCE STANDARDS

- A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service; Federal Specification; Revision E, 2013.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- C. NECA 407 - Standard for Installing and Maintaining Panelboards; 2009.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- E. NEMA PB 1 - Panelboards; 2011.
- F. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less; 2013.
- G. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.
- H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- J. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- K. UL 67 - Panelboards; Current Edition, Including All Revisions.
- L. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted panelboards where indicated.
 - 4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
 - 5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.
 - 1. Include characteristic trip curves for each type and rating of overcurrent protective device.
- C. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
 - 1. Include dimensioned plan and elevation views of panelboards and adjacent equipment with all required clearances indicated.
 - 2. Include wiring diagrams showing all factory and field connections.
 - 3. Clearly indicate whether proposed short circuit current ratings are fully rated or, where acceptable, series rated systems.
 - 4. Include documentation of listed series ratings.
- D. Field Quality Control Test Reports.
- E. Project Record Documents: Record actual installed locations of panelboards and actual installed circuiting arrangements.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store panelboards in accordance with manufacturer's instructions and NECA 407.
- B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle carefully in accordance with manufacturer's written instructions to avoid damage to panelboard internal components, enclosure, and finish.

1.08 FIELD CONDITIONS

- A. Maintain ambient temperature within the following limits during and after installation of panelboards:
 - 1. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Schneider Electric; Square D Products: www.schneider-electric.us.
- B. Source Limitations: Furnish panelboards and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 PANELBOARDS - GENERAL REQUIREMENTS

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
 - 1. Altitude: Less than 6,600 feet.
 - 2. Ambient Temperature:
 - a. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.
- C. Short Circuit Current Rating:
 - 1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as determined by short circuit study performed in accordance with Section 26 0573.

- D. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.
- E. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.
- F. Bussing: Sized in accordance with UL 67 temperature rise requirements.
 - 1. Provide fully rated neutral bus unless otherwise indicated, with a suitable lug for each feeder or branch circuit requiring a neutral connection.
 - 2. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
- G. Conductor Terminations: Suitable for use with the conductors to be installed.
- H. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
 - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1.
 - b. Outdoor Locations: Type 3R.
 - 2. Boxes: Galvanized steel unless otherwise indicated.
 - a. Provide wiring gutters sized to accommodate the conductors to be installed.
 - b. Increase gutter space as required where sub-feed lugs, feed-through lugs, gutter taps, or oversized lugs are provided.
 - 3. Fronts:
 - a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
 - b. Fronts for Flush-Mounted Enclosures: Overlap boxes on all sides to conceal rough opening.
 - 4. Lockable Doors: All locks keyed alike unless otherwise indicated.
- I. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.
- J. Multi-Section Panelboards: Provide enclosures of the same height, with feed-through lugs or sub-feed lugs and feeders as indicated or as required to interconnect sections.

2.03 POWER DISTRIBUTION PANELBOARDS

- A. Description: Panelboards complying with NEMA PB 1, power and feeder distribution type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.
- B. Conductor Terminations:
 - 1. Main and Neutral Lug Material: Copper, suitable for terminating copper conductors only.
 - 2. Main and Neutral Lug Type: Mechanical.
- C. Bussing:
 - 1. Phase and Neutral Bus Material: Copper.
 - 2. Ground Bus Material: Copper.
- D. Circuit Breakers:
 - 1. Provide bolt-on or plug-in type.
 - 2. Provide thermal magnetic circuit breakers.
 - 3. Provide electronic trip circuit breakers.
- E. Enclosures:
 - 1. Provide surface-mounted or flush-mounted enclosures.
 - 2. Fronts: Provide door-in-door trim with hinged cover for access to load terminals and wiring gutters, and separate lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
 - 3. Provide clear plastic circuit directory holder mounted on inside of door.

2.04 LIGHTING AND APPLIANCE PANELBOARDS

- A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.

- B. Conductor Terminations:
 - 1. Main and Neutral Lug Material: Copper, suitable for terminating copper conductors only.
 - 2. Main and Neutral Lug Type: Mechanical.
- C. Bussing:
 - 1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
 - 2. Phase and Neutral Bus Material: Copper.
 - 3. Ground Bus Material: Copper.
- D. Circuit Breakers: Thermal magnetic bolt-on or plug-in type.
- E. Enclosures:
 - 1. Provide surface-mounted or flush-mounted enclosures.
 - 2. Fronts: Provide door-in-door trim with hinged cover for access to load terminals and wiring gutters, and separate lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
 - 3. Provide clear plastic circuit directory holder mounted on inside of door.

2.05 OVERCURRENT PROTECTIVE DEVICES

- A. Molded Case Circuit Breakers:
 - 1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
 - 2. Interrupting Capacity:
 - a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating as required by the Overcurrent Protection Device Coordination Study
 - b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
 - 3. Conductor Terminations:
 - a. Lug Material: Copper, suitable for terminating copper conductors only.
 - 4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
 - 5. Electronic Trip Circuit Breakers: Furnish solid state, microprocessor-based, true rms sensing trip units.
 - a. Provide the following field-adjustable trip response settings:
 - 6. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.
 - 7. Provide the following features and accessories where indicated or where required to complete installation:
 - a. Handle Pad-Lock Provision: For locking circuit breaker handle in OFF position.

2.06 SOURCE QUALITY CONTROL

- A. Factory test panelboards according to NEMA PB 1.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as shown on the drawings.
- B. Verify that the ratings and configurations of the panelboards and associated components are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive panelboards.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.

- B. Install panelboards securely, in a neat and workmanlike manner in accordance with NECA 1 (general workmanship), NECA 407 (panelboards), and NEMA PB 1.1.
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide required supports in accordance with Section 26 0529.
- E. Install panelboards plumb.
- F. Install flush-mounted panelboards so that trims fit completely flush to wall with no gaps and rough opening completely covered.
- G. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches above the floor or working platform.
- H. Provide minimum of six spare 1 inch trade size conduits out of each flush-mounted panelboard stubbed into accessible space above ceiling and below floor.
- I. Provide grounding and bonding in accordance with Section 26 0526.
- J. Install all field-installed branch devices, components, and accessories.
- K. Set field-adjustable circuit breaker tripping function settings as determined by overcurrent protective device coordination study performed according to Section 26 0573.
- L. Provide filler plates to cover unused spaces in panelboards.
- M. Identify panelboards in accordance with Section 26 0553.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Molded Case Circuit Breakers: Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for all main circuit breakers. Tests listed as optional are not required.
- D. Procure services of a qualified manufacturer's representative to observe installation and assist in inspection, testing, and adjusting. Include manufacturer's reports with field quality control submittals.
- E. Correct deficiencies and replace damaged or defective panelboards or associated components.

3.04 ADJUSTING

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.
- B. Adjust alignment of panelboard fronts.
- C. Load Balancing: For each panelboard, rearrange circuits such that the difference between each measured steady state phase load does not exceed 20 percent and adjust circuit directories accordingly. Maintain proper phasing for multi-wire branch circuits.

3.05 CLEANING

- A. Clean dirt and debris from panelboard enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical connections to equipment.

1.02 RELATED REQUIREMENTS

- A. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables.
- B. Section 26 0534 - Conduit.
- C. Section 26 0537 - Boxes.

1.03 REFERENCE STANDARDS

- A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
 - 2. Determine connection locations and requirements.
- B. Sequencing:
 - 1. Install rough-in of electrical connections before installation of equipment is required.
 - 2. Make electrical connections before required start-up of equipment.

1.05 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Products: Listed, classified, and labeled as suitable for the purpose intended.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Flexible Conduit: As specified in Section 26 0534.
- B. Wire and Cable: As specified in Section 26 0519.
- C. Boxes: As specified in Section 26 0537.

2.02 EQUIPMENT CONNECTIONS

- A. HVAC Equipment:
 - 1. Electrical Connection: Flexible conduit.

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

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section includes AC Motor Variable Frequency Drives rated 600 V and less.

1.03 REFERENCES

- A. ANSI/UL Standard 508.
- B. ANSI/NEMA ICS 6 - Enclosures for Industrial Controls and Systems.
- C. IEEE Standard 519-1981 - Guide for Harmonic Control and Reactive Compensation of Static Power Converters.
- D. FCC Rules and Regulations, Part 15, Subpart J - Radio Frequency Interference.

1.04 DEFINITIONS

- A. BAS: Building automation system.
- B. CPT: Control power transformer.
- C. EMI: Electromagnetic interference.
- D. IGBT: Insulated-gate bipolar transistor.
- E. LAN: Local area network.
- F. LED: Light-emitting diode.
- G. MCP: Motor-circuit protector.
- H. NC: Normally closed.
- I. NO: Normally open.
- J. OCPD: Overcurrent protective device.
- K. PCC: Point of common coupling.
- L. PID: Control action, proportional plus integral plus derivative.
- M. PWM: Pulse-width modulated.
- N. RFI: Radio-frequency interference.
- O. TDD: Total demand (harmonic current) distortion.
- P. THD(V): Total harmonic voltage demand.
- Q. VFD: Variable-frequency drive

1.05 SUBMITTALS

- A. Product Data: Provide catalog sheets showing voltage, Drive size, ratings, and size of switching and overcurrent protective devices, short circuit ratings, dimensions and enclosure details.
 - 1. Shop Drawings: Include front and side views of enclosure with overall dimensions and weights shown; conduit entrance locations and requirements; and nameplate legends.
 - 2. Show tabulations of installed devices, equipment features, and ratings. Include the following:
 - a. Each installed unit's type and details.
 - b. Factory-installed devices.
 - c. Enclosure types and details.
 - d. Nameplate legends.
 - e. Short circuit current (withstand) rating of enclosed unit.
 - f. Features, characteristics, ratings and factory settings of each VFC and installed devices.
 - 3. Schematic and Connection Wiring Diagrams: For power, signal and control wiring.

- B. Manufacturer's installation instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, installation and starting of Product.

1.06 OPERATION AND MAINTENANCE DATA

- A. Operation and Maintenance Data: For VFDs to include in emergency, operation and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data" include the following:
 - 1. Manufacturer's written instructions for testing and adjusting thermal-magnetic circuit breaker and MCP trip settings.
 - 2. Manufacturer's written instructions for setting field-adjustable overload relays.
 - 3. Manufacturer's written instructions for testing, adjusting, and reprogramming microprocessor control modules.
 - 4. Manufacturer's written instructions for setting field-adjustable timers, controls, and status and alarm points.
- B. Load-Current and Overload-Relay Heater List: Compile after motors have been installed, and arrange to demonstrate that selection of heaters suits actual motor nameplate, full-load currents.
- C. Shop Drawings for each VFD.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Provide VFD's from manufacturers regularly engaged in the manufacture of equipment of the types and capacities indicated, with such products in satisfactory use in similar service for not less than 5 years. Manufacturer shall maintain, within 100 miles of the project site, a service center capable of providing training, parts and emergency maintenance and repairs.
- B. Single-source Responsibility: Obtain VFD's from a single manufacturer.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site in accordance with Conditions of Contract, Division 01 and Division 26 Specifications.
- B. Accept drives on-site in original packing. Inspect for damage.
- C. Store in a clean and dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect each drive from dirt, water, construction debris and traffic.
- D. Handle in accordance with manufacturer's written instructions. Lift only with lugs approved for the purpose. Handle carefully to avoid damage.

1.09 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Power Fuses: Equal to three (3) of each size and type.
 - 2. Control Power Fuses: Equal to two (2) of each size and type.
 - 3. Air filter: Equal to two (2) of each size.

1.10 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace VFDs that fail in materials or workmanship within specified warranty period. Warranty Period: Five (5) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURED UNITS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Basis of Design: Toshiba International Corporation, Model Q9 or FS1.

2. Danfoss
 3. Eaton
- B. General Requirements for VFDs: Comply with NEMA ICS 7, NEMA ICS 61800-2 and UL 508C.
- C. Application: Variable torque.
- D. VFD Description: Variable-Frequency Drive (rectifier, D.C. bus and IGBT, PWM inverter) factory-packaged in an enclosure; listed and labeled by an NRTL as a complete unit; arranged to provide self-protection, protection and variable-speed control of one or more three-phase induction motors by adjusting output voltage and frequency. No neutral conductor shall be used to supply the VFD.
1. Units suitable for standard NEMA Design B squirrel cage 1.15 service factor induction motors without requiring any modifications to the motor or the drive.
 2. Listed and labeled for integrated short-circuit current (withstand) rating by an NRTL acceptable to Authorities Having Jurisdiction.
- E. Features
1. Display: Provide integral digital display to indicate all protection faults and drive status (including overcurrent, overvoltage, undervoltage, ground fault, over-temperature, phase loss, input power ON, output voltage, output frequency and output current.
 2. Protection:
 - a. Input transient protection by means of surge suppressors.
 - b. Snubber networks to protect against malfunctions due to system transients,
 - c. Under- and over-voltage trips; inverter over-temperature, overload and overcurrent trips.
 - d. Motor thermal overload relay(s) adjustable and capable of NEMA 250 and sized per motor nameplate data.
 - e. Notch filter to prevent operation of the controller-motor-load combination at a natural frequency of the combination.
 - f. Instantaneous line-to-line and line-to-ground overcurrent trips on input and output.
 - g. Loss-of-phase protection.
 - h. Reverse-phase protection.
 - i. Short-circuit protection (fuses or circuit breaker).
 - j. Motor over-temperature fault.
 3. Acceleration Rate Adjustment: 0.5 to 30 seconds.
 4. Deceleration Rate Adjustment: 1 to 30 seconds.
 5. Minimum Adjustment Range for the Lower Output Frequency shall be: 0 to 40 Hertz.
 6. Minimum Adjustment Range for the Upper Output Frequency Range shall be: 40 to 90 Hertz.
 7. Minimum Volts/Hertz Range: 3.7 to 8.6 volts/Hertz.
 8. Provide MANUAL-OFF-AUTOMATIC selector switch and manual analog speed control mounted on the front of the enclosure.
 9. Safety Interlocks: Provide terminals for remote contact to inhibit starting under both manual and automatic mode.
 10. Control Interlocks: Provide terminals for remote contact to allow starting in automatic mode.
 11. Provide adjustable skip frequencies on the drive output (minimum of three ranges).
 12. Automatic Reset/Restart: Attempt three restarts after controller fault or on return of power after an interruption, and before shutting down for manual reset or fault correction. Bi-directional autospeed search shall be capable of starting into rotating loads spinning in either direction and returning motor to set speed in proper direction, without damage to controller, motor or load.
 13. Power-Interruption Protection: After a power interruption, it prevents the motor from reenergizing until the motor has stopped.
 14. Torque Boost: Automatically varies starting and continuous torque to at least 1.5 times the minimum torque to ensure high-starting torque and increased torque at slow speeds.

15. Motor Temperature Compensation at Slow Speeds: Adjustable current fall-back based on output frequency for temperature protection of self-cooled, fan-ventilated motors at slow speeds.
16. Status Lights: Door-mounted LED indicators shall indicate the following conditions:
 - a. Power on.
 - b. Run.
 - c. Overvoltage.
 - d. Line fault.
 - e. Overcurrent.
 - f. External fault.
17. Panel-Mounted Operator Station: Start-stop and auto-manual selector switches with manual speed control potentiometer and elapsed time meter.
18. Indicating Devices: Meters or digital readout devices and selector switch, mounted flush in controller door and connected to indicate the following controller parameters:
 - a. Output frequency (Hz).
 - b. Motor speed (rpm).
 - c. Motor status (running, stop, fault).
 - d. Motor current (amperes).
 - e. Motor torque (percent).
 - f. Fault or alarming status (code).
 - g. PID feedback signal (percent).
 - h. DC-link voltage (VDC).
 - i. Set-point frequency (Hz).
 - j. Motor output voltage (V).
19. Control Signal Interface:
 - a. ELECTRIC INPUT SIGNAL INTERFACE: A MINIMUM OF TWO (2) ANALOG INPUTS (0 TO 10 V OR 0/4-20 MA) AND 6 PROGRAMMABLE DIGITAL INPUTS.
 - b. Remote Signal Inputs: Capability to accept any of the following speed-setting input signals from the BMS or other control systems:
 - 1) 0 to 10-V dc.
 - 2) 0-20 or 4-20 mA.
 - 3) Potentiometer using up/down digital inputs.
 - 4) Fixed frequencies using digital inputs.
 - 5) RS485.
 - 6) Keypad display for local hand operation.
 - c. Output Signal Interface:
 - 1) A minimum of one (1) analog output signal (0/4-20 mA), which can be programmed to any of the following:
 - (a) Output frequency (Hz).
 - (b) Output current (load).
 - (c) DC-link voltage (VDC).
 - (d) Motor torque (percent).
 - (e) Motor speed (rpm).
 - (f) Set-point frequency (Hz).
 - d. Remote Indication Interface: A minimum of two (2) dry circuit relay outputs (120-V a.c., 1A) for remote indication of the following:
 - 1) Motor running.
 - 2) Set-point speed reached.
 - 3) Fault and warning indication (over-temperature or overcurrent).
 - 4) PID high- or low-speed limits reached.
20. Communications: Provide a communications card to interface VFD with Building Automation System (BAS). Coordinate interface requirements with the BAS. Interface shall allow all parameter settings of VFD to be programmed via BAS control and displayed on

BAS operator workstation. Provide capability for VFD to retain these settings within the nonvolatile memory.

21. Bypass is not required unless otherwise noted on the drawings.
 22. Two-Contactor Manual Bypass:
 - a. Provide contactors, motor running overload protection, under-voltage and loss of phase protection, and short circuit protection for full voltage, non-reversing operation of the motor. Include isolation switch to allow maintenance of inverter during bypass operation.
 - b. All bypass circuitry shall be located within the same enclosure as the variable frequency drive.
 - c. All fire alarm and/or smoke control interconnections (e.g., air-handling unit shutdown) shall apply regardless of whether control is through VFD or bypass.
 - d. Provide a Drive-Bypass Selector Switch.
 - e. Provide nameplate with instructions for switching from drive-to-bypass and from bypass-to-drive.
 23. Control:
 - a. With the "Manual-Off-Auto" switch in the "Manual" position and, if applicable, the "Drive-Bypass" in the "Drive" position, the drive shall be controlled by the manual speed potentiometer on the drive door.
 - b. With the "Manual-Off-Auto" switch in the "Auto" position and, if applicable, the "Drive-Bypass" in the "Drive" position, the drive shall be controlled by the input signal from an external source.
 - c. If applicable, with the "Drive-Bypass" in the "Bypass" position, regardless the position of the "Manual-Off-Auto" switch, the motor shall be connected across the lines and shall be run at full speed.
 - d. With the "Manual-Off-Auto" switch in the "Off" position, if applicable, the drive run circuit shall be open and the VFD shall not operate.
 - e. If applicable, signal from the fire alarm control panel shall shut down VFD and bypass.
 - f. All disconnect switches between VFD and motor(s) shall include an auxiliary contact interlock wired to the VFD fault trip input to shut down the drive upon opening of the disconnect main contacts.
 24. Auxiliary Contacts: NO/NC, arranged to activate before switch blades open.
- F. Historical Logging Information and Displays:
1. Real-time clock with current time and date.
 2. Running log of total power versus time.
 3. Total run time.
 4. Fault log, maintaining last four faults with time and date stamp for each.
- G. PID Control Interface: Provides closed-loop set point, differential feedback control in response to dual feedback signals. Allows for closed-loop control of fans and pumps for pressure, flow, or temperature regulation.
1. Number of Loops: One.

2.02 LINE CONDITIONING AND FILTERING

- A. Input Line Conditioning: Provide input filtering, as required, to limit TDD and THD(V) at the defined PCC per IEEE 519.

2.03 OPTIONAL FEATURES

- A. Multiple-Motor Capability: VFD suitable for variable-speed service to multiple motors. Overload protection shuts down VFD and motors served by it, and generates fault indications, when overload protection activates.
1. Configure to allow two or more motors to operate simultaneously at the same speed; separate overload relay for each controlled motor.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas, surfaces, and substrates to receive VFDs, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine VFD before installation. Reject VFDs that are wet, moisture damaged or mold damaged.
- C. Examine roughing-in for conduit systems to verify actual locations of conduit connections before VFD installation.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Coordinate layout and installation of VFDs with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Wall-Mounting: Install VFDs on walls with tops at uniform height and with disconnect operating handles not higher than 79 inches above finished floor unless otherwise indicated, and by bolting units to wall or mounting on lightweight structural-steel channels bolted to wall. For controllers not on walls, provide freestanding racks complying with Division 26 Section "Hangers and Supports."
- C. Install fuses in control circuits if not factory installed. Comply with requirements in Division 26 Section "Fuses."
- D. Install heaters in thermal-overload relays. Select heaters based on actual nameplate full-load amperes after motors have been installed.
- E. Install, connect, and fuse thermal-protector monitoring relays furnished with motor-driven equipment.
- F. Comply with NECA 1.

3.03 IDENTIFICATION

- A. Identify VFDs, components, and control wiring. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."
 - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 - 2. Label each VFD with engraved nameplate.
 - 3. Label each enclosure-mounted control and pilot device.

3.04 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to be present at start up and inspect, test, and adjust components, assemblies, and equipment installations, including connections.

3.05 ADJUSTING

- A. Program microprocessors for required operational sequences, status indications, alarms, event recording, and display features. Clear events memory after final acceptance testing and prior to Substantial Completion.
- B. Set field-adjustable switches, auxiliary relays, time-delay relays, timers, and overload-relay pickup and trip ranges.

- C. Adjust the trip settings of MCPs and thermal-magnetic circuit breakers with adjustable, instantaneous trip elements. Initially adjust to six times the motor nameplate full-load amperes and attempt to start motors several times, allowing for motor cool-down between starts. If tripping occurs on motor inrush, adjust settings in increments until motors start without tripping. Do not exceed eight times the motor full-load amperes (or 11 times for NEMA Premium Efficient motors if required). Where these maximum settings do not allow starting of a motor, notify Engineer before increasing settings.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fire alarm system design and installation, including all components, wiring, and conduit.
- B. Replacement and removal of existing fire alarm system components, wiring, and conduit indicated.
 - 1. As required for modifications to HVAC systems.
- C. New devices and or modifications required due to renovations and additions.

1.02 RELATED REQUIREMENTS

- A. Section 23 3300 - Air Duct Accessories: Smoke dampers monitored and controlled by fire alarm system.

1.03 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 - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- C. IEEE C62.41.2 - Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits; 2002 (Cor 1, 2012).
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. NFPA 72 - National Fire Alarm and Signaling Code; 2016.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Evidence of designer qualifications.
- C. Design Documents: Submit all information required for plan review and permitting by authorities having jurisdiction, including but not limited to floor plans, riser diagrams, and description of operation:
 - 1. Copy (if any) of list of data required by authority having jurisdiction.
 - 2. NFPA 72 "Record of Completion", filled out to the extent known at the time.
 - 3. Clear and concise description of operation, with input/output matrix similar to that shown in NFPA 72 Appendix A-7-5-2.2(9), and complete listing of software required.
 - 4. System zone boundaries and interfaces to fire safety systems.
 - 5. Location of all components, circuits, and raceways; mark components with identifiers used in control unit programming.
 - 6. Circuit layouts; number, size, and type of raceways and conductors; conduit fill calculations; spare capacity calculations; notification appliance circuit voltage drop calculations.
 - 7. List of all devices on each signaling line circuit, with spare capacity indicated.
 - 8. Manufacturer's detailed data sheet for each component, including wiring diagrams, installation instructions, and circuit length limitations.
 - 9. Description of power supplies; if secondary power is by battery include calculations demonstrating adequate battery power.
 - 10. Certification by either the manufacturer of the control unit or by the manufacturer of each other component that the components are compatible with the control unit.
 - 11. Certification by the manufacturer of the control unit that the system design complies with the contract documents.
 - 12. Certification by Contractor that the system design complies with the contract documents.
 - 13. Do not show existing components to be removed.
- D. Evidence of installer qualifications.
- E. Inspection and Test Reports:
 - 1. Submit inspection and test plan prior to closeout demonstration.

2. Submit documentation of satisfactory inspections and tests.
 3. Submit NFPA 72 "Inspection and Test Form," filled out.
- F. Operating and Maintenance Data: Revise and resubmit until acceptable; have one set available during closeout demonstration:
1. Complete set of specified design documents, as approved by authority having jurisdiction.
 2. Additional printed set of project record documents and closeout documents, bound or filed in same manuals.
 3. Contact information for firm that will be providing contract maintenance and trouble call-back service.
 4. List of recommended spare parts, tools, and instruments for testing.
 5. Replacement parts list with current prices, and source of supply.
 6. Detailed troubleshooting guide and large scale input/output matrix.
 7. Preventive maintenance, inspection, and testing schedule complying with NFPA 72; provide printed copy and computer format acceptable to Owner.
 8. Detailed but easy to read explanation of procedures to be taken by non-technical administrative personnel in the event of system trouble, when routine testing is being conducted, for fire drills, and when entering into contracts for remodeling.
- G. Project Record Documents: Have one set available during closeout demonstration:
1. Complete set of floor plans showing actual installed locations of components, conduit, and zones.
 2. "As installed" wiring and schematic diagrams, with final terminal identifications.
 3. "As programmed" operating sequences, including control events by device, updated input/output chart, and voice messages by event.
- H. Closeout Documents:
1. Certification by manufacturer that the system has been installed in compliance with his installation requirements, is complete, and is in satisfactory operating condition.
 2. NFPA 72 "Record of Completion", filled out completely and signed by installer and authorized representative of authority having jurisdiction.

1.05 QUALITY ASSURANCE

- A. Designer Qualifications: NICET Level III or IV (3 or 4) certified fire alarm technician or registered fire protection engineer, employed by fire alarm control panel manufacturer, Contractor, or installer, with experience designing fire alarm systems in the jurisdictional area of the authorities having jurisdiction.
- B. Installer Qualifications: Firm with minimum 3 years documented experience installing fire alarm systems of the specified type and providing contract maintenance service as a regular part of their business.
1. Authorized representative of control unit manufacturer; submit manufacturer's certification that installer is authorized; include name and title of manufacturer's representative making certification.
 2. Installer Personnel: At least 2 years of experience installing fire alarm systems.
 3. Supervisor: NICET level III or IV (3 or 4) certified fire alarm technician; furnish name and address.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Fire Alarm Control Units - Connect new fire alarm devices indicated on plans to existing Simplex 4010 fire alarm system.

2.02 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. 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.
 - 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.
- B. 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.
- C. 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).

2.03 EXISTING COMPONENTS

- A. Existing Fire Alarm System: Remove existing components indicated and incorporate remaining components into new system, under warranty as if they were new; do not take existing portions of system out of service until new portions are fully operational, tested, and connected to existing system.
- B. Clearly label components that are "Not In Service."
- C. Remove unused existing components and materials from site and dispose of properly.

2.04 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.

2.05 COMPONENTS

- A. General:
 1. Provide legible, permanent labels for each control device, using identification used in operation and maintenance data.
- B. Fire Alarm Control Units, Initiating Devices, and Notification Appliances: Conventional or addressable type; listed, classified, and labeled as suitable for the purpose intended.
- C. Initiating Devices:
 1. Manual Pull Stations
 2. Smoke Detectors
 3. Duct Smoke Detectors
 4. Heat Detectors
- D. Notification Appliances:
 1. Horn/Strobes
 2. Strobes
- E. Circuit Conductors: Copper or optical fiber; provide 200 feet extra; color code and label.
- F. Surge Protection: In accordance with IEEE C62.41.2 category B combination waveform and NFPA 70; except for optical fiber conductors.
- G. Locks and Keys: Deliver keys to Owner.

1. Provide the same standard lock and key for each key operated switch and lockable panel and cabinet; provide 5 keys of each type
- H. Instruction Charts: Printed instruction chart for operators, showing steps to be taken when a signal is received (normal, alarm, supervisory, and trouble); easily readable from normal operator's station.
 1. Frame: Stainless steel or aluminum with polycarbonate or glass cover.
 2. Provide one for each control unit where operations are to be performed.
 3. Obtain approval of Owner prior to mounting; mount in location acceptable to Owner.
 4. Provide extra copy with operation and maintenance data submittal.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with applicable codes, NFPA 72, NFPA 70, and the contract documents.
- B. Conceal all wiring, conduit, boxes, and supports where installed in finished areas.
- C. Obtain Owner's approval of locations of devices, before installation.
- D. Install instruction cards and labels.

3.02 INSPECTION AND TESTING FOR COMPLETION

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

3.03 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.

END OF SECTION