

Farm Credit of Western Arkansas Ozark Office Ozark, Arkansas

Project No. 2529



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GENERAL CONDITIONS
SPECIFICATIONS
FOR FURNISHING LABOR AND
MATERIALS FOR:
CONSTRUCTION OF
**FARM CREDIT OF WESTERN ARKANSAS
OZARK OFFICE
OZARK, ARKANSAS**

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PROJECT #2529

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PROJECT MANUAL FOR CONSTRUCTION OF

FARM CREDIT OF WESTERN ARKANSAS

OZARK OFFICE

OZARK, ARKANSAS

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GENERAL CONDITIONS OF THE CONTRACT

PART 1 GENERAL

1.1 SCOPE OF WORK

- A. The work included under these Specifications consists of furnishing all items, materials, operations, or methods listed, mentioned, indicated, or scheduled on the drawings and/or in these Specifications, including all labor, materials, equipment, transportation, temporary facilities, services and incidental necessary and required for the construction and completion of the project named in the title page in accordance with contract documents.

1.2 FORM OF SPECIFICATIONS

- A. General Conditions and Division 1 (General Requirements) apply to every Division (1 through 33 of these Specifications.
- B. These Specifications are of abbreviated form and contain incomplete sentences. Omissions of words or phrases such as “the Contractor shall” “shall be”, “as noted on the drawings”, “according to the drawings”, “a”, “an”, “the”, and “all” are intentional. Omitted words and phrases shall be supplied by inference in the same manner as they are when a “note” occurs on the drawings.
- C. All specification instructions are directed to the Contractor and the inclusion of any work by mention, note, or itemization, however brief, implies the Contractor shall provide same, unless specifically directed otherwise. Where a specific Contractor is named, he shall be responsible for and provide work so designated.
- D. In specifying an item by manufacturer’s name and/or catalog number, such item is to be provided complete with all the standard devices and accessories as indicated in the latest edition of the manufacturer’s catalog or brochure published at date of invitation to submit proposal, unless specifically stated otherwise.

1.3 AIA GENERAL CONDITIONS

- A. AIA Document A201-2017:
“GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION”, 2017 EDITION, 15 Articles, hereinafter referred to as the “AIA General Conditions”, is hereby made a part of this specification, a copy of which is herein attached. Contractor shall consult this document and become intimately familiar with its contents before submitting his proposal.

END OF SECTION

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SECTION 00 73 00

SUPPLEMENTARY GENERAL CONDITIONS

PART 1 SUPPLEMENTARY GENERAL CONDITIONS

1.1 GENERAL

- A. Where any Articles of the AIA General Conditions Document A201-2017 are supplemented hereby, the provision of such Articles remains in effect with supplemental provisions added thereto. Where any Article is amended, voided or superseded hereby, the provisions of such article that are not so amended voided or superseded remain in effect.
- B. Where provisions of the General Conditions relate in general to the work of the Contractor and Subcontractor, these paragraphs are modified in Division 1, GENERAL REQUIREMENTS of the specifications.
- C. Should conflict occur between these Special Provisions and the General Conditions, the requirements of the Special Provisions shall take precedence.

PART 2 AMENDMENTS TO THE GENERAL CONDITIONS

ARTICLE 1 GENERAL PROVISION

Add the following paragraphs:

- 1.1.7.1 Construction Manager shall be responsible for working drawings and specifications distribution to subcontractors and material suppliers. Refer to Construction Manager's Manual for drawings and specifications distribution.
- 1.1.7.2 Each Contractor shall pay the actual cost of reproduction for all additional sets requested by him.
- 1.1.7.3 Accompanying these Specifications are Drawings, which jointly with these Specifications are intended to explain each other and describe and coordinate the work to be performed under Contract.

Add the following paragraphs:

- 1.2.2.1. The Specifications are divided and the Drawings are numbered, each under headings set forth in the Specifications Index and in the Enumeration of Drawings below, such headings indicating the division of responsibility between contracts. The General Contract includes all work indicated under the headings CIVIL, ARCHITECTURAL, STRUCTURAL, MECHANICAL, ELECTRICAL, AND PLUMBING. However, the divisions created by the above headings shall not alleviate any contractor or subcontractor from work to be performed by him that is specifically indicated by the

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Drawings or in the division of Specifications of other contracts, for each contractor shall fully familiarize himself with all of the drawings and specifications for this project before submitting his proposal.

- 1.2.4. Should a discrepancy be found among the contract documents, request interpretation from the Architect, before proceeding with the work. Should an error, inconsistency or omission later be found in the drawings or specifications, or between drawings and specifications, or between drawing divisions, Contractor is deemed to have estimated on the more expensive way of doing work unless he shall have asked for and obtained a written decision before submission of proposal as to which method of materials will be required. Contractor shall notify Architect if any of these situations occur, and gain approval before proceeding. Reference used in these specifications to the Architect shall mean Hight-Jackson Associates PA.
- 1.2.5. Before submitting his proposal, each bidder shall check his set(s) of Specifications and Drawings and advise the Architect if any sheets are missing.
- 1.2.6. Do not scale drawings for dimensions. Accurately lay out such work from dimensions indicated on architectural drawings unless such is found in error. Consult Architect for any interpretations concerning locations of equipment.
- 1.2.7. If there is a discrepancy between drawings and specifications, consult Architect for clarification. Otherwise the more stringent requirement shall take precedent.
- 1.2.8. Consult Drawings for miscellaneous items of each trade and provide same as indicated.

Add the following paragraphs:

- 1.4.1 When a word, such as “approved”, “proper”, “satisfactory”, “alternate”, and “as directed” is used, it implies such reference is to the architect’s specific approval and directions.
- 1.4.2 “Provide” means furnish and install.

Edit the following paragraph:

- 1.7 Digital Data Use Transmission, revise AIA Document E203-2013 to C106-2013

Add the following paragraph:

- 1.7.1 Electronic Drawing Files: After project is awarded, electronic “read-only” drawing files will be available to the General Contractor, Sub-contractors, and / or vendors to prepare shop drawings, etc., for a cost of \$100.00 total for the first Ten (10) sheets and \$10.00 each for any additional sheets. An electronic drawing file release form will be submitted for signature and pre-payment of all costs will be required before any drawing files are released. Checks are to be made payable to Hight-Jackson Associates PA. Please contact Jorge Andrade at (479) 464-4965 for all requests.

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Delete the following paragraph:

1.8 Building Information Models Use and Reliance to be deleted in its entirety.

ARTICLE 2 OWNER

Add the following sentence:

2.3.2 Paragraph 2.3.2 is modified with the following addition: Where the word “Architect” appears in each Division of the Specifications, it refers to the Architect or to the Owner as applicable

ARTICLE 3 CONTRACTOR

Add the follow subparagraphs:

3.3.4 Contractor notify his Subcontractors, Owner, and all Contractors and Subcontractors under the Owner when he is ready for them to install their portions of the work and see that they comply with any reasonable period of time. Neither enclose nor cover any piping, wiring ducts, equipment or other items until proper tests and inspection have been made by Architect and/or proper authorities.

3.3.5 Notify Architect to inspect any work when placing of subsequent work would prevent observation of previous work.

3.3.6 Contractor shall take charge of and assume general responsibility for proper protection of building during construction. He shall further provide substantial enclosures at all openings as necessary for protection, including doors with locks.

3.3.7 Each Contractor assumes responsibility for his materials stored on the premises.

3.4.1 ORDERS FOR MATERIALS. Paragraph 3.4.1.is modified with the following additions:

3.4.1.1 Place material orders immediately following materials submittal approval. Furnish evidence of orders to Architect upon request.

3.4.1.2 Place orders contingent upon selection of colors and finishes, approval of shop drawings and samples by Architect.

3.4.1.3 Include with monthly request for payment and progress schedule a report of materials purchased and date materials are scheduled for delivery.

Add the following paragraphs:

- 3.4.2 Paragraph is modified with the addition: Proposals for substitutions of material, equipment, or methods shall be submitted no later than thirty days from date of written Notice to Proceed, authorizing performance of the Contract. Include a list of all materials, which he proposes to substitute for materials specified. Proposals for substitution shall be accompanied by such technical data, as the Architect may need in order to compare the proposed material with the material that was specified. No substitutions shall be made until written permission is given by the Architect at the direction of the Owner.
- 3.4.4 Where a material is mentioned in the Specifications by trade name or manufacturer's name, the same is not preference for said material, but the intention of using said name is to establish a type of quality of material. Material of other trade names or of other manufacturers which is in the opinion of the architect, equivalent or better in type or quality will be accepted by the Architect on behalf of the Owner only as provided in Section 01 60 00.
- 3.4.5 Before submitting proposal, Contractor, his Subcontractors and Material Suppliers observe Drawings and Specifications, and should any material and/or its installation be indicated or specified in a manner not approved by the Material Manufacturer, or specified item has been discontinued, notify Architect and receive his instructions. The Contractor shall provide other equivalent materials suitable for the installation as selected by Architect, or if not discovered until after installation. Contractor shall replace materials with such other equivalent suitable and selected materials, and in either event, at no added cost to Owner.

Add the following paragraphs:

- 3.5.1.1 Warranty all work to be free from defects in materials and workmanship for a period of one year from the date of Substantial Completion, except where a different time period is specifically prescribed. Contractor will promptly correct such defects to the state of condition originally required by the contract documents at contractor's expense.
- 3.5.1.2 Warranty period for all equipment and material shall not begin until the date of Substantial Completion. Contractor will promptly correct such defects to the state of condition originally required by the contract documents at contractor's expense during the warranty period.
- 3.5.2.1 When, at any time during the warranty period, work is considered defective by either Owner or Architect, immediately:
 - A. Place such defective work into satisfactory condition, free from faults and defects and in conformance with contract requirements.

- B. Make good all damage to work, including contents thereof and grounds, developing within warranty period when such damage is due to use of materials and labor not conforming to contract requirements.
 - C. Make good all work disturbed in fulfillment of contract obligations during warranty period. If work of other contractors is disturbed in the process of fulfilling contract, restore such work to its original condition and warranty such restored work.
- 3.5.3 Upon failure by contractor to proceed promptly to comply with terms of any warranty under the contract, Owner shall have such work performed as necessary to fulfill warranties, and contractor shall pay Owner such sums as expended to fulfill such warranty.
- 3.5.4 Work required for fulfillment of warranties embraced under the contract shall be performed at no additional expense to Owner.
- 3.5.5 Unless other specifically prescribed in warranty, normal wear and tear and results of accidents not chargeable to contractor are excluded from the requirements of this Article.
- 3.5.6 Prior to expiration of the one-year warranty period, the Architect will conduct an inspection of the project and create a punch list for items found to be deficient. Contractor will be required to be present. The Architect will set a date by which the deficient items are to be corrected. Contractor will return punch list to Architect, initialing completed each completed item. Note that contractor will remain responsible for repair and or replacement of items with warranties extending beyond one year as called for in individual specification sections or on drawings.

Add the following paragraph:

- 3.6.1 Materials and equipment incorporated into this project will be required to follow the Guidelines of Arkansas Sales Tax and such taxes shall be included in bidder's proposals. Contractors shall include Social Security Taxes, State Unemployment compensation Insurance and all other items of like nature.

Add the following paragraphs:

- 3.9.1.1 The superintendent shall be employed as full time and be in attendance at the project site during performance of the work. Superintendent shall have a minimum of 10 years of construction experience. Five (5) years of that experience shall have been in the capacity of a project superintendent on similar type projects. If the superintendent is unknown to the Architect, a resume shall be submitted for review and approval to qualify in this capacity. The Owner retains the right to accept or reject proposed superintendent prior to signing of contract.

3.9.4 The superintendent assigned to the project at the beginning of construction will remain as superintendent for the entire duration of construction period. The superintendent shall provide duties per general conditions and remain on site for the entire duration of the project, including completion of all punch list items. The only circumstances that would permit replacement of the superintendent are prolonged illness, resignation of the superintendent from the company, or death. If one of the preceding circumstances should occur, the Contractor shall state in writing to the Owner the reason for replacement, send qualification statement of the proposed project superintendent, and obtain approval from the Owner and Architect. The replacement superintendent shall possess the minimum requirements set forth in paragraph 3.9.2.

3.15.1.2 The Contractor shall replace broken or scratched glass, clean fixtures, remove dust, dirt, spots, marks, labels, stains, foreign paint and other blemishes from all finish work, unless more exactly specified, clean all floors and floor coverings, clean and polish hardware.

ARTICLE 4. ARCHITECT

4.1.1 Paragraph 4.1.1 is modified with the following addition: Where the word "Architect" appears in each Division of the Specifications, it refers to the Architect or to the Owner as applicable.

ARTICLE 5. SUBCONTRACTORS

Paragraph 5.2.2 of the General Conditions Add the following:

5.2.2.1.1 Submit list of proposed subcontractors to Architect prior to, or at time of pre-construction conference. Subcontractors listed shall not be released from their contract or replaced without notification and approval of Owner.

ARTICLE 6. CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

Add the following paragraph:

6.2.6 Contractor shall assume general coordination and direction of the project. Each Contractor shall cooperate with other Contractors on the Work and install his work in sequence to facilitate and not delay the installation of such other contractors. The Architect is neither the coordinator nor the expeditor of the work of the various contractors.

ARTICLE 7. CHANGES IN THE WORK

7.3.3 Delete in its entirety and substitute the following:

7.3.3 The value of any extra work or change performed by Contractor using his own forces shall be determined in one or more of the following ways:

1. By estimate and acceptance of a lump sum, computed as follows:

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- a. Net cost of materials.
- b. State and local sales tax.
- c. Net placing cost.
- d. W.C. insurance premium and FICA tax.
- e. Overhead and profit, 15% x (a + b + c + d).
- f. Allowable bond premium.
- g. Total Cost = a + b + c + e + f.

Credit for work omitted, which was included in original contract, shall be computed on the same basis, except that Contractor may retain 7% of overhead and profit percentage, computed on above basis.

2. By unit prices named in contract or subsequently agreed upon. (Unit price will include contractor's profit and overhead, insurance and bond, and quantification of amount of material by third party.)
3. By cost and percentage or by cost and a fixed fee, to be computed according to above formula.

Contractor shall be required, if called upon, to furnish original bills and payrolls and support of statement with proper affidavits. Burden of proof of costs rests upon Contractor.

Add the following paragraph:

- 7.3.3.1 The value of any such extra work or change performed by a subcontractor shall be determined by the subcontractor computing his cost as outlined in subparagraph 7.3.3 (a. through e.), to which cost the Contractor shall add an overhead and profit charge of 5% plus allowable bond premium.

ARTICLE 8. TIME

- 8.1.2 Delete: "The date of commencement of the Work is the date established in the Agreement" and add the following:
Add: "The date of commencement of the Work is the date established in the written Notice to Proceed. Do not begin work prior to receipt of written Notice to Proceed authorizing performance of the contract. The official Notice to Proceed will be issued by the Owner."
- 8.3.1 Delete the words "unusual delay in deliveries, unavoidable casualties".
- 8.3.1 Paragraph 8.3.1 of the GENERAL CONDITIONS is amended with addition of the following paragraphs:

- 8.3.1.1 Extension of time for completion of the work on account of rainfall, snow, or cold weather during the contract time will be subject to approval by the Architect and as provided in Section 01 29 76. Request for extension of time is to be submitted with each Request for Payment. Request for extension of time is to be submitted in writing within Thirty (30) days of the occurrence. If Contractor fails to submit request, time extension will not be approved for the pay period.
- 8.3.1.2 If it is not possible to obtain certain materials when needed and the Contractor submits evidence that he issued purchase orders and/or subcontracts immediately following execution of the Contract with the Owner and that he and his subcontractors have made every reasonable effort to obtain the materials when or before needed, delays in completion due to inability to obtain such materials will be acknowledged as being “beyond the Contractor’s control”.
- 8.3.2.5 Extension of time will be subjected to approval by the Owner/Architect and as provided in Section 01 29 76.

ARTICLE 9. PAYMENTS AND COMPLETION

- 9.3.1 Paragraph 9.3.1 of the General Conditions is deleted. Add the following:
- 9.3.1 On or before the date established for submittal of each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment for operations prepared in accordance with the schedule of values. Such application shall be notarized and supported by data supporting the Contractors’ right to payment such as copies of requisitions from Subcontractors and materials suppliers, and reflecting retainage if provided for elsewhere in the Contract Documents. Refer to Section 01 29 76 for additional provisions.
- 9.3.1.1 Paragraph 9.3.1.1 of the General Conditions is deleted.
- Add the following Subparagraph:
- 9.3.1.1 In making partial payments for the work, there shall be retained **Ten (10.0%) percent** of the estimated amount for labor and materials until final completion and acceptance of all work covered in the contract. Retainage shall be paid to the Contractor in the final payment if all conditions of the contract documents have been met.
- 9.3.2 Paragraph 9.3.2 is modified with the following addition:
- 9.3.2.1 **PAYMENT APPLICATIONS FOR MATERIALS STORED OFF SITE.** Payments will only be processed for materials stored off site that are stored in a bonded warehouse. Payment claims for materials stored off site must be accompanied with an itemized list of materials establishing value, proof that the materials are insured, and a receipt of storage from a bonded warehouse. Upon

payment of materials stored, title to the material shall be to the Owner. All expenses incurred in storage of materials will be paid by the Contractor.

Delete Paragraph 9.8.1 and replace with the following:

- 9.8.1 The date of substantial completion of the work or designated portion thereof is the date certified by the Architect when construction is sufficiently complete in accordance with the Contract Documents, so the Owner can occupy or utilize the work or designated portion thereof for the use for which it is intended without sacrificing the quality of services or having to significantly modify operations from intended usage as per design, as expressed in the Contract Documents.

Delete Paragraphs 9.8.2 through 9.8.5 and replace with the following paragraphs:

- 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected. The contractor shall notify Architect ten (10) days prior to the date on which the building will be ready for final inspection. The Contractor shall proceed promptly to complete and correct items on his list. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Document and ready for Architect/Engineer's final punch. Provide submittals to Architect / Engineer that are required by any governing body or other authorities. Upon receipt of the Contractor's list, the Architect will perform a punch and determine by observation whether the Work or designated portion thereof is substantially complete. Failure to include an item on the final list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. Significant amounts of incomplete work found during the inspection shall be grounds for ceasing the inspection. Minor adjustments and corrections to work shall not be considered cause for discontinuing final inspection. When the Architect determines that Work or designated portion thereof is substantially complete, he will prepare a Certificate of Substantial Completion which shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, insurance, subsequent damage to the Work. Should all work not be completed at the time substantial completion is set, the Certificate of Substantial Completion shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion. The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate.
- 9.8.3 Upon Substantial Completion of the Work or designated portion thereof, receipt of closeout documents called for in Section 01 77 00 and upon final application by the Contractor and certification by the Architect, the Owner shall make payment, reflecting adjustment in retainage, if any, for such Work or portion thereof as

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provided in the Contract Documents. The final application for payment will not be approved for payment by the Architect until the "CLOSEOUT" documents are provided to and reviewed by the Architect by the Contractor. These documents are to be complete in every respect with no exclusions or exceptions. Closeout documents shall be delivered to the Architect no later than thirty (30) calendar days from Date of Substantial completion.

ARTICLE 11 INSURANCE AND BONDS

Add the following paragraph:

- 11.6 Refer to AIA Document A133 – 2019 Exhibit B for additional Insurance and Bond requirements

ARTICLE 13 MISCELLANEOUS PROVISIONS.

- 13.1 Section 11.3 is amended as follows:
The contract shall be governed by the law of the place where the project is located, excluding jurisdiction's choice of law.
- 13.4.1 Add statement after first sentence:
Testing and inspections are to be paid for by the Contractor unless otherwise provided as stated in individual specification sections.
- Second sentence - Change the beginning of the statement "Unless otherwise provided" to read: "Unless otherwise provided for in individual specification sections or on drawings,"
- 13.4.4. The words "and Owner" shall be added to Subparagraph 13.5.4. The Owner shall have all of the rights which the Architect would have had under these changed Articles and Subparagraphs.

Add the following paragraph:

- 13.4.7 For soils testing and observation, contractors will be required to employ the services of the same geotechnical engineering company as that listed in Section 02 32 00, Earthwork. If no previous soils investigation has been performed, architect to approve Contractor's intended selection prior to Notice-to-Proceed.

ARTICLE 15. CLAIMS AND DISPUTES

Modify the following paragraphs:

- 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by date accompanying each payment request, substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled

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- construction beyond anticipated weather days as stated in 8.3.2 of General Conditions.
- 15.3.2 Delete the last sentence of this paragraph.
- Add the following sentence:
- 15.3.4 If mediation proves unsuccessful the dispute will be handled in Franklin County, AR, Court of Law.
- 15.4 ARBITRATION. All references to arbitration will be deleted from contract document AIA 201 General Conditions of the Contract for Construction, and specifically paragraphs 15.4.1; 15.4.1.1; 15.4.2; 15.4.3; 15.4.4; 15.4.4.1; 15.4.4.2; 15.4.4.3.

END OF SECTION

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SECTION 01 00 00

GENERAL REQUIREMENTS AND PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. General intention.
- B. General Method of Procedure.
- C. Applicable state and local laws
- D. Fire Protection verification
- E. Erosion Control.

1.2 GENERAL INTENTION

- A. Contractor shall completely prepare site for building operations, furnish labor and materials and perform work for a new Farm Credit of Western Arkansas, Ozark Office, Ozark, AR, as required by drawings and specifications.
- B. Visits to the site by Bidders may be made only by appointment with the Construction Manager.
- C. In some instances, it may have been impracticable to detail all items in specifications or on drawings because of variances in manufacturer's methods or of multiple methods of achieving specified results. In such instances Contractor will be required to furnish all labor, materials, drawings, services and connections necessary to produce systems or equipment which are completely installed, functional, and ready for operation by personnel in accordance with their use. Contractor and each subcontractor is to perform work to comply with standard practices of his or her trade or profession.
- D. Offices of HIGHT/JACKSON/ASSOCIATES/P.A., as Architects, will render certain technical services during construction. Such services shall be considered as advisory to the Owner and shall not be construed as expressing or implying a contractual act of the Owner without affirmations by the Owner or his duly authorized representative.

1.3 GENERAL METHOD OF PROCEDURE

- A. Working space and space available for storing materials shall be coordinated prior to construction.
- B. Workmen are subject to rules of the Owner applicable to their conduct.

01 00 00-1

- C. Contractor shall furnish Architect with a schedule of approximate phasing dates on which the Contractor intends to accomplish work in each specific area of site, building or portion thereof.
- D. If work is scheduled to be performed on Saturdays, Sundays or holidays the Contractor shall provide written notification to the Architect indicating dates on which work will be performed. Notification shall be a minimum of 48 hours before the work date commences.
- E. Existing Utilities: Before construction can begin, contractor shall have all existing underground utility line locations in affected construction area verified and located by one-call service, if this service exists. In addition consult Owner and/or utility companies. In Arkansas the one-call phone number is 1 800-482-8998. Contractor is to provide written proof that contact with utility companies and any private utilities such as telephone companies that the Owner may have contracted with. Provide a statement that contact has been made with Owner's personnel, all utility companies, and that all utility lines have been located to the best of their knowledge and ability. It shall be the responsibility of the contractor to relocate all existing utilities which conflict with the proposed improvements shown on the drawings.

1.4 APPLICABLE STATE AND LOCAL LAWS

- A. Contractor and all subcontractors of all trades present on site shall comply with applicable state and local laws and ordinances while present on public property.
- B. **Absolutely no tobacco or e-cigarette use is permitted in building or on the project site.**

1.5 FIRE PROTECTION VERIFICATION

- A. If any changes to the contract during construction occurs that involves work to any addition, remodel, or work to this project or in an adjacent building, Contractor to be responsible for verifying and adding onto, altering or updating existing fire alarm or fire sprinkler system to meet state and local current code requirements and verified by representative of the local fire department having jurisdiction.

1.6 EROSION CONTROL

- A. The site work contractor is to comply with the provisions of the Arkansas Water and Air Pollution Control Act (Act 274 of 1949, as amended, AR Ann. 8-4-101 et seq.), and the Federal Clean Water Act 33 U.S.C. 1251 et seq. which safeguards the storm water runoff to all receiving waters, i.e., streams, lakes and oceans by limiting effluent, erosion and other conditions. Application for permitting and monitoring requirements will be required through the state where the work is being performed. State of Arkansas, Storm Water Section NPDES, PO Box 8913, Little Rock, AR 72214 Phone 501/-682-0628.

PART 2 PRODUCTS Not Used.

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PART 3

EXECUTION

Not Used.

END OF SECTION

01 00 00-3

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Ozark Office
Ozark, Arkansas

SECTION 01 11 00

SUMMARY OF WORK

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Contract Description.
- B. Description of the work.
- C. Owner supplied Products.
- D. Contractor use of site and premises.
- E. Future work.
- F. Work sequence.
- G. Site security and encumbrances.
- H. Owner occupancy.
- I. Permits and fees

1.2 DESCRIPTION OF THE WORK

- A. The work under this contract will include all work as shown on drawings and specifications and shall include all work required to complete the project.
- B. Items noted NIC (Not in Contract), will be supplied and installed by Owner.
- C. Contractor is responsible for familiarizing himself with the entire project; for expediting and completing all phases of the project in accordance with the Contract Documents; and is solely responsible for work completed by other trades under his contract.
- D. Contractor is responsible for coordinating items furnished and installed by owner.

1.4 OWNER SUPPLIED PRODUCTS

- A. Owner's Responsibilities:
 - 1. Arrange for and deliver Owner reviewed Shop Drawings, Product Data, and Samples, to Contractor.
 - 2. Arrange and pay for Product delivery to site.
 - 3. On delivery, inspect Products jointly with Contractor.

01 11 00-1

4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
5. Arrange for manufacturers' warranties, inspections, and service.

B. Contractor's Responsibilities:

1. Review Owner reviewed Shop Drawings, Product Data, and Samples. Verify owner supplied products fit where product is to be installed or placed.
2. Receive and unload Products at site; inspect for completeness or damage jointly with Owner.
3. Handle, store, install and finish Products.
4. Repair or replace items damaged after receipt.

C. Products supplied to site and installed by Owner's direct hire installer/contractor:

1. Access Control System (all specified parts in 08 43 13 and 08 71 00 to be provided and installed by contractor)

D. Items supplied by Owner for installation by Contractor:

1. TV brackets

1.5 CONTRACTOR USE OF SITE AND PREMISES

- A. Limit use of site and premises to allow construction in accordance with contract and construction documents.

1.6 SITE SECURITY

- A. Contractor is responsible for always securing the site to prevent loss of property or injury to persons present at site. Such responsibility shall remain with the Contractor until all work is completed.
- B. Refer to Section 01 50 00 for temporary construction fencing requirements.

1.7 SITE ENCUMBRANCES

- A. Contractor will remove and/or relocate all interfering sheds, concrete slabs, driveways, curbs, walks, trees, footings, etc., prior to construction.
- B. Contractor shall maintain utilities in operation on a temporary basis till near the end of construction when finished utilities shall be completed.
- C. Contractor will cut grass and weeds before starting of project and dispose of the same.
- D. Provide barriers at drip line of trees to keep traffic off of root system. Trim branches to clear equipment.

1.8 ACCESS TO PROPERTY

- A. Provide and maintain access to property for all trades.
- B. Access for workmen and delivery of materials and equipment to immediate construction working areas within building is to be coordinated with the Owner. Provide unobstructed access to building areas required to remain in operation. Use hoist or lift wherever practical to move equipment and materials to levels above the ground floor. Hoist or lift is to be removed from premises at completion of construction.
- C. Access by Contractor and his personnel through occupied portions of buildings is not permitted within the occupied building area except along designated routes verified by the Owner.

1.9 OWNER OCCUPANCY

- A. Portions of building may become occupied during performance of work, but areas of alterations will be vacated as required. Contractor shall take all measures and provide all material necessary for protecting existing equipment and property in affected areas of construction against dust and debris, so that equipment and affected areas to be used in Owner operations will not be hindered. Contractor shall permit access to Owner personnel through construction areas. Contractor to provide temporary means of protected access to all occupied areas of alteration during the construction period.

1.10 PERMITS AND FEES

- A. Contractor to be responsible for verifying and obtaining a written list of all permits, fees, etc. from local, county, state, and federal (if applicable) governing bodies that will apply to this project. The contractor is responsible for paying for these permits and fees.
- B. Building Permit - Contractor secure and pay for city building permit if required by City.
- C. Special Permits/Fees – Contractor and/or subcontractors shall be responsible for securing and paying for all special permits, licenses and fees that may be required by local, state, or federal laws as may be applicable to the review, installation or certification of their systems and materials or required for installation of such materials.
- D. Connection Fees - Contractor and/or subcontractors shall be responsible for securing and paying for all fees and associated costs for review of, and connection to public utility services.

PART 2 PRODUCTS Not Used.

PART 3 EXECUTION Not Used.

END OF SECTION

01 11 00-3

SECTION 01 22 13

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Measurement and payment criteria applicable to portions of the Work performed under a unit price payment method.
- B. Defect assessment and nonpayment for rejected work.

1.2 AUTHORITY

- A. Measurement methods delineated in the individual specification sections complement the criteria of this section. In the event of conflict, the requirements of the individual specification section govern.
- B. Take all measurements and compute quantities. The Architect/Engineer will verify measurements and quantities.
- C. Assist by providing necessary equipment, workers, and survey personnel as required.

1.3 UNIT SPECIFIED QUANTITIES

- A. All labor and material shall be provided as shown in construction documents, unless otherwise noted. Pricing for unit quantities referenced in the individual specification sections is for bidding and in cases of unusual conditions of change in scope of work.
- B. If the actual Work requires more or fewer quantities than those quantities indicated, provide the required quantities at the unit sum/prices contracted. Quantities and measurements supplied or placed into the work shall be verified by a third party and approved by the Architect/Engineer prior to proceeding with work. The cost for work performed by the third party to verify quantities shall be paid for by Contractor, unless noted otherwise.
- C. Each Unit Price shall include all costs incurred to the contractor for the particular item the Unit Price provides for.

1.4 MEASUREMENT OF QUANTITIES

- A. Measurement Devices:
 - 1. Weigh Scales: Inspected, tested and certified by the applicable state Weights and Measures department within the past year.
 - 2. Platform Scales: Of sufficient size and capacity to accommodate the conveying vehicle.

- 3. Metering Devices: Inspected, tested and certified by the applicable State department within the past year.
- B. Measurement by Weight: Concrete reinforcing steel, rolled or formed steel or other metal shapes will be measured by handbook weights. Welded assemblies will be measured by handbook or scale weight.
- C. Measurement by Volume: Measured by cubic dimension using mean length, width and height or thickness.
- D. Measurement by Area: Measured by square dimension using mean length and width or radius.
- E. Linear Measurement: Measured by linear dimension, at the item centerline or mean chord.
- F. Stipulated Sum/Price Measurement: Items measured by weight, volume, area, or linear means or combination, as appropriate, as a completed item or unit of the Work.

1.5 PAYMENT

- A. Payment Includes: Full compensation for all required labor, Products, tools, equipment, plant, transportation, services and incidentals; erection, application or installation of an item of the Work; overhead and profit.
- B. Final payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities accepted by the Architect/Engineer multiplied by the unit sum/price for Work which is incorporated in or made necessary by the Work.

1.6 DEFECT ASSESSMENT

- A. Replace the Work, or portions of the Work, not conforming to specified requirements.
- B. If, in the opinion of the Architect/Engineer, it is not practical to remove and replace the Work, the Architect/Engineer will direct one of the following remedies:
 - 1. The defective Work may remain, but the unit sum/price will be adjusted to a new sum/price at the discretion of the Architect/Engineer.
 - 2. The defective Work will be partially repaired to the instructions of the Architect/Engineer, and the unit sum/price will be adjusted to a new sum/price at the discretion of the Architect/Engineer.
- C. The individual specification sections may modify these options or may identify a specific formula or percentage sum/price reduction.
- D. The authority of the Architect/Engineer to assess the defect and identify payment adjustment is final.

1.7 NONPAYMENT FOR REJECTED PRODUCTS

- A. Payment will not be made for any of the following:
1. Products wasted or disposed of in a manner that is not acceptable.
 2. Products determined as unacceptable before or after placement.
 3. Products not completely unloaded from the transporting vehicle.
 4. Products placed beyond the lines and levels of the required Work.
 5. Products remaining on hand after completion of the Work.
 6. Loading, hauling, and disposing of rejected Products.

1.8 SCHEDULE OF UNIT PRICES

- A. Item: Rock Removal, Section 31 23 16.
- B. Item: Trench Rock Removal, Section 31 23 33
- C. Item: Engineered Fill, Section 31 23 00.
- D. Item: Engineered Fill Where Trench Rock is Removed, Section 31 23 33
- E. Item: Earth Removal, Section 31 23 00.
- F. Item: Credit to Owner for use of on-site fill, Section 31 23 00.
- G. Item: Shot Rock Fill, Section 31 23 00.
- H. Item: Controlled Low Strength Material (CLSM) / Flowable Fill, Section 31 23 00

PART 2 PRODUCTS Not Used.

PART 3 EXECUTION Not Used.

END OF SECTION

01 22 13-3

SECTION 01 26 00

MODIFICATION REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Submittals.
- B. Documentation of change in Contract Sum/Price and Contract Time.
- C. Change procedures.
- D. Construction Change Directive.
- E. Stipulated Sum change order.
- F. Unit price change order.
- G. Time and material change order.
- H. Execution of change orders.
- I. Correlation of Contractor submittals.

1.2 RELATED SECTIONS

- A. Document 00 72 00 - General Conditions - AIA: Governing requirements for changes in the Work, in Contract Sum/Price, and Contract Time.
- B. Document 00 73 00 - Supplementary General Conditions - AIA: Percentage allowances for Contractor's overhead and profit.
- C. Section 01 33 00 - Submittals: Schedule of values.
- D. Section 01 60 00 - Material and Equipment: Product options and substitutions.
- E. Section 01 77 00 - Contract Closeout: Project record documents.

1.3 SUBMITTALS

- A. Submit the name of the individual authorized to receive change documents and be responsible for informing others in Contractor's employ or Subcontractors of changes to the Work.
- B. Change Order Forms: AIA G701. Change Order.

01 26 00-1

1.4 DOCUMENTATION OF CHANGE IN CONTRACT SUM/PRICE AND CONTRACT TIME

- A. Maintain detailed records of work done on a time and material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs of changes in the Work.
- B. Document each quotation for a change in cost or time with sufficient data to allow evaluation of the quotation.
- C. Provide additional data to support computations:
 - 1. Quantities of products, labor, and equipment.
 - 2. Taxes, insurance, and bonds.
 - 3. Overhead and profit.
 - 4. Justification for any change in Contract Time.
 - 5. Credit for deletions from Contract, similarly documented.
- D. Support each claim for additional costs, and for work done on a time and material basis, with additional information:
 - 1. Origin and date of claim.
 - 2. Dates and times work was performed, and by whom.
 - 3. Time records and wage rates paid.
 - 4. Invoices and receipts for products, equipment, and subcontracts, similarly documented.

1.5 CHANGE PROCEDURES

- A. The Architect/Engineer will advise of minor changes in the Work not involving an adjustment to Contract Sum/Price or Contract Time as authorized by AIA A201, 2017 Edition, Paragraph 7.4 by issuing a Field Order, AIA Form G708, Supplemental Instructions, AIA Form G710 or Hight Jackson Associates Architect's Supplemental Instructions.
- B. The Architect/Engineer may issue a Proposal Request which includes a detailed description of a proposed change with supplementary or revised Drawings and specifications and change in Contract Time for executing the change with the stipulation of any overtime work required. The contractor will prepare and submit an estimate within 10 calendar days unless instructed otherwise.
- C. The Contractor may propose a change by submitting a request for change to the Architect/Engineer, describing the proposed change and its full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Sum/Price and Contract Time with full documentation. Document any requested substitutions in accordance with Section 01 60 00.

1.6 CONSTRUCTION CHANGE DIRECTIVE

- A. Architect/Engineer may issue a document signed by the Owner, instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
- B. The document will describe changes in the Work and will designate a method of determining any change in Contract Sum/Price or Contract Time.
- C. Promptly execute the change in Work.

1.7 STIPULATED SUM CHANGE ORDER

- A. Based on Proposal Request and Contractor's fixed price quotation or Contractor's request for a Change Order as approved by Architect/Engineer.

1.8 UNIT PRICE CHANGE ORDER

- A. For predetermined unit prices and quantities, the Change Order will be executed on a fixed unit price basis.
- B. For unit costs or quantities of units of work which are not predetermined, execute Work under a Construction Change Directive.
- C. Changes in Contract Sum/Price or Contract Time will be computed as specified for Time and Material Change Order.

1.9 TIME AND MATERIAL CHANGE ORDER

- A. Submit an itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.
- B. Architect/Engineer will determine the change allowable in Contract Sum/Price and Contract Time as provided in the Contract Documents.
- C. Maintain detailed records of work done on a Time and Material basis.
- D. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work.

1.10 EXECUTION OF CHANGE ORDERS

- A. Execution of Change Orders: Architect/Engineer will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

1.11 CORRELATION OF CONTRACTOR SUBMITTALS

- A. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum/Price.
- B. Promptly revise progress schedules to reflect any change in Contract Time, revise sub schedules to adjust times for other items of work affected by the change and resubmit.
- C. Promptly enter changes in Project Record Documents.

PART 2 PRODUCTS Not Used.

PART 3 EXECUTION Not Used.

END OF SECTION

01 26 00-4

SECTION 01 29 76

APPLICATIONS FOR PAYMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Procedures for preparation and submittal of applications for payment.

1.2 RELATED SECTIONS

- A. Document 00 72 00 - General Conditions - AIA: Progress payments and final payments.
- B. Section 00 73 00 - Supplementary General Conditions
- C. Section 01 31 00 - Coordination and meetings:
- D. Section 01 32 36 – Construction Progress Schedules: Submittal procedures.
- E. Section 01 77 00 - Contract Closeout: Final payment.

1.3 FORMAT

- A. AIA G702 - Application and Certificate for Payment and AIA G703 - Continuation Sheet.
- B. For each item, provide a column for listing each of the following:
 - 1. Item Number.
 - 2. Description of work.
 - 3. Scheduled Values.
 - 4. Previous Applications.
 - 5. Work in Place and Stored Materials under this Application.
 - 6. Authorized Change Orders Listed separately.
 - 7. Total Completed and Stored to Date of Application.
 - 8. Percentage of Completion.
 - 9. Balance to Finish.
 - 10. Retainage.

1.4 PREPARATION OF APPLICATIONS

- A. Present required information in typewritten form or on electronic media printout.
- B. Execute certification by signature of authorized officer.
- C. Use data from the approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored Products.

01 29 76-1

- D. List each authorized Change Order as an extension on AIA G703 - Continuation Sheet, listing Change Order number and dollar amount as for an original item of Work.
- E. Prepare Application for Final Payment as specified in Section 01 77 00.

1.5 SUBMITTAL PROCEDURES

- A. Submit Application for Payment.
- B. Submit **updated** construction schedules with each Application for Payment.
- C. Submit Certificate of Insurance for items stored off-site with each Application for Payment.
- D. Submit delays caused because of adverse weather, strikes, etc. Include backup with each pay application. Provide the project superintendent's weather log for project with each pay application. If no delay days occur during the last pay period provide statement on transmittal or letter stating that no delay days occurred. Delay days for Saturday and Sunday and Holidays will not be approved unless prior notice has been given and accepted by Architect. Approved delay days will not result in an increase in completion time unless days exceed the anticipated delay days as set forth under Supplementary General Conditions.
 - 1. Submit as part of the pay application a monthly updated CPM work schedule as required in Section 01 32 36.
 - 2. Monthly Progress Report
 - a. Refer to Section 01 31 00, paragraph 1.7 for details.
 - 3. Updated and currently in force proof of insurance. (The proof of insurance needs to only be filed during the month of renewal, however, a lapsed Insurance Certificate will result in Pay Application being held as incomplete)
 - 4. Failure to submit any of the above-mentioned items will result in pay application being held until submissions are complete.
- E. Payment Period: Submit at intervals stipulated in the Agreement.
- F. Submit with transmittal letter as specified for Submittals in Section 01 33 00.

1.6 SUBSTANTIATING DATA

- A. When Architect/Engineer requires substantiating information, submit data justifying dollar amounts in question.
- B. Submit data with a cover letter for each copy of the submittal. Show application number and date and line item by number and description.
- C. Include the following with the application when substantiating data is asked for:
 - 1. Current available construction photographs of items in question.
 - 2. Record documents for review by the Owner which will be returned to the contractor.

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3. Affidavits attesting to off-site stored products.
4. Construction progress schedules revised and current.
5. Other data and information as required or asked for by Architect.

D. Partial Lien Waivers: If directed by Owner or Architect, the Contractor may be required to submit partial lien waivers of subcontractors and suppliers accompanying payment request applications to show proof that he has made percentage of progress payment as shown on previous payment request application. If partial lien waivers are asked for, Contractor must submit them for review and approval. If he has not submitted them, or if a subcontractor or supplier has not been paid for the previous pay periods, the current pay application will not be processed until partial lien waivers are received and approved, or until justification is accepted by Owner and Architect as to the reason payment was withheld for the subcontractor or supplier on previous payment applications.

1.7 PROOF OF INSURANCE FOR MATERIALS STORED OFF SITE.

A. Payments will only be processed for materials stored off site that are stored in a bonded or insured warehouse. If materials are stored off site on a secure open-air site, material must be insured. Payment claims for materials stored off site must be accompanied with an itemized list of materials establishing value, proof that the materials are insured, and a receipt of storage from a bonded warehouse. Upon payment of materials stored, title to the material shall be to the Owner. All expenses incurred in storage of materials will be paid by the contractor.

1.8 RETAINAGE

A. In making partial payments for the work, there shall be retained **Ten (10.0%) percent** of the estimated amount for labor and materials until final completion and acceptance of all work covered in the contract. Retainage shall be paid to the Contractor in the final payment if all conditions of the contract documents have been met including completed close-out documents and as-built drawings.

PART 2 PRODUCTS Not Used.

PART 3 EXECUTION Not Used.

END OF SECTION

01 29 76-3

SECTION 01 31 00

COORDINATION AND MEETINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Coordination and project conditions.
- B. Pre-construction meeting.
- C. Field engineering
- D. Progress meetings.
- E. Pre-installation meetings.
- F. Equipment electrical characteristics and components.
- G. Examination.
- H. Preparation.
- I. Schedule and Reports

1.2 COORDINATION AND PROJECT CONDITIONS

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

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- E. Coordinate completion and cleanup of Work of separate sections in preparation for Substantial Completion and for portions of Work if designated for Owner's partial occupancy.
- F. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.3 FIELD ENGINEERING

- A. Contractor shall locate and protect survey control and reference points.
- B. Control data for survey is shown on Drawings.
- C. Verify setbacks and easements; confirm drawing dimensions and elevations.
- D. Provide field engineering services. Establish elevations, lines, and levels, utilizing recognized engineering survey practices.

1.4 PRECONSTRUCTION MEETING

- A. Construction Manager will schedule a pre-construction meeting after Notice to Proceed and shall conduct meeting.
- B. Attendance Required: Owner, Architect/Engineer, Prime Contractor, Major Subcontractors, Representatives of Governmental or other regulating Agencies.
- C. Agenda:
 - 1. Execution of Owner-Contractor Agreement.
 - 2. Submission of executed bonds and insurance certificates.
 - 3. Submission of list of Subcontractors, schedule of values, and progress schedule.
 - 4. Designation of personnel representing the parties in Contract, and the Architect/Engineer.
 - 5. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, and Change Order procedures.
 - 6. Scheduling and coordination of prime contractors.
 - 7. Inspection procedures.
 - 8. Shop drawings and Submittals, Grouping of Submittals
 - 9. Critical areas of the work
 - 10. Reports, testing and scheduling activities of a Geotechnical Engineer.
 - 11. Use of premises by Owner and Contractor.
 - 12. Owner's requirements and occupancy.
 - 13. Construction facilities and controls.
 - 14. Temporary utilities.
 - 15. Procedures for maintaining record documents (As-Builts).
 - 16. Requirements for start-up of equipment.
 - 17. Inspection and acceptance of equipment put into service during construction period.

01 31 00-2

18. Contract closeout procedures, Substantial Completion, Final inspection, warranties, and manuals.
19. Other items as deemed necessary by the Architect or owner.

D. Contractor is to record minutes and distribute copies within two days after meeting to participants, with copies to Architect/Engineer, Owner, participants, and those affected by decisions made.

1.5 PROGRESS MEETINGS

A. Contractor will schedule and administer meetings with assistance of Architect throughout progress of the Work at **MONTHLY** intervals unless different interval is approved by Architect.

B. Contractor will schedule and make arrangements for meetings, prepare an agenda with copies for participants, preside at meetings. Schedule comments from Architect on agenda. Architect to approve schedule.

C. Contractor shall provide written copies of previous items of discussion, resolution of same, and any new outstanding issues to be addressed.

D. Attendance is required by the following people:

1. General Contractor's Project Manager and Job Superintendent
2. Project Manager and Field Foreman for each trade currently working on the site.
3. Project Manager of any trade who will be mobilizing on site during the next thirty (30) days.
4. Representative of Major Suppliers
5. Owner/Architect/Engineer as appropriate to address agenda items.

E. Agenda:

1. Review minutes of previous meetings.
2. Review of Work progress.
3. Field observations, problems, and decisions.
4. Identification of problems which impede planned progress.
5. Review of submittals schedule and status of submittals.
6. Review of off-site fabrication and delivery schedules.
7. Maintenance of progress schedule.
8. Corrective measures to regain projected schedules.
9. Planned progress during the succeeding work period.
10. Coordination of projected progress.
11. Maintenance of quality and work standards.
12. Effect of proposed changes on progress schedule and coordination.
13. Contractor to present outline work schedule for the next month.
14. Other business relating to Work.

- F. Contractor to record minutes and distribute copies within two days after meeting to participants, with copies to Architect/Engineer, Owner, participants, and those affected by decisions made.

1.6 PRE-INSTALLATION MEETING

- A. When required in individual specification sections, convene a pre-installation meeting at the site prior to commencing work of the section. Group preinstallation meeting of related work items together.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify Architect/Engineer four days in advance of meeting date.
- D. Prepare the agenda and preside at meeting:
 - 1. Review conditions of installation, preparation and installation procedures.
 - 2. Review coordination with related work.
- E. Attendance Required: Contractor's Project Manager, Job superintendent, major Subcontractors and suppliers, Owner, Architect/Engineer, as appropriate to agenda topics for each meeting.

1.7 PROGRESS REPORTS

- A. The Contractor shall submit monthly progress reports to the Architect, attached to his request for payment, showing each major item of the work, the current percentage of completion, and whether ahead or behind schedule. Any delays beyond the contractor's control, such as adverse weather conditions, strikes, etc., that delay the project's completion are to be documented and submitted each month along with the progress report. Orders for all materials, except those requiring a decision by the Owner, must be placed within thirty (30) days after the award of the contract and evidence of such orders furnished to the Architect. For order of materials requiring Owner decision, such as color, texture, etc; these orders will be placed as soon as possible after selection. Contractor is responsible for notifying the Architect when delaying selection will cause delays in completion. These requirements will be considered mandatory prior to any approval of a monthly pay request by the Architect.
- B. Include the following items as additional requirements of the monthly report.
 - 1. Updated schedule
 - 2. All meeting minutes for month
 - 3. Updated submittal schedule
 - 4. RFI log (all logs should contain date submitted to Architect, Date returned and Status)

1.8 OWNER'S ACCESS TO CONSTRUCTION

- A. In addition to the Architect, the Owner shall be allowed to provide on-site representation as he deems necessary. Contractor and all subcontractors are to allow access to this (these) Individual(s) identified during the pre-construction conference, or by later correspondence from the Architect.

Note: The Architect shall remain the sole responsible party for making selections, determining colors and/or textures, and directing changes in the scope or corrections to the work covered by this contract. **NO EXCEPTIONS!**

PART 2 PRODUCTS Not Used.

PART 3 EXECUTION Not Used.

END OF SECTION

01 31 00-5

SECTION 01 32 33

CONSTRUCTION PHOTOGRAPHS & DOCUMENTATION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Photography.
- B. Electronic Photographic Digital Images
- C. Technique.
- D. Submittals.

1.2 RELATED SECTIONS

- A. Section 01 11 00 - Summary of Work: Stages of the Work.
- B. Section 01 77 00 - Contract Closeout: Project record documents.

1.3 PHOTOGRAPHY

- A. Have available a digital camera of sufficient quality to produce photographs of site and construction throughout progress of work when required or asked for by Architect or Owner. Contractor must have means of electronically transferring images from job site and office via e-mail to Architect/Engineer.
- B. If an Architect elects to view an observation such as footing or slab preparation via photos taken by Contractor, placement will not take place until Architect/Engineer reviews and issues observation and comment of photos.
- C. Take photographs of critical areas asked of the Architect/Engineer.
Such areas might be:
 - 1. Excavations.
 - 2. Foundations.
 - 3. Structural framing.
 - 4. Enclosure of building.
 - 5. Other items as asked for.

1.4 IMAGES

- A. Full color.
- B. Size: Appropriate to show detail required.

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- C. Identify each image in an electronic file name. Identify name of Project and date of view.
- D. Deliver electronic images to Architect immediately for his/her review and retention in job files.

1.5 VIEWS

- A. Consult with Architect/Engineer for instructions on views required.

1.6 SUBMITTALS

- A. Deliver e-mail images for each requested installation.

PART 2 PRODUCTS Not Used.

PART 3 EXECUTION Not Used.

END OF SECTION

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SECTION 01 32 36

CONSTRUCTION PROGRESS SCHEDULES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Format.
- B. Content.
- C. Revisions to schedules.
- D. Submittals.

1.2 RELATED SECTIONS

- A. Section 01 11 00 - Summary of Work: Work sequence.
- B. Section 01 29 76 - Applications for Payment: Application for payment.
- C. Section 01 33 00 - Submittals: Shop drawings, product data,

1.3 FORMAT

- A. Prepare schedules as a horizontal bar chart with separate bar for each major portion of Work or operation, identifying first workday of each week.
- B. Scale and Spacing: To provide space for notations and revisions.
- C. Sheet Size: Multiples of 11 x 17 inches.

1.4 CONTENT

- A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.
- B. Identify each item by specification section number.
- C. Identify work of separate stages, and other logically grouped activities.
- D. Show critical path for sequencing trades and materials.
- E. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.

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F. Coordinate content with schedule of values specified in Section 01 29 76.

1.5 REVISIONS TO SCHEDULES

- A. Indicate progress of each activity to date of submittal, and projected completion date of each activity.
- B. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes. Show on schedule by either variation of shading or patterns so the difference is apparent.
- C. Provide narrative report to define problem areas, anticipated delays, and impact on Schedule and report corrective action taken or proposed and its effect.
- D. Provide a separate schedule of submittal dates for shop drawings, product data, and samples, including dates when submittals will be required from Architect. Show decision dates for selection of finishes.

1.6 SUBMITTALS

- A. Submit initial schedules on or before pre-construction conference. After review, resubmit required revised data within ten (10) days.
- B. Submit revised Progress Schedules with each Application for Payment. Pay request will not be processed without a revised schedule submittal. Submit one copy for each copy of the Application for payment.
- C. Submit a computer-generated horizontal bar chart with separate lines for each section of Work, identifying first work day of each week.
- D. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates, and duration.
- E. Indicate estimated percentage of completion for each item of Work at each submission.
- F. Indicate submittal dates required for shop drawings, product data, samples, and product delivery dates, including those furnished by Owner and required by Allowances.
- G. Show critical path if sequence of work is dependant on certain items or trades completing their work in order for the project to be completed on time.

1.7 DISTRIBUTION

- A. Distribute copies of reviewed schedules to Project site file, Subcontractors, suppliers, and other parties concerned.

B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

PART 2 PRODUCTS Not Used.

PART 3 EXECUTION Not Used.

END OF SECTION

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SECTION 01 33 00

SUBMITTALS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Submittal procedures.
- B. Proposed Products list.
- C. Product Data.
- D. Shop Drawings.
- E. Samples.
- F. Design data.
- G. Test reports.
- H. Certificates.
- I. Manufacturer's instructions.
- J. Manufacturer's field reports.
- K. Warranties
- L. Erection drawings.

1.2 RELATED SECTIONS

- A. Section 01 40 00 - Quality Control: Manufacturers' field services and reports.
- B. Section 01 77 00 - Contract Closeout: Contract warranties, bonds, manufacturers' certificates, and closeout submittals.

1.3 REFERENCES

- A. AGC (Associated General Contractors of America) publication "The Use of CPM in Construction - A Manual for General Contractors and the Construction Industry".

1.4 GENERAL SUBMITTAL PROCEDURES

- A. Transmit each submittal with AIA Form G810. Or Architect/Engineer accepted form.

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- B. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix.
- C. Identify Project, Contractor, Subcontractor or supplier, pertinent drawing and detail number, and **specification section numbers**, as appropriate.
- D. Apply Contractor's stamp signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents. **The contractor shall review submittal before submitting to Architect.** Architect will not review submittal until Contractor has shown proof of review. **DO NOT MAKE SEPARATE SUBMITTAL ENTRIES FOR PROJECT DATA, INSTALLATION, SHOP DRAWINGS, ETC. SUBMIT AS ONE ENTRY.**
- E. **Group submittals of like type/by one subcontractor together such as Plumbing submittals, HVAC submittals, Masonry submittals, Structural submittals, etc.** Review of single submittals of like types will be subject to delay until remaining submittals related to that being submitted are received by Architect.
- F. Architect will review submittals and if applicable, forward to consultant(s) for review. When Construction Manager uses website-based program, Construction Manager to submit applicable submittals to consultant and then route to the Architect. Architect must be final review for all submittals/shop drawings before return to Construction Manager. Upon review, Architect or consultant shall stamp each set of submittals indicated review status or required action, if any. This stamp in no way relieves the Contractor of meeting the requirements and/or intent of the specifications. The architect's review of shop drawings and submittals is for intent and general compliance with contract documents. All other criteria are the sole responsibility of the General Contractor and his supplier.
- G. Schedule submittals to expedite the Project and deliver to Architect/Engineer at business address. Coordinate submission of related items.
- H. Where colors and/or patterns are to be selected, or specifications include cash allowances by Architect, request such selections and materials in ample time for procurement.
- I. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor. However, Architect will make every effort to return submittals in a timely manner.
- J. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.
- K. Provide space for Contractor and Architect/Engineer review stamps on front of submittal, minimum space of **4" x 8" on right hand border.**
- L. When revised for resubmission, identify all changes made since previous submission. Similar procedures are to be followed when resubmitting.

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- M. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.
- N. Submittals not requested will not be recognized or processed.

1.5 ELECTRONIC SUBMITTAL PROCEDURE

- A. **All product data sheets, shop drawings, and miscellaneous submittal information are to be submitted electronically via email, FTP site, website platform, or other acceptable electronic submittal means. Please note that at Architect's discretion for large shop drawing submittals, a hard copy would need to be submitted along with electronic submittal. The architect will advise the contractor of such submittals.**
 - 1. The contractor shall perform initial review and have comments and review stamp included on electronic submittal or shop drawings. **Please note that this is mandatory. Submittals and shop drawings will not be reviewed by Architect until Contractor reviews them and notes any comments or corrections required.**
 - 2. Submit for Architect's review.
 - 3. After review, electronic copy will be sent back to Contractor with any comments and markups, including review stamp status. If comments require re-submittal of all or partial original submittals or shop drawings, correct and resend for final approval or for Architect's record copy.
 - 4. Contractor is to list **specification section numbers** related to each item submitted. This shall include product data and shop drawings.
- B. Items to be included in electronic submittals (As required by each product or item specification section):
 - 1. Product data
 - 2. Shop drawings
 - 3. Design data
 - 4. Test reports
 - 5. Certificates
 - 6. Manufacturer's instructions
 - 7. Warranties
 - 8. Erection drawings
 - 9. Any other information pertinent to a product or item.

1.6 PRODUCT DATA

- A. Product Data for Review:
 - 1. Submitted to Architect for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
 - 2. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article above and for record documents purposes described in Section 01 77 00 - CONTRACT CLOSEOUT.

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- B. Product Data for Information:
 - 1. Submitted electronically for the Architect/Engineer's knowledge as contract administrator or for the Owner.
- C. Product Data for Project Closeout:
 - 1. Submitted for the Owner's benefit during and after project completion.
- D. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- E. Indicate Product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- F. After reviewing distribution in accordance with the Submittal Procedures article above and provide copies of record documents described in Section 01 77 00 - CONTRACT CLOSEOUT.

1.7 SHOP DRAWINGS

- A. Shop Drawings for Review:
 - 1. Submitted to Architect/Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
 - 2. After review, produce copies and distribute in accordance with SUBMITTAL PROCEDURES article above and for record documents purposes described in Section 01 77 00 - CONTRACT CLOSEOUT.
- B. Shop Drawings for Information:
 - 1. Submitted electronically for the Architect/Engineer's knowledge as contract administrator or for the Owner.
- C. Shop Drawings for Project Closeout:
 - 1. Submitted for the Owner's benefit during and after project completion.
- D. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

1.8 SAMPLES

- A. Samples for Review:
 - 1. Submit actual samples to Architect/Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
- B. Samples for Information:
 - 1. Submit actual samples for the Architect/Engineer's knowledge as contract administrator or for the Owner.

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C. Samples for Selection:

1. Submitted to Architect/Engineer for aesthetic, color, or finish selection.
2. Submit samples of finishes from the full range of manufacturers' current standard colors, textures, and patterns for Architect/Engineer selection.
3. After review, produce duplicates and distribute them in accordance with SUBMITTAL PROCEDURES article above and for record documents purposes described in Section 01 77 00 - CONTRACT CLOSEOUT.

D. Submit samples to illustrate functional and aesthetic characteristics of the Product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

E. Include identification on each sample, with full Project information.

F. Submit the number of samples specified in individual specification sections; one of which will be retained by Architect/Engineer.

G. For each job-finished material (i.e. Masonry, Stucco, concrete, paint and other finishes), prepare a sample panel as called for in individual sections. Obtain Architect's approval before installing balance of such work. The Architect may require additional panels or samples. The contractor shall follow the same procedure for Architect's approval. Subsequent work shall be in accordance with the approved sample panels.

H. Reviewed samples which may be used in the Work are indicated in individual specification sections.

I. Samples will not be used for testing purposes unless specifically stated in the specification section.

1.9 DESIGN DATA

A. Submit electronically for the Architect/Engineer's knowledge as contract administrator or for the Owner.

B. Submit information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

1.10 TEST REPORTS

A. Submit for the Architect/Engineer's knowledge as contract administrator or for the Owner. All test reports are to immediately be sent to Architect for his/her review.

B. Submit test reports for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

1.11 CERTIFICATES

- A. When specified in individual specification sections, submit certification by the manufacturer, installation/application Subcontractor, or the Contractor to Architect/Engineer, in quantities specified for Product Data.
- B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or Product but must be acceptable to Architect/Engineer.

1.12 MANUFACTURER'S INSTRUCTIONS

- A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to Architect/Engineer for delivery to Owner in quantities specified for Product Data. A copy of such information will be included in the appropriate section of Close-Out Documents.
- B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.13 MANUFACTURER'S FIELD REPORTS

- A. Submit reports for the Architect/Engineer's benefit as contract administrator or for the Owner.
- B. Submit report within 15 days of observation to Architect/Engineer for information.
- C. Submit information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

1.14 WARRANTIES

- A. Submit product or system warranty for each product submitted on. Warranties shall accompany shop drawings and submittals. The warranty must be at least to a minimum specified in individual sections, but not less than one year from the date of substantial completion. Warranties will also be required as part of record documents. Refer to Section 01 77 00.

1.15 ERECTION DRAWINGS

- A. Submit electronic drawings for the Architect/Engineer's benefit as contract administrator or for the Owner.

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- B. Submit information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.
- C. Data indicating inappropriate or unacceptable Work may be subject to action by the Architect/Engineer or Owner.

PART 2 PRODUCTS Not Used.

PART 3 EXECUTION Not Used.

END OF SECTION

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SECTION 01 40 00

QUALITY CONTROL

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Quality assurance - control of installation.
- B. Cleaning during construction
- C. Tolerances
- D. Protection
- E. References and standards.
- F. Mockup.
- G. Inspecting and testing laboratory services.
- H. Architect/Engineer Construction Observation Notices
- I. Required Special Inspections
- J. Required Pre-Installation Meetings
- K. Manufacturers' field services.
- L. Tobacco Use
- M. Grading Certification

1.2 RELATED SECTIONS

- A. Section 01 33 00 - Submittals: Submission of manufacturers' instructions and certificates.
- B. Section 01 60 00 - Material and Equipment: Requirements for material and product quality.
- C. Section 01 75 00 - Starting of Systems.

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1.3 CRAFTMANSHIP

- A. Each trade is to perform work and install products, following best standards of their industry. Work not in conformance with industry standards and quality will not be tolerated and will be subject to rejection.

1.4 QUALITY ASSURANCE - CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Furnish, apply, install, connect, erect, clean, and condition manufactured articles, materials, and equipment per manufacturer's printed directions, unless otherwise indicated or specified. Comply with manufacturers' instructions, including each step-in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform Work by people qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement. All attachment devices and materials shall be required to secure materials together or to other materials and to secure work of other trades.
- H. Manufacturer's printed directions must be on the job prior to and during installation of materials and equipment.
- I. Make allowance for ample expansion and contraction for all building components subject to same.
- J. Each trade shall provide sleeves, recesses and openings in their work as required to receive work from other trades.
- K. Make field check of actual building dimensions before fabricating products.
- L. Where proper fit of work depends upon close tolerances of manufactured products, furnish manufacturer with necessary templates to ensure proper fit of all components.

- M. Install materials only when conditions of temperature, moisture, humidity, and condition of adjacent building components are conducive to achieving the best installation on results.
- N. Erect, install and secure building components in a structurally sound and appropriate manner. Where necessary, temporarily brace, shore, or otherwise support members until the final connection or installation. Brace walls and other structural elements to prevent damage by wind and construction operations. Leave temporary bracing, shoring or other structural supports in place as long as necessary for safety and until the structure is strong enough to withstand all loads involved.
- O. Where construction consists of a series of courses of units, assemble units in best acceptable manner to provide structurally sound installation, waterproof where exposed to exterior. Accurately plumb and level all courses and verify levels of frequent courses with instruments.
- P. Handle materials in a manner to prevent scratching, abrading, distortion, chipping, breaking or other disfigurement.
- Q. Unless indicated, fabricate, and install materials true to line, plumb and level. Leave finished surfaces smooth and flat or of smooth contour where indicated, free from wrinkles, warps, scratches, dents, and other imperfections.
- R. Provide a quality of workmanship not less than the commercially accepted standards of that trade.
- S. Where obviously of best practice, furnish materials in longest practical lengths and largest practical sizes to avoid unnecessary jointing. Make all joints secure.
- T. Where fabrics, plastics and other such items join, make seams tight, secure and inconspicuous.
- U. Scribe and/or otherwise neatly fit materials to adjoining materials.
- V. Consult Architect for mounting height or position of any unit not specifically located.
- W. Mix no more materials than can be used before materials begin to “set”. Mix no partially “set” batch with another. Clean tools and appliances prior to mixing materials to avoid contamination.
- X. Conduct work in a manner to avoid injury to previously placed work.
- Y. Do not disturb materials requiring curing time until appropriate curing time has transpired.

Z. Vertical & Horizontal Penetrations and Sleeves:

1. Contractor is responsible for the layout, placement and identification of all necessary sleeves or penetrations needed to complete his work.
2. All penetrations are to be fire stopped (where penetrating smoke and fire rated barriers) and sealed watertight prior to completion of the contractor's work.
3. All vertical sleeves or penetrations are to extend one and one half (1 ½") above the floor, slab, or housekeeping pad and be sealed watertight.

AA. Coordinate plumbing fixtures and valves with all toilet accessories to obtain proper clearances and meet ADA Guidelines at accessible locations.

BB. Contractor to be responsible for coordinating items or equipment provided by owner so that proper space and clearances are provided in newly installed work. Notify the owner if conflicts are found.

CC. During construction, if any material or product is damaged, it shall be repaired to the Architect's satisfaction. If the repair is not satisfactory, the material or product will be replaced at no additional cost to owner.

DD. Where masonry is installed, all vertical and horizontal joints align according to bond types. Where differing masonry types are installed in same wall, joints are to align between each masonry unit type unless noted otherwise.

EE. Where electrical conduit & wire, plumbing piping, fire sprinkler piping and mechanical ductwork are exposed, each trade is to install items neatly and coordinated with work of other trades. Where multiple electrical conduits or pipes protrude through walls or space, they are to be evenly spaced apart and routed in the same plane. **Do not install below finished ceiling elevation unless shown otherwise.** At exposed structure locations conduit to exit wall at top of wall at coursing directly below roof supporting bond beam. Ductwork shall be routed logically and will be installed to provide neat, clean, and aligned appearance, both vertically and horizontally.

FF. Any exposed exterior or interior plywood sheathing to be covered with temporary or permanent weather barrier within 24 hours following sheathing installation to prevent exposure to moisture or sunlight. Gypsum sheathing is to be covered with temporary or permanent weather barrier within minimum time allowed by sheathing manufacturer.

GG. No plywood roof decking will be left exposed to moisture and sunlight. Weather barriers are to be installed immediately following the installation of roof deck.

HH. Schedule work so that installed weather barriers at roofs and walls are not exposed to moisture, wind, or sunlight any longer than what the weather barrier manufacturer allows. Replace any weather barrier damaged by these elements.

- II. No items including millwork and ceiling grid are to be installed against or on walls prior to the final coat of paint being applied.

1.5 CLEANING DURING CONSTRUCTION

- A. Contractor to keep building and site reasonably free of debris during construction, including mud and dirt inside building. Provide means for keeping mud and clay off floors that are to remain unfinished or clear sealed only.
- B. If a floor sweep product is used, use only a wax base product. **Oil base products are not to be used.** Verify with floor covering and adhesive suppliers and obtain approval of floor sweep product so that warranty is not jeopardized.

1.6 DUST CONTROL DURING CONSTRUCTION

- A. Contractor to keep dust on site to a minimum the entire duration of construction by means of regular watering. This will include dust created by grading operations, vehicular traffic, and wind. Also comply with SWPPP requirements.
- B. Contractor to sprinkle work with water during demolition operations to minimize dust. Provide hoses and water connections for this purpose.

1.7 MATERIALS STORAGE

- A. Limit site storage for construction materials in a central, secured area, within the boundaries of construction area. Assume full responsibility for protection of same.

1.8 APPROPRIATE MATERIALS

- A. No materials containing asbestos fibers shall be allowed in any construction materials used in this project. General Contractor shall provide written certification to this effect at the end of the project. Certification shall be included in the project close-out documents. Refer to Section 02 26 23.
- B. Should the General Contractor or any subcontractors discover materials that must be disturbed and are suspected of containing asbestos fibers or hazardous material, immediately notify the Architect. No disruption of such materials shall be attempted.

1.9 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerance to accumulate.
- B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

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1.10 PROTECTION

- A. Protect installed materials to prevent damage until substantial completion and comply with individual specification sections pertaining to protection of finished products.
- B. No gypsum board, batt insulation, or materials prone to damage by moisture, mold and/or mildew will be installed prior to enclosing and drying in of building.
- C. During construction, if any material is damaged after installation because of moisture, mold and/or mildew, it shall be replaced immediately.
- D. Prior to installation and/or application of interior finishes, the building will be completely enclosed, dried in and conditioned continually to meet minimum temperature and humidity requirements for finished product installation/application.

1.11 REFERENCES AND STANDARDS

- A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes. The contractor is to be familiar with all standards pertaining to project.
- B. Conform to reference standards at date of invitation to bidders.
- C. Obtain copies of standards when required by the Contract Documents.
- D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.
- E. Should specified reference standards conflict with Contract Documents, request clarification from the Architect/Engineer before proceeding.
- F. Neither the contractual relationship, duties, nor responsibilities of the parties in Contract nor those of the Architect/Engineer shall be altered by the Contract Documents by mention or inference otherwise in any reference document.

1.12 REFERENCES

- A. Reference to technical society, organization or body is made in these specifications in accordance with but not limited to the following:
 - DBA ARKANSAS DEPARTMENT OF BUILDING AUTHORITY MINIMUM STANDARDS & CRITERIA
 - AIA AMERICAN INSTITUTE OF ARCHITECTS
 - ACI AMERICAN CONCRETE INSTITUTE
 - ADA THE AMERICANS WITH DISABILITIES ACT
 - AEC ARKANSAS ENERGY CODE
 - AFGG ARKANSAS FUEL GAS CODE

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AFPC	ARKANSAS FIRE PREVENTION CODE
AIEE	AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUCTION
AMC	ARKANSAS MECHANICAL CODE
APC	ARKANSAS PLUMBING CODE
ASHRAE	AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR- CONDITIONING ENGINEERS, INC.
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS
ASTM	AMERICAN SOCIETY FOR TESTING MATERIALS
AWSC	AMERICAN WELDING SOCIETY CODE
AWI	ARCHITECTURAL WOODWORK INSTITUTE
IBC	INTERNATIONAL BUILDING CODE
NBFU	NATIONAL BOARD OF FIRE UNDERWRITERS
NBS	NATIONAL BUREAU OF STANDARDS
NEC	NATIONAL ELECTRIC CODE
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
OSHA	OCCUPATIONAL SAFETY & HEALTH ACT OF 1970
UL	UNDERWRITERS' LAB

1.13 MOCK-UP

- A. Tests will be performed under provisions identified in this section and identified in the respective product specification sections.
- B. Accepted mock-ups shall be a comparison standard for the remaining Work.
- C. Where mock-up has been accepted by Architect/Engineer and is specified in product specification sections to be removed; remove mock-up and clear area when directed to do so.
- D. Wall Mock-Ups: Construct mock-ups of wall assemblies in “cut-away view, showing each step and material or the assembly (i.e., Stud wall, sheathing, weather barrier, thru-wall membrane flashing, cavity insulation system, and wall finish material). Also show typical weather barrier installation(s) at wall openings.

1.14 TESTING SERVICES

- A. Furnish materials and equipment that have been properly inspected and tested in accordance with accepted industry standards. Make field or laboratory tests where specified herein, the costs of such being paid for by the contractor, unless specifically stated otherwise. **FOR TESTING PAID FOR BY CONTRACTOR, THE PROPOSED TESTING LABORATORY/ENGINEER MUST BE APPROVED BY THE ARCHITECT NO LATER THAN 10 DAYS PRIOR TO BID OPENING.** If certain tests are to be paid for by others, the General Contractor will remain responsible for scheduling and coordinating their tests at appropriate times.

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- B. Should such test or visual observation indicate failure of the materials or construction to meet requirements of the drawings and or specification, Contractor is to make additional tests as directed by the Architect, until compliance has been achieved. If such work should fail to comply, Contractor shall replace it at his expense. Charges for this additional testing will be paid for by the Contractor.
- C. Testing and source quality control may occur on or off the project site. Perform off-site testing as required by the Architect/Engineer or the Owner.
- D. Reports will be submitted by the independent firm to the Architect/Engineer and Contractor at the same time, indicating observations and results of tests and indicating compliance or noncompliance with Contract Documents.
- E. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.
 - 1. Make arrangements with an independent firm and pay for additional samples and tests required for Contractor's use.
- F. Testing does not relieve Contractor performing Work to contract requirements.

1.15 NOTICE FOR ARCHITECT/ENGINEER OBSERVATION

- A. Whenever specifications require the contractor to have any part of the work observed and approved by the Architect, THE CONTRACTOR SHALL GIVE THE ARCHITECT A MINIMUM 24 HOUR NOTICE as to when that part of the work will be ready for observation. No part of weekends or holidays shall be counted as part of the required hours of notice. If the schedule of work has changed after notification, immediately notify the Architect to inform him of change. The following is a partial list of items requiring Construction Observation. This is a general listing; your specific project may not contain some of the items listed. Refer to each individual specification section for additional observation requirements:
 - 1. **Sanitary Sewer Line:** 24 hr 10' standpipe, proper bedding, proper clearances from water lines
 - 2. **Domestic Water Line:** 24 hr city wall pressure or 75 psi air pressure test, proper bedding, proper clearance from sanitary sewer lines.
 - 3. **Footing Inspections:** Count rebar and sizes, clearances, clean trenches, proper supports, proper clearances for drain lines & conduit.
 - 4. **Cast In Place Concrete:** (retaining walls, stem walls, pedestals) water stops are in place, count rebar and size.
 - 5. **Below Grade Water Proofing Membranes:** Inspection of surfaces, laps, lapping over top of footing prior to any backfill, or protection board being applied.
 - 6. **Slab on Grade:** vapor barrier, taping, extension to adjacent pours, wire mesh placement, proper supports, concrete slab depth, termite spray application (dyed)
 - 7. **Floor or Roof Deck:** structural engineer / architect is to inspect welds and side-lap fasteners.
 - 8. **Wall and Above Ceiling:** correct insulation, mechanical and electrical engineers are to inspect conduits, ducts etc. prior to closing in walls.

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9. **Masonry:** Mason to prepare mock sample for review prior to starting masonry on job site
10. **Gas Line:** 15psi, 24hr or as required by governing jurisdiction if more stringent.
11. **Through Wall Flashing:** Inspection of surfaces, laps, termination bar installed and sealed, alignment with masonry face.

1.16 REQUIRED SPECIAL INSPECTIONS

- A. When required by local or governing jurisdiction, the contractor will arrange with testing company, special inspections in accordance with Chapter 17 of the International Building Code. Contractor is to pay for special inspections.

1.17 REQUIRED PRE-INSTALLATION MEETINGS

- A. When noted in individual Specification Sections, on-site pre-installation meetings will be scheduled and held by the Contractor prior to installation of the system, product or material. The installation of items is not to begin until meeting is held. Group related pre-installation meeting together. Each specification Section should state the people that are required to attend each meeting.

1.18 MANUFACTURERS' FIELD SERVICES

- A. When specified in individual specification sections, require material or Product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.
- B. Submit qualifications of observer to Architect/Engineer 30 days in advance of required observations.
- C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
- D. Refer to Section 01 33 00 - SUBMITTALS, MANUFACTURERS' FIELD REPORTS article.

1.19 TOBACCO USE

- A. **Absolutely no tobacco or e-cigarette use is permitted inside new or existing building areas throughout construction of project.**

1.20 FINISH GRADING AND SITE STRUCTURE PLACEMENT CERTIFICATION

- A. Contractor to provide and pay for the services a surveyor licensed in the state which the work is to be performed, approved by the Architect, to certify that finish grade elevations and building and site structure locations are as per drawings and specifications. The Civil

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Engineer of record would be the preferred Surveyor, but not mandatory. Criteria for verification shall be, but not limited to the following:

1. Finish elevation of grading about perimeter of building, finish spot elevations shown on grading plan, and general site grading.
2. Finish elevations of paving areas, sidewalks, handicapped ramp slopes, finished floor elevation of new building(s), and other site structures.
3. Location of new building(s), and other site structures.
4. Finish elevations shall be checked by string line at not more than 50 feet on center. Tolerance of not more than 0.10 feet will be permitted.

- B. Any items found out of compliance with the drawings and specifications are to be identified, stated, and shown as to how it differs from intended elevation and/or location. All spot elevations are to be shown on a grading plan submitted by a surveyor.
- C. Items found out of compliance with the drawings and specifications will be subject to rework or adjustment as determined by the Architect and certified by Surveyor as corrected. Provide a letter and drawing from surveyor stating and showing that grades and locations are within tolerances per specifications.
- D. Final certification, showing all items within tolerances shall be submitted to and approved by Architect before Final payment will be released. Certification shall also be included for project closeout, Section 01 77 00.
- E. Grade and site structure elevations found to not be in compliance with intended grades after certification shall be corrected by grading contractor under this contract and re-certified as correct.

PART 2 PRODUCTS Not Used.

PART 3 EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Clean substrate surfaces prior to applying the next material or substance.

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

END OF SECTION

01 40 00-11

SECTION 01 50 00

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Temporary Utilities: Electricity, lighting, heat, ventilation, telephone service, water, and sanitary facilities.
- B. Temporary Controls: Barriers, enclosures and fencing, protection of the Work, and water control.
- C. Construction Facilities: Access roads, parking, progress cleaning, project signage, and temporary buildings.
- D. Temporary Equipment

1.2 RELATED SECTIONS

- A. Section 01 77 00 - Contract Closeout: Final cleaning.

1.3 TEMPORARY ELECTRICITY

- A. Cost: By Contractor; provide and pay for power service required from utility source. Provide enough power and voltage/phase sufficient for construction needs of any and all trades during course of construction. Contractor shall continue to pay for this temporary service until project is substantially complete as determined by Architect and/or Owner.
- B. Provide power outlets for construction operations, with branch wiring and distribution boxes located as required. Provide flexible power cords as required.
- C. Provide main service disconnect and over current protection and meter at convenient location.
- D. Permanent convenience receptacles may be utilized during construction. Damage done to receptacles and cover plates during construction period shall be repaired and or replaced.
- E. Provide adequate distribution equipment, wiring, and outlets to provide single phase branch circuits for power and lighting.

1.4 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

- A. Provide and maintain incandescent lighting for construction operations to achieve a minimum lighting level of 2 watt/sq ft.

01 50 00-1

- B. Provide and maintain 1 foot candle of lighting to the exterior staging and storage areas after dark for security purposes.
- C. Provide and maintain 5-foot candles of lighting to interior work areas after dark for security purposes.
- D. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.
- E. Maintain lighting and provide routine repairs.
- F. Permanent building lighting may be utilized during construction.

1.5 TEMPORARY HEATING

- A. Contractor is to provide and pay for heating devices and heat from electric utility or gas utility as needed to maintain specified conditions for construction operations until project is substantially complete as determined by the Architect and/or Owner. Contractor to make ready permanent heating system to supply heat to building as soon as system is tested and operational and pay for operation of permanent heating system until project is substantially complete as determined by Architect and/or Owner. Prior to operation of permanent equipment for temporary heating purposes, verify that installation is approved for operation, equipment is lubricated, and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts. Contractor is to double filter at return air during construction. Refer to Specification Division 23 for additional requirements during construction. The contractor shall continue to pay for this temporary service until the project is accepted by the owner. **The warranty period shall not begin until Certificate of Substantial Completion is issued.**
- B. Maintain minimum ambient temperature between 50- and 70-degrees F during working hours and 35 degrees F at other times in areas where construction is in progress, unless indicated otherwise in product sections.

1.6 TEMPORARY COOLING

- A. Utilize new cooling plant when it becomes available. Extend and supplement with temporary cooling devices as needed to maintain specified conditions for construction operations. The warranty period shall not begin until Certificate of Substantial Completion is issued.
- B. Prior to the operation of permanent equipment for temporary cooling purposes, verify that installation is approved for operation, equipment is lubricated, and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.

- C. Just prior to turning the building or portions of building over to owner, contractor will replace all filters on equipment that was used for temporary ventilation, heat, or cooling during construction. Double-filter at return air during construction.
- D. Maintain maximum ambient temperature of 80 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.

1.7 TEMPORARY VENTILATION

- A. Ventilate enclosed areas to achieve curing of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- B. Utilize existing ventilation equipment as they become available. Extend and supplement equipment with temporary fan units as required to maintain clean air for construction operations.

1.8 TELEPHONE SERVICE

- A. Provide, maintain, and pay for telephone service to field office at time of project mobilization.
- B. Contractor to have cellular telephone service at time of project mobilization.
- C. Equipment is to remain in operation until project substantial completion is issued.

1.9 FACSIMILE/COMPUTER E-MAIL SERVICE

- A. Provide, maintain and pay for facsimile service and a dedicated telephone line to field office at time of project mobilization. As an alternative, Provide on-site computer with e-mail and printer/scanner capabilities.
- B. Equipment is to remain in operation until project substantial completion is issued.

1.10 TEMPORARY WATER SERVICE

- A. At the earliest possible date provide, maintain and pay for suitable quality water service required for construction operations at time of project mobilization. Contractor shall continue to pay for this temporary service until project is substantially complete as determined by Architect and/or Owner.

1.11 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain the required facilities and enclosures. Provide at time of project mobilization. Maintain disposal service on a weekly basis and more often as required.

1.12 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations.
- B. Provide barricades and covered walkways if required per International Building Code Section 3306 and as required by governing authorities for public right-of-way and for public access to existing buildings.
- C. Provide protection for plants designated to remain. Replace damaged plants.
- D. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.13 FENCING

- A. Construction: Commercial grade chain link fence.
- B. Provide a minimum 8-foot-high fence around construction site per requirements of International Building Code Section 3306; equip with vehicle and pedestrian gates with locks. The contractor shall be responsible for compliance with this requirement.

1.14 WATER CONTROL

- A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment. Remove ice and snow as necessary for safety and proper execution of work.
- B. Protect site from puddling or running water.
- C. The contractor is to comply with the provisions of the Arkansas Water and Air Pollution Control Act (Act 472 of 1949, as amended, AR Ann. 8-4-101 et seq.), and the Federal Clean Water Act [33 U.S.C. 1251 et seq.]

1.15 EXTERIOR ENCLOSURES

- A. Provide temporary weather tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.
- B. Temporary Construction: Framing with contractor's option of reinforced polyethylene, plywood, or gypsum board sheet materials unless more specifically called for on drawings, with closed joints and sealed edges at intersections with existing surfaces.

1.16 PROTECTION OF INSTALLED WORK

- A. Protect installed Work and provide special protection where specified in individual specification sections.
- B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to prevent damage.
- C. Provide protective coverings at walls, top of cavity walls, projections, jambs, sills, and soffits of openings.
- D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting them with durable sheet materials.
- E. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- F. Prohibit traffic from landscaped areas.
- G. In cold weather, protect work from damage from frost and freezing. In hot weather, protect work from rapid drying out.
- H. Protect previously placed work by suitable coverings or other protection during installation of subsequent work. Immediately clean off any foreign materials accidentally deposited on finished surfaces and where such would stain, corrode, or otherwise disfigure work.
- I. Support no runways, ramps, or construction equipment on, nor transport over any items or assemblies subject to displacement, disfigurement, or other damage to finished surfaces.
- J. Brace all construction to prevent damage or failure from wind.

1.17 SECURITY

- A. Provide security and facilities to protect Work, and Owner's operations from unauthorized entry, vandalism, or theft.
- B. Coordinate with Owner's security program.

1.18 ACCESS ROADS

- A. Construct and maintain temporary roads accessing public thoroughfares to serve the construction area.

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- B. Extend and relocate as Work progress requires. Provide detours necessary for unimpeded traffic flow.
- C. Provide and maintain access to fire hydrants, free of obstructions.
- D. Provide means of removing mud from vehicle wheels before entering streets. Streets shall be cleaned on a regular basis of mud and gravel soiled as a result of construction activities. Local requirements shall also be followed by maintaining cleanliness of streets.
- E. Designated existing on-site roads may be used for construction traffic. Contractor will be responsible for repairing any damage to existing roads as a result of construction traffic. Road inspection shall be conducted prior to beginning of construction by Owner, Architect, and Contractor.

1.19 PARKING

- A. Arrange for or provide temporary gravel surface parking areas to accommodate construction personnel.
- B. When site space is not adequate, arrange for additional off-site parking.

1.20 PROGRESS CLEANING AND WASTE REMOVAL

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and rubbish from site weekly, or more often if needed, and dispose off-site.
- E. Open free fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.21 PROJECT IDENTIFICATION

- A. Construction Manager to provide 8 feet wide x 8 feet high project sign. Provide full color image provided by the Architect with location shown on project sign diagram shown in Appendix "A" at end of specification book. Place where directed by Architect. Provide wood structural support as required to resist light to moderate winds in the area.
- B. No other signs are allowed without Owner permission except those required by law.

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1.22 FIELD OFFICES AND SHEDS

- A. Office: For use by Contractor and Architect/Engineer, Weather tight, with lighting, electrical outlets, phone facsimile machine, heating, cooling, and Janitor service, and equipped with minimum 2 chairs, marker board/chalkboard, drawing rack, and drawing display table. An adequate size trailer will also be acceptable. The Field Office is to remain the property and/or responsibility of the Contractor.
- B. Provide space for Project meetings, with table and chairs to accommodate all anticipated persons attending.
- C. It shall be the Contractor's responsibility to secure placement for field office staging and material storage areas either on or off site for the accomplishment of the construction and to pay any associated fees.

1.23 TEMPORARY EQUIPMENT

- A. Contractor is to provide temporary elevators, hoists, walks, ramps, ladders, runways, scaffolding, shoring, bracing, and other equipment required for proper progress of project work.
- B. Each subcontractor is to provide proper equipment necessary to perform and complete work associated with his trade.

1.24 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, materials, and all other temporary items prior to Substantial Completion inspection.
- B. Clean and repair damage caused by installation or use of temporary work.
- C. Restore existing and permanent facilities used during construction to original or specified conditions as indicated on drawings and specifications.

PART 2 PRODUCTS Not Used.

PART 3 EXECUTION Not Used.

END OF SECTION

01 50 00-7

SECTION 01 60 00

MATERIAL AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Products.
- B. Transportation and handling.
- C. Storage and protection.
- D. Product options.
- E. Substitutions.

1.2 RELATED SECTIONS

- A. Section 01 40 00 - Quality Control: Product quality monitoring.

1.3 PRODUCTS

- A. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.
- B. Provide interchangeable components of the same manufacturers for components being replaced.

1.4 TRANSPORTATION AND HANDLING

- A. Transport and handle Products in accordance with manufacturer's instructions.
- B. Promptly inspect shipments to ensure that Products comply with requirements, quantities are correct, and Products are undamaged.
- C. Provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.

1.5 STORAGE AND PROTECTION

- A. Store and protect Products in accordance with manufacturers' instructions.
- B. Store with seals and labels intact and legible.

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- C. Store sensitive Products in weather tight, climate controlled, enclosures in an environment favorable to Product.
- D. For exterior storage of fabricated Products, place on sloped supports above ground.
- E. Provide bonded or insured off-site storage and protection when site does not permit on-site storage or protection.
- F. Cover Products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of Products.
- G. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- H. Provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.
- I. Arrange storage of Products to permit access for inspection. Periodically inspect to verify Products are undamaged and are maintained in acceptable condition.

1.6 PRODUCT OPTIONS

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

1.7 ALTERNATE SUBSTITUTIONS

- A. In general, these Specifications identify the required materials and equipment by naming one or more manufacturer's brand, model, catalog number and/or other identification; the first-named manufacturer's product used as the basis for design; other named brands considered acceptable for the application by Architect. Alternate brand manufacturers named must furnish products consistent with the specifications for the first-named product, as determined by Architect. Base Proposal shall include only those brands named, except as hereinafter provided.
 - 1. Submit product data and specifications.
 - 2. Submit color samples if color selection is required or specified.
 - 3. Provide a list of locations and contacts with telephone numbers of local installations.
 - 4. Provide qualifying comparison, comparing specifications of specified product to proposed substitution.

If any of these items are not provided, proposed substitution will be rejected.

- B. Where materials or equipment are described but not named, provide required first-quality items, adequate in every respect for the intended use, such items subject to Architect's approval prior to procurement.
- C. Prior to receipt of proposals, should Contractor wish to incorporate in Base Proposal brands of products other than those named in Specifications, **he shall submit written request for substitution with required information to Architect not later than ten (10) days prior to date proposals are due.** Architect will consider requests and items. If proposed substitution is approved, it will be listed in an addendum issued to principal Proposers.
- D. After execution of Owner-Contractor Agreement, alternate substitution of product brands for those named in Specifications will be considered, only if (1) request is received within thirty (30) calendar days after Contract date and request includes statement showing credit due Owner, if any; if substitution product is used, (2) Owner requests consideration be given to substitute brands, (3) Proposer provides qualifying comparison, comparing specifications of specified product to proposed alternate substitution. If this is not provided, the proposed substitution will be rejected. The Architect/Engineer will notify Contractor in writing of decision to accept or reject request.
- E. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents. Materials and equipment proposed for substitution shall be acceptable by Architect to that specified in regard to construction, efficiency, utility, aesthetic design, and color. The Architect's decision shall be final and without further recourse. The physical size of substitute brand shall not be larger than the space provided for it. Requests must be accompanied by full description and technical data, in two copies, including manufacturer's name, model, catalog number, photographs or cuts, physical dimensions, operating characteristics, and any other information necessary for comparison.
- F. Substitutions may be considered when a Product becomes unavailable through no fault of the Contractor.
- G. A request constitutes a representation that the Bidder: / Contractor:
1. Has investigated proposed Product and determined that it meets or exceeds the quality level of the specified Product.
 2. Will provide the same warranty for the Substitution as for the specified Product.
 3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
 4. Waives claims for additional costs or time extension which may subsequently become apparent.
 5. Will reimburse Owner and Architect/Engineer for review or redesign services associated with re-approval by authorities if required.

H. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, specifications section states that no substitutions are allowed for a specific material or item, or when acceptance will require revision to the Contract Documents.

PART 2 PRODUCTS Not Used.

PART 3 EXECUTION Not Used.

END OF SECTION

01 60 00-4

SECTION 01 75 00

STARTING OF SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Starting systems.
- B. Demonstration and instructions.
- C. Testing, adjusting, and balancing.

1.2 RELATED SECTIONS

- A. Section 01 40 00 - Quality Control: Manufacturers field reports.
- B. Section 01 77 00 - Contract Closeout: System operation and maintenance data and extra materials.
- C. Division 23 – Heating, Ventilation, and Air Conditioning

1.3 STARTING SYSTEMS

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Notify Architect/Engineer seven days prior to start-up of each item.
- C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions which may cause damage.
- D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- E. Verify that wiring and support components for equipment are complete and tested.
- F. Execute start-up under supervision of applicable manufacturer's representative or Contractors' personnel in accordance with manufacturers' instructions and requirements.
- G. When specified in individual specification Sections, require manufacturers to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

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- H. Submit a written report in accordance with Section 01 33 00 that equipment or system has been properly installed and is functioning correctly.

1.4 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate operation and maintenance of Products to Owner's personnel two weeks prior to date of final inspection.
- B. Demonstrate Project equipment and instruct the owner's representative by a qualified manufacturers' representative who is knowledgeable about the Project.
- C. For equipment or systems requiring seasonal operation, perform demonstrations for other seasons within six months.
- D. Utilize operation and maintenance manuals as the basis for instruction. Review contents of manual with Owners' personnel in detail to explain all aspects of operation and maintenance.
- E. Demonstrate start-up, operation, control, adjustment, troubleshooting, servicing, maintenance, and shutdown of each item of equipment at agreed time, at equipment location.
- F. Prepare and insert additional data in operations and maintenance manuals when the need for additional data becomes apparent during instruction.
- G. The amount of time required for instruction on each item of equipment and system is specified in individual sections.
- H. Contractor to provide DVD recording of all training sessions with Owner personnel. A copy of the recorded training sessions is to be given to the Owner included in the closeout documents.

1.5 TESTING, ADJUSTING, AND BALANCING

- A. The Contractor will employ services of an independent firm to perform testing, adjusting, and balancing. Contractor shall pay for services.
- B. The independent firm will perform the services specified in Division 23.
- C. Reports will be submitted by the independent firm to the Architect/Engineer indicating observations and results of tests and indicating compliance or noncompliance with the requirements of the Contract Documents.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTIONS

Not Used.

END OF SECTION

01 75 00-3

SECTION 01 77 00

CONTRACT CLOSEOUT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Closeout procedures.
- B. Final cleaning.
- C. Adjusting.
- D. Project record documents.
- E. Operation and maintenance data.
- F. Spare parts and maintenance Products.
- G. Warranties and Guarantees.
- H. Maintenance service.

1.2 RELATED SECTIONS

- A. Section 01 50 00 - Construction Facilities and Temporary Controls: Progress cleaning.
- B. Section 01 75 00 - Starting of Systems: System start-up, testing, adjusting, and balancing.

1.3 CLOSEOUT PROCEDURES

- A. Contractor shall notify Architect ten (10) days prior to the date on which the building will be ready for final inspection and prepare his own punch list of items to complete to meet contract documents. Such notice shall not be made until completion of all items is assured and has submitted completed punch list items to Architect. Architect will not schedule inspection for punch list until Contractor's completed punch list is received and each item is initialed by contractor as complete.
- B. Incomplete work found during the inspection shall be grounds for ceasing the inspection. Final inspection shall be resumed only upon completion of work.
- C. Minor adjustments and corrections to work shall not be considered cause for discontinuing final inspection.
- D. Upon receipt of the punch list prepared by Architect, the Contractor will immediately make necessary corrections to work as required for final completion of the project.

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- E. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Architect/Engineer's review.
- F. Provide submittals to Architect / Engineer that are required by any governing or other authorities.
- G. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due. The final application for payment will not be approved for payment by the Architect until the "COMPLETE CLOSEOUT" documents are provided to and reviewed by the Architect by the Contractor.
- H. Owner will occupy all portions of the building as specified in Section 01 11 00.

1.4 FINISHING

- A. Adjust windows, doors, drawers, hardware, appliances, motors, valves, controls, and other equipment for proper operation.
- B. Seal exterior joints between materials to form a waterproofed and airtight enclosure.
- C. Clean surface using appropriate materials and methods that will thoroughly clean but not damage materials and their finishes.

1.5 REPAIRS

- A. Unless Architect grants permission to repair any defective work, remove from project any work not in accordance with Contract Documents. Permission to repair any such work shall not constitute a waiver of Architect's right to require complete removal of defective work if repair operation does not restore quality and appearance of member of surface to Architect's satisfaction. If permission is granted, repair according to Architect's directions.

1.6 COMPLETED WORK

- A. Completed work shall find materials structurally sound, free from scratches, abrasions, distortions, chips, breaks, blisters, holes, splits, or other disfigurement considered as imperfections for the specific material.
- B. Completed surfaces shall be thoroughly clean and free from foreign materials and stains.
- C. Contractor is to install, connect, service and operate permanent systems at earliest practical dates, unless otherwise directed by Architect.
- D. Contractor is to provide Certification that finish grades and site structures placement is as per drawings and specifications. Refer to Section 01 40 00.

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1.7 FINAL CLEANING

- A. Execute final cleaning prior to final project assessment.
- B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- C. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- D. Clean permanent filters or replace disposable filters of operating equipment.
- E. Clean debris from roofs, gutters, downspouts, and drainage systems.
- F. Clean site: sweep paved areas, rake clean landscaped surfaces.
- G. Remove waste and surplus materials, rubbish, and construction facilities from the site.

1.8 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.
- B. Adjust windows, doors, drawers, hardware, appliances, motors, valves, controls, and other equipment for proper operation.

1.9 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract.
 - 5. Reviewed Shop Drawings, Product Data, and Samples.
 - 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
 - 1. Manufacturer's name and product model and number.
 - 2. Product substitutions or alternatives utilized.

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3. Changes made by Addenda and modifications. (Actual sections of addendum items may be pasted into specification in appropriate locations.)

- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
1. Measured depths of foundations in relation to finish floor datum.
 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent marker (i.e. new building, property line, etc.).
 3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 4. Field changes of dimension and detail.
 5. Details not on original Contract drawings.
 6. Changes made by Addenda and modifications. (Actual sections of addendum items may be pasted onto drawings in appropriate locations.)
- G. Submit to Architect in electronic media, **two (2) DVDs or Flash Drives**, containing **Record Documents as described in this section** and scanned **As-Built drawings in PDF format**, properly marked to show field modifications. **These shall include both Drawings and Specifications.** For videos asked for, provide videos on separate DVDs or Flash Drives
- H. All paper copies of closeout items to be scanned and copied to the electronic media.

1.10 CLOSEOUT DOCUMENTS

- A. Prepare Flash Drive titled "CLOSEOUT DOCUMENTS", title of project, and subject matter.
- B. Submit two (2) complete Sets of closeouts and As-Built drawings in electronic format, within 60 days after final inspection.
- C. Organize closeout contents, logically organized into sections as described below.

GENERAL (section tab)

Contents:

1. Directory, listing names, addresses, and telephone numbers of Architect / Engineer, Contractor, Subcontractors, and major equipment suppliers.
2. Executed original of occupancy permit
3. Punch Lists showing items signed off as completed by Contractor.
4. Contractor's "Asbestos Free" certification letter stating that no materials have been placed in the building containing asbestos material.
5. Contractors' "storm water pollution" certification letter stating that the work has been performed in compliance with the requirements of the Arkansas Water and Air Pollution Control Act and the Federal Clean Water Act.

LIEN WAIVERS (section tab)

Lien Waivers must demonstrate that the project is free of any debt or claim from any subcontractor, supplier or vendor and that the project is free and clear except for monies owed the General Contractor. All subcontractors and suppliers must have been completely paid except for the percentage of monies owed by the General Contractor, or payment a bond posted for each sub-contractor and supplier for whom a balance is owed. For this project, the amount is not to exceed Ten Percent (10%) of their contract. Lien waiver submitted from each subcontractor and supplier is to show the amount they are still owed. **These requirements are mandatory conditions to qualify for final payment.**

Contents:

1. AIA G706A - CONTRACTOR'S AFFIDAVIT OF RELEASE OF LIENS
2. AIA G706 - CONTRACTOR'S AFFIDAVIT OF PAYMENT OF DEBTS AND CLAIMS
3. AIA G707 - CONSENT OF SURETY TO FINAL PAYMENT
4. Final Lien Release from each subcontractor and supplier.

WARRANTIES / GUARANTEES / BONDS (section tab)

- A. Provide notarized copies, one original and one photocopy. Execute and assemble transferable warranty documents from Subcontractors, suppliers, and manufacturers. Submit warranties prior to final Application for Payment. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within 10 days after acceptance, listing date of acceptance as start of warranty period.
- B. Provider manufacturer **warranties and guarantees** for each product and system provided under this contract. Provide installer and manufacturer warranty department phone numbers and contact the person if available for each product and system. This is a general listing; your specific project may not contain some of the items listed.

Contents:

1. General Contractor's Statement of Warranty
2. All manufacturers' warranties and guaranties stipulated or implied on equipment and products (i.e., carpet wear. prefinished metal finish, etc.)
3. One-year warranty from each subcontractor
4. Termite Protection Warranty (Five-Year)
5. Polished concrete warranty: Ten-Year
6. Below-Grade Waterproofing Membrane Warranty (Five-Year)
7. FM 1-90 roof uplift compliance letter from roofer.
8. Fluid-applied weather barrier (Five-Year)
9. Executed Metal Roofing Guarantee (Five-Year Installer's Warranty, 20-year Finish Warranty)
10. Wood interior door: Lifetime warranty
11. Aluminum door construction: Lifetime warranty
12. Glazing warranty
13. Continuous hinges warranty: (manufacturer's lifetime warranty)
14. Lockset warranty: Mortise: Three-year

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15. Exit device: Three-years.
16. Door closers: 30-years
17. Suspended ceilings: 30-year limited system performance Warranty
18. Millwork: 10-year warranty)
19. Modular carpet warranty: (Refer to specific Specification Section)
20. Fiber Reinforced Plastic (FRP): One-year warranty
21. Special coatings: 5-year warranty
22. Window Shades: 25-year standard manufacturer's warranty
23. Hot Water Tank Warranty: (Refer to specific Specification Section and/or water heater schedule on drawings)
24. HVAC Manufacturers Warranties-(Contractor to fill out equipment warranty and registration cards and mail into manufacturer. Provide a copy of each warranty in the closeout manual.

1.11 OPERATION / MAINTENANCE DOCUMENTS

- A. Submit data on DVD or Flash Drive.
- B. Organize each individual section with printed title "OPERATION / MAINTENANCE DOCUMENTS", title of project, and subject matter.
- C. Submit one set of volumes, within 10 days after final inspection.
- D. Subdivide contents, logically organized into sections as described below, with tab titling each section. Prepare a Table of Contents for each system or material description identified as follows:

MECHANICAL (section tab)

Contents:

1. Directory, listing names, addresses, and telephone numbers of Subcontractors, and major equipment suppliers.
2. Operation and maintenance instructions, arranged by system. Identify the following:
 - a. Significant design criteria.
 - b. List of equipment.
 - c. Parts list for each component.
 - d. Operating instructions.
 - e. Maintenance instructions for equipment and systems.
 - f. Maintenance instructions for finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
 - g. Video on flash drive of each equipment and system training session.
3. Project documents and certificates, including the following:
 - a. Shop drawings and product data.
 - b. Air balance and test reports - see specifications.
 - c. Certificates.
 - d. Start up report on all major equipment items (See Division 23 of Specifications)

- e. Copies of registration and warranty cards on major equipment initiating warranty time dated the date of substantial completion and mailed by contractor as required.

ELECTRICAL (section tab)

Contents:

1. Directory, listing names, addresses, and telephone numbers of Subcontractors, and major equipment suppliers.
2. Operation and maintenance instructions, arranged by system. Identify the following:
 - a. Significant design criteria.
 - b. List of fixtures, equipment and switch gear.
 - c. Parts list for each component.
 - d. Operating instructions.
 - e. Maintenance instructions for equipment and systems.
 - f. Maintenance instructions for finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
 - g. Video on flash drive of each equipment and system training session.
3. Project documents and certificates, including the following:
 - a. Shop drawings and product data.
 - b. Electrical System Test Report - see specifications
 - c. Certificates / Warranties.
 - d. Start up report
 - e. Copies of registration cards on major equipment initiating warranty time dated the date of substantial completion and mailed by contractor as required.

MISCELLANEOUS EQUIPMENT & MATERIALS (section tab)

Contents:

1. Directory, listing names, addresses, and telephone numbers of Subcontractors, and major equipment or materials suppliers.
2. Operation and maintenance instructions for equipment arranged by system and subdivided by specification section. Identify the following:
 - a. Significant design criteria.
 - b. List of equipment.
 - c. Parts list for each component.
 - d. Operating instructions.
 - e. Maintenance instructions for equipment and systems.
 - f. Maintenance instructions for finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
3. Finish material schedule including the following:
 - a. Listing of all materials
 - b. Manufacturers of each material.
 - c. Color or finish supplied on each material.
4. Project documents and certificates, including the following:
 - a. Shop drawings and product data.
 - b. Material Maintenance instructions and recommendations.
 - c. Wear, finish, or misc. guarantees

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1.12 SPARE PARTS AND MAINTENANCE PRODUCTS

- A. Provide spare parts, maintenance, and extra products in quantities specified in individual specification sections.
- B. Deliver to project site and place in location as directed by Owner; obtain receipt prior to final payment.

1.13 CLOSEOUT SUBMITTAL LIST

The following is a list of submittals required by this section. It includes but is not necessarily limited to the following:

- All warranties guarantees and bonds as listed above.
- Record Drawings and Shop Drawings - Provide one set of All Shop Drawings, and two sets of Record Drawings per section 1.9.
- A Directory, listing names, addresses, and telephone numbers of Architect / Engineer, Contractor, Subcontractors, and major equipment suppliers.
- Executed original of occupancy permit
- Copy of Architect's and consultant's punch list(s) with the project manager's initials beside each item signifying that each item has been corrected.
- Contractor's "Asbestos Free" certification letter.
- Contractor's "storm water pollution" certification letter
- Contractor's "concrete placement" drawings identifying the area placed, the time and date of the placement and weather conditions.
- Finish grading and site structure placement certification
- Letter or proof stating SWPPP has been terminated for this contract from state environmental office and responsibility transferred to Building Contractor.
- AIA G706A - CONTRACTOR'S AFFIDAVIT OF RELEASE OF LIENS
- AIA G706 - CONTRACTOR'S AFFIDAVIT OF PAYMENT OF DEBTS AND CLAIMS
- AIA G707 - CONSENT OF SURETY TO FINAL PAYMENT
- Final Lien Release from each subcontractor and supplier.
- General Contractor's Statement of Warrantee
- Inspection Report from Roofing Manufacturer's Representative.
- Third Party Special Inspection Reports
- Copy of HVAC Manufacturers Warranties and registration (Originals filled out and sent to manufacturer.)
- MECHANICAL, ELECTRICAL & MISCELLANEOUS EQUIPMENT
 - a. Directory, listing names, addresses, and telephone numbers of Subcontractors, and major equipment suppliers.
 - b. Design criteria.
 - c. List of equipment.
 - d. Parts lists
 - e. Operating instructions.
 - f. Maintenance instructions
 - g. Shop drawings and product data.
 - h. test reports.

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- i. Certificates.
- j. Startup report.
- Finish material schedule including the following:
 - a. Listing of all materials
 - b. Manufacturers of each material.
 - c. Color or finish supplied on each material.
- Owner receipt of spare parts and maintenance products. Contractor will provide list, naming all spare material, items and parts as specified in individual sections or on drawings. The contractor will deliver spare material, items and parts to the owner and ask him to sign list as proof that all items have been provided as listed.

PART 2 PRODUCTS Not Used.

PART 3 EXECUTION Not Used.

END OF SECTION

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SECTION 02 32 00

GEOTECHNICAL SOILS REPORT

PART 1 GENERAL

1.1 SUMMARY

- A. A soils investigation report has been prepared for the site of this work by Data Testing, Inc., Consultants, Fort Smith, AR, hereinafter referred to as the Soil Engineer.
- B. Availability: The soils investigation report is bound in this specification for reference only.
- C. Use of data:
 - 1. This report was obtained only for the Architect's use in design and is not a part of the Contract Documents. The report is available for bidders' information but is not a warranty of subsurface conditions.
 - 2. Bidders should visit the site and acquaint themselves with all existing conditions. Prior to bidding, bidders may make their own subsurface investigations to satisfy themselves as to site and subsurface conditions, but all such investigations, shall be performed only under time schedules and arrangements approved in advance by the Architect.
 - 3. If a conflict should occur between the soil report and Section 31 23 00, the information in Section 31 23 00 shall govern.

PART 2 PRODUCTS Not Used

PART 3 EXECUTIONS

3.1 SUMMARY

- A. Contractor shall follow the design for this work indicated by the drawings. Include all labor, equipment, and materials including borrow and disposal of waste, to accomplish final grades shown on drawings and specified herein.
- B. Adjustment of work: Re-adjust all work performed that does not meet technical or design requirements but make no deviations from the Contract Documents without specific and written approval from the Architect.

END OF SECTION

02 32 00-1

GEOTECHNICAL INVESTIGATION

FOR

Farm Credit

1990 N 18th St
Ozark, AR 72949

Investigation performed September 2025



Document Reference: DT-25-1009-DC-01
Project No.: G2025086

Prepared for
Mickle Griffin

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GEOTECHNICAL INVESTIGATION

FOR

Farm Credit

1990 N 18th St

Ozark, AR 72949

Certificate of Authorization #1478

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DATA TESTING

WATER - SOIL - CONCRETE - ASPHALT

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1. Project Information

On the date of September 25th 2025, Data Testing Inc. conducted on-site geotechnical borings to establish appropriate design criteria for the future Farm Credit in Ozark, Arkansas. DT Inc was provided the boring locations by the client with the investigation taking place across the entirety of the property with the future building and pavement areas to aid in geotechnical design. This site plan was used as a guide to locate the boundaries of the project site to survey exact borehole locations. The soil conditions discussed in this report are those encountered at the time of the drilling operations. This geotechnical investigation was authorized by **Ben Forsgren with Mickle Griffin**.

2. Purpose & Scope

The purpose of this geotechnical exploration was to assess the general type and condition of the sub-surface materials present at the project site and provide recommendations to guide in site development, foundation design, and quality assurance.

SCOPE

The Scope of our geotechnical exploration included the following items:

1. Use GPS systems to locate borings within the property.
2. Coordinate Utility Locate within a 25-foot radius of each boring location.
3. Drilling five (5) Standard Penetration Test (SPT) borings, continuous sampling in the top 5.0 feet. Visual evaluation of the soil samples obtained during our field testing for further identification and classification.
4. Measuring groundwater in each boring.
5. Analyzing the field data results in order to provide recommended soil parameters for building & pavement design.
6. Perform laboratory analysis of field-collected samples.
7. Preparing this report to document the results of the fieldwork and provide our recommendations.

3. Project & Site Conditions

The site consists of an undeveloped piece of farmland west of 1900 N 18th St in Ozark, AR. The site was found to have silty clays, silty sands & clayey sands that continue to refusal depths. The site is currently being used for raising cattle. No trees or extensive foliage was present within the project footprint. Each existing ground elevation is displayed on the corresponding boring log.

Table 1: Project & Site Description

Development Item	Detail	Description
General Site	Size (Acre)	±1.5 Acres
	Existing Development	N/A
	Vegetation	Maintained Pasture
	Slopes	Southward
	Retaining Walls	N/A
	Drainage	Southern Ditch line
	Cuts & Fills	None Observed
Proposed Building	No. of Buildings	Single
	Square Ft.	±2,500
	Stories	Single
	Construction	Wood Framed
	Column Loads	Unknown
	Wall Loads	Unknown
	Preferred Foundation	Shallow Continuous Foundation
Pavements	Preferred Slab	Assumed Slab-on-grade
	Traffic	EASL Unknown
	Standard Duty	Rigid & Flexible
	Heavy Duty	Rigid

3.1. Field Operations

The test borings were drilled to depths of 3.5 to 7.1 feet within all areas of the site. The borings were found to have silty clays, silty sands & clayey sands. Soil samples were obtained by split-spoon and auger sampling techniques.

Standard penetration tests were performed at depths between 0.0 and 7.0 feet to determine the on-site (in-place) shear strength of the soils anticipated to be within the stress envelope induced by the proposed construction. The standard penetration test (ASTM D1586) consists of determining the number of blows required for a 140-pound hammer, free falling 30 inches, to drive a split-spoon sampler 12 inches into the sub-surface materials after being seated six inches. The number of blows required to drive the split-spoon sampler in the final 12 inches of the test is the SPT "N" value. The "N" value can be correlated to the on-site shear strength of the soils.

Following the Standard Penetration Tests, solid flight augers were drilled to specified depths. All borings were sealed with a cement bentonite grout mixture after water level readings and soil investigation work was complete. Borings through existing pavements were capped with 4000psi non-shrink grout to match the pavements' thickness.

The test borings were logged in the field during the drilling operations. Each soil sample collected was placed in a sealed container to preserve the natural moisture content and transported to DT Inc's. laboratory for further testing and classification. The soil samples will be stored for 90 days after the submittal of this report. Please notify us prior to this time if longer storage is required.

3.2. Laboratory Testing

Moisture content determinations (ASTM D2216) were made on a majority of soil samples received in the laboratory. Atterberg limit tests (ASTM D4318) were performed on selected soil samples to determine the plasticity index of the soils encountered. A partial sieve analysis was also performed on these samples to determine the percentage by weight, of the soil passing the #200 sieve. The results of the Atterberg limit tests and partial sieves were used to verify and/or revise the visual classifications of the soils and determine the engineering properties of the soils.

The results of the laboratory tests with data are referenced within the boring logs in **Appendix I Boring & Test Pit Logs** Sub-surface Stratigraphy. Specific types and depths of sub-surface strata encountered in the borings are shown on the attached Logs of Test Holes.

Sub-surface materials encountered on this site can be grouped into four generalized strata with distinct physical and engineering properties. The lines designating the interface between strata on the test boring logs represent approximate boundaries. Transitions between strata may be gradual.

Table 2: Laboratory Testing

Test	ASTM	No. of Tests
Natural Moisture Contents	D2216	18
Atterberg Limits	D4318	10
Materials Finer Than No. 200 Sieve by Washing	D1140	10

3.3. Site Stratum

Table 3: Stratum Overview

Stratum No.	Description	Consistency & Hardness
1	Silty Sands (SM)	Very Stiff
2	Clayey Sands (SC)	Medium to Stiff
3	Sandy Lean Clay (CL-ML)	Stiff

Subsurface soil profiles were developed using data from 5 borings conducted across the site (**B1-B5**). These profiles, which illustrate the thickness and distribution of the encountered strata, are included in the Appendix. Elevations for each boring were determined using a Trimble GPS system. While the logs delineate distinct strata boundaries, transitions between materials are often gradual.

Stratum I – Silty Sands (SM)

Beneath the top-soil layer, which ranged from approximately .25 to .33 feet thick, silty sands were encountered in nearly all borings. These sands extended to depths of up to 3.5 feet. Multiple Atterberg Limits tests yielded Plasticity Index PI values of 0. These values suggest a low potential for volume change with moisture changes.

Allowable bearing capacities, estimated using Standard Penetration Test (SPT) blow counts and a safety factor of 3, ranged from 650 to over 8,000 psf depending on depth and consistency.

Stratum II – Clayey Sand (SC)

Clayey sand layers were encountered beneath the silty sands in several borings. Multiple Atterberg Limits tests yielded Plasticity Index PI values of 4, 6 & 11. These values suggest a low potential for volume change with moisture changes.

Allowable bearing capacities, estimated using Standard Penetration Test (SPT) blow counts and a safety factor of 3, ranged from 2,000 to over 4,600 psf depending on depth and consistency.

Stratum III – Sandy Clay (CL)

Sandy Clays were encountered in all borings aside from **B5**. Atterberg Limits testing yielded Plasticity Index (PI) values of 17 & 21. These values suggest a moderate to high potential for volume change with moisture fluctuations.

Allowable bearing capacities, estimated using Standard Penetration Test (SPT) blow counts and a safety factor of 3, ranged from 1,550 to over 8,000 psf depending on depth and consistency.

4. Discussion

The following recommendations are based on our understanding of the proposed construction scope, data obtained in our test borings, a site investigation, and our experience with soils and sub-surface conditions similar to those encountered at this site.

4.1. Development Considerations

At the time of this report, a grading plan was not available. Based on anticipated grades, it is expected that varying amounts of cut and fill will be necessary to achieve the final grades. Once a grading plan is developed, Data Testing Inc. should be given the opportunity to review the plan and assess its impact on our recommendations.

Our evaluation of the sub-surface conditions encountered in the test borings, along with the assumed foundation loads, indicates that construction using a Conventional Shallow Foundation system is feasible. The site development recommendations provided below are intended to support construction with this foundation system. Should an alternative foundation system be preferred, Data Testing Inc. should be consulted to review the site development recommendations and ensure their suitability for the chosen foundation system.

4.2. Site Preparation

Prior to construction commencing, any existing structures & debris such as concrete slabs/pavements, and any underground utilities should be demolished and removed from work limits. Underground utility lines should be relocated or capped off outside the construction area. We do not recommend active or non-active lines remain within the proposed structure's footprint until new installation begins. All utility excavations should be backfilled with properly compacted engineered fill. Any abandoned utility lines, if left in place outside the structure's footprint, should be filled in with cement grout with a minimum 28-day compressive strength of 500 pounds per square inch (psi).

After demolition and removal as mentioned above, the Geotechnical Engineer or his representative should evaluate the subgrade.

Areas to receive fill, such as foundations, pavements, and slabs should be scarified and recompacted, then proof rolled prior to the fill placement. Proof rolling should be accomplished with a fully loaded, tandem-axle dump truck or similar vehicle. Areas that exhibit "pumping" during proof roll procedures should be treated by a method recommended by the Geotechnical Engineer. This method may consist of undercutting and backfilling with suitable select fill (as specified in foundation recommendations) or various other methods deemed suitable by the Geotechnical Engineer. Soil stabilization methods may be considered by the engineer of record, however additional testing of the soils will be required to achieve the desired strength of stabilized materials. Cement stabilization is recommended over lime stabilization via cost & workability. Primarily fine-grained soils such as the ones found at this project site may require 3 to 7 percent cement (Baseline of 5) to achieve desired strength. Stabilization depths can range from 12" to 24" depending on the needed bearing and future pavement type.

All trees, vegetation, roots, topsoil, and deleterious materials must be removed from the designated construction areas. Observations from the borings indicate that the topsoil thickness ranges from

approximately 3 to 4 inches. While this measurement is precise at the specific boring locations, it can be extrapolated between boreholes for preliminary cost estimation purposes. It is recommended that a Geotechnical engineer supervise the stripping and grubbing operations to ensure the complete removal of unsuitable materials from the construction sites.

The presence of medium stiff to stiff soils within the surface has been noted and should be anticipated. Site access and mobility are expected to be challenging, especially during wet periods of the year.

Materials disturbed during clearing operations should either be stabilized in place or, if necessary, undercut to reach undisturbed materials and subsequently backfilled with properly compacted, approved structural fill.

During site preparation activities, the contractor should identify borrow source materials intended for use as structural fill and submit samples to the testing laboratory. This will ensure compliance with the Structural Fill requirements outlined below and facilitate the determination of appropriate moisture-density relationship curves.

4.3. Difficult Excavation

Auger refusal was encountered in multiple borings at the site. Most of the soils to be removed are expected to have some resistance. It is our understanding that shallow continuous foundations will be utilized for the building structures.

Table 4: Refusal Depths

Boring No.	Depth (ft)	Boring No.	Depth (ft)
B1	6.5' (T)	B4	7.1' (R)
B2	5' (R)	B5	3.5' (R)
B3	6.3' (R)		

(R) =Refusal – (T) =Terminate

4.4. Groundwater

No Groundwater was found during drilling operations. Water levels may change depending on the time and date that the borings were conducted. At different intervals during the construction process, it may be beneficial for temporary drainage to be cut & diverted from the work area due to the site's flat nature and elevation to the surrounding properties. Given the information that no sub-surface structures will be present, we do not anticipate dewatering to be necessary across this project site. All borings were backfilled once the on-site work was completed.

4.5. Subgrade Evaluation

It is recommended that the project Geotechnical engineer or a qualified representative assess the subgrade once the site has been prepared. There may be unsuitable or unstable areas in parts of the site that have not been explored. All areas requiring fill or intended to support structures should be thoroughly proof rolled using a heavy (minimum 40,000 lb.), rubber-tired vehicle at the following times:

- After an area has been stripped and undercut, if necessary, before placing any fill.
- After grading an area to the finished subgrade elevation in building or pavement areas.
- After areas have been exposed to precipitation or have been exposed for more than 48 hours.

Instability may occur during construction due to climatic conditions and other factors immediately before and during the construction process. If any soft or unsuitable soils are detected during proof rolling, they must be undercut or stabilized before placing fill, constructing pavements, or building floor slabs. All unsuitable materials identified during construction should be removed and replaced in accordance with the Structural Fill section of this report.

4.6. On & Off-Site Fills

Table 5: Fill Requirements

Soil Type	USCS Classification	Site Requirements	Placement Locations
Sand & Gravel	GW, GP, GM, SW, SP, SM	Maximum 3" Particle Size	All Structural Locations & Depths with Proper Drainage
Clayey Sands & Gravel	SC, GC	LL<50, PI<24, yd>100 pcf	All Locations & Depths
Clay	CH	LL>50, PI>25, yd<100 pcf	Detention Ponds & Green Areas
Silt	ML, MH	N/A	Green Areas
On-Site Materials	SC	As Listed Above	To be Assessed

All Structural fills should be free of vegetation, topsoil's & deleterious materials. Organic contents of materials to be used for fills should be less than 3 percent unless approved by the Geotechnical engineer. Laboratory testing of the soils proposed for fill must be performed in order to verify their conformance with the above recommendations. Any fill placed at the site should be reviewed by the Geotechnical engineer.

Table 6: Structural Fill Placement Requirements

Specification	Requirement
Lift Thickness	Maximum 8-inch loose lifts when compacted with large heavy compaction equipment. Maximum 6-inch loose lifts when compacted with lightweight compaction equipment. (Thinner lifts may be required in confined locations.)
Density	Minimum of 98 percent of maximum dry density as defined by ASTM D698 at all locations and depths.
Moisture	±2 percent of optimum moisture as defined by ASTM D698 for cohesive soils. For cohesionless soils with greater than 12 percent passing the US Standard No. 200 sieve, ±3 percent of optimum moisture as defined above. The moisture requirement is waived for cohesionless soil with less than 12 percent passing the No. 200 sieve.
Density Testing Frequency	One test per 2,500 sf in building areas and one test per 5,000 sf in pavement areas with a minimum of 3 tests per lift. One test per 100 feet of trench backfill with a minimum of 2 tests per lift. The testing frequency can be increased or decreased by the Geotechnical Engineer of Record in the field based on uniformity of material being placed and compactive effort used.

Under-slab materials should consist of at least four inches of clean, washed, free-draining, natural rock placed directly on the prepared subgrade or fill soils. A vapor barrier consisting of 10 ml polyethylene sheeting should be placed on top of the clean rock. The rock should conform to the American Society of Testing and Materials "Standard Specifications for Concrete Aggregates" ASTM C33. The rock should be moistened which will assist in placement of the concrete floor slab.

Pavement Base Course shall conform to Arkansas State Highway and Transportation Department (ARDOT) Standard Specification Section 303 Class-7. Base thickness shall be dependent on the chosen pavement type.

These base materials should not be placed in more than an 8-inch loose lift at any time. If the placement of rock is to be greater than 8 inches, the material should be placed and compacted in 4-inch increments. Base materials should be compacted to 98 percent of modified laboratory density, ASTM D-1557.

Utility Trenches must be backfilled and compacted according to the specified procedures for structural fill. To achieve proper compaction with hand-operated equipment, it may be necessary to reduce the lift thickness to 4 to 6 inches. The completion of utility trenches under asphaltic concrete pavements are recommended to be a slurry (flowable fill) to mitigate settlement.

4.7. Wet Weather Construction

Excessive movement of construction equipment across the site during wet weather can create ruts that collect rainwater, thereby extending the drying time of subgrade soils. During rainy periods, additional effort is required to properly prepare the site and maintain an acceptable subgrade. This task becomes more challenging in areas where clay or silty soils are exposed at the subgrade elevation.

Grading contractors typically delay operations during wet weather, waiting for more favorable conditions. During intermittent periods of favorable weather, contractors can disk or aerate the upper soils to promote drying. When deadlines prevent the postponement of grading operations, additional measures such as undercutting and replacing saturated soils or stabilization can be employed to facilitate the placement of additional fill material.

To minimize the potential for soil moisture fluctuations within building areas and pavement subgrades, site grading should ensure positive drainage away from buildings and pavements. Excessive irrigation of landscaping should be avoided as it poses a risk of saturating and softening soils beneath shallow footings and pavements, potentially leading to the settlement of footings and premature pavement failure.

5. Recommendations

5.1. Building Recommendations

At this time, the specific development details for this site, such as the type of structure, desired finished floor elevation, and other design parameters are unknown. Therefore, the following recommendations are based on general assumptions and should be confirmed once final plans are available.

It is our understanding that the future building's floor slab may sit at an approximate elevation of 578' based on a provided Topographical map of the site. The footprint of the building has approximately 3.0 feet of fall from the north to the south. Given the layer of organic silts and mildly inconsistent soils, DT Inc. recommends removing the top 3.0 feet of existing materials, extending a minimum of 5.0 feet beyond the building's foundation footprint as well as a minimum of 3.0 feet below the desired finished floor elevations. With this assumption it may be possible to reuse on-site materials from the north to fill development areas in the south. The materials relocated should be further tested to ensure they meet the criteria for structural applications. This approach will ensure that all foundations are seated in consistent, stable materials.

The floor slab should include at least 4 inches of clean, washed drainage rock (as specified in **Section 4.7, On & Off-Site Fills**), followed by reinforced concrete.

It is critical that the overbuild be placed during building pad construction to ensure adequate stabilization on all sides of the foundation and to aid in water retention near/below the footings. Proper select fill material with an adequate plasticity range should be used across the site to prevent groundwater absorption. After excavation and prior to select fill or base course placement, the site should be scarified, moisture-conditioned, recompacted, and proof-rolled with a loaded dump truck to identify any soft areas. If soft areas remain, additional remediation will be necessary.

All in-place foundations should have a minimum of 12 inches of select fill material beneath them. Shallow continuous footings should be seated 18 inches below adjacent exterior grades (minimum width: 24 inches). The allowable bearing capacity for footings placed in this manner is 2,500 psf. The slab should be designed by the structural engineer of record.

The foundation and floor slab concrete should be placed as soon as possible after completion of the building pad subgrade to minimize changes in moisture content or stress conditions of the foundation soils.

5.2. Pavement Recommendations

At this time, the anticipated traffic loading and Equivalent Single Axle Load (ESAL) count for pavement design are unknown. Therefore, the following recommendations are preliminary and based on general assumptions. Final pavement design should be confirmed once traffic and usage details are available.

Based on the materials encountered at the boring locations and assuming our site preparation recommendations are implemented, pavements may be designed using a California Bearing Ratio (CBR) of 3. Note that no CBR or plate load testing was performed to develop these recommendations.

Due to the predominance of soft silty sands on the surface, it is recommended to remove 1.5 feet of material below the proposed finished pavement elevations, extending a minimum of 3.0 feet beyond the pavement

perimeter. If pavement sections are elevated above this cut, all topsoil and organics should be stripped prior to fill placement. Replace unsuitable material with off-site select fill as specified in Section 4.7, On & Off-Site Fills. Above the select fill, place the appropriate thickness of compacted Class-7 base rock, followed by the pavement section as outlined below. Cement stabilization to a minimum depth of 1.0 foot below base rock levels may also be considered for added stability (see **Section 4.2, Site Preparation**).

After excavation and prior to select fill or base course placement, proof-roll the subgrade with a loaded dump truck to identify soft areas. Wet, silty soils may require additional undercutting or a bridge lift. A Geotechnical Engineering representative should be present during proof-rolling for both granular and cohesive materials.

Concrete Pavement:

- Light Duty: 6 inches of Portland Cement Concrete over 4 inches of (ARDOT) Class-7 Base
- Heavy Duty: 6 inches of Portland Cement Concrete over 6 inches of (ARDOT) Class-7 Base Concrete should be 4,000 psi and properly reinforced. Heavy-duty pavement is recommended for aprons, dumpster pads, and heavy truck traffic areas.

Asphalt Pavement:

- Light Duty: 2.5 inches of Hot Mix Asphaltic Concrete (minimum 3 inches) over 6 inches of (ARDOT) Class-7 Base

The pavement design should be confirmed by the Civil Engineer of record. Maximum slope should not exceed 5% in parking and roadway areas, with a 2% cross slope for drainage.

The most critical factor for long-term pavement performance is a well-prepared, uniform subgrade. Localized areas of poor preparation can lead to cracking or potholes, significantly reducing service life.

Pavements should be installed late in construction after heavy traffic has ceased. If needed, a base course layer can be placed earlier as a working surface, but the site should be proof-rolled again before final paving.

5.3. Retaining Walls

It is our understanding that no structural retaining walls are proposed on this project site. If the addition of structural walls is made, Data Testing should be able to provide load-bearing parameters.

Retaining walls should be designed by a professional engineer familiar with retaining wall design and registered in Arkansas. The designer should consider sloping backfill, surcharges, and other factors affecting load pressures against the wall.

5.4. Seismic Site Classification

Based on the average N values from our boring data, we recommend the following:

Table 7: Seismic Site Classification

Basis of Evaluation	Recommended Site Classification
2015 International Building Code (IBC) and ASCE 7, Chapter 20	C
This recommended seismic site classification is based on the 2015 Edition of the International Building Code, the sub-surface conditions encountered in the borings, and our knowledge of the geologic conditions of the site. Our sub-surface exploration extended to a maximum depth of about 15 feet; hence the seismic site classification should be re-evaluated in the event sub-surface information is made available to a depth of 100 feet.	

6. Quality Assurance Considerations

Additional analyses and comments may be necessary during the design phase after finished grade elevations are known, as final plans are developed. Data Testing, Inc. cannot accept responsibility for any misinterpretation of our recommendations if we have not been provided with an opportunity to review the final plans and specifications.

Furthermore, we recommend that a QA program be implemented to monitor the quality of materials and construction during the course of the project.

7. Limitations

This report is for the exclusive use of **Mickle Griffin** personnel only as required by the designers of the project described herein and may only be applied to this specific project. Our conclusions and recommendations have been prepared using the generally accepted standards of Geotechnical Engineering practice in the State of Arkansas. No other warranty is expressed or implied. Our firm is not responsible for the conclusions, opinions, or recommendations of others.

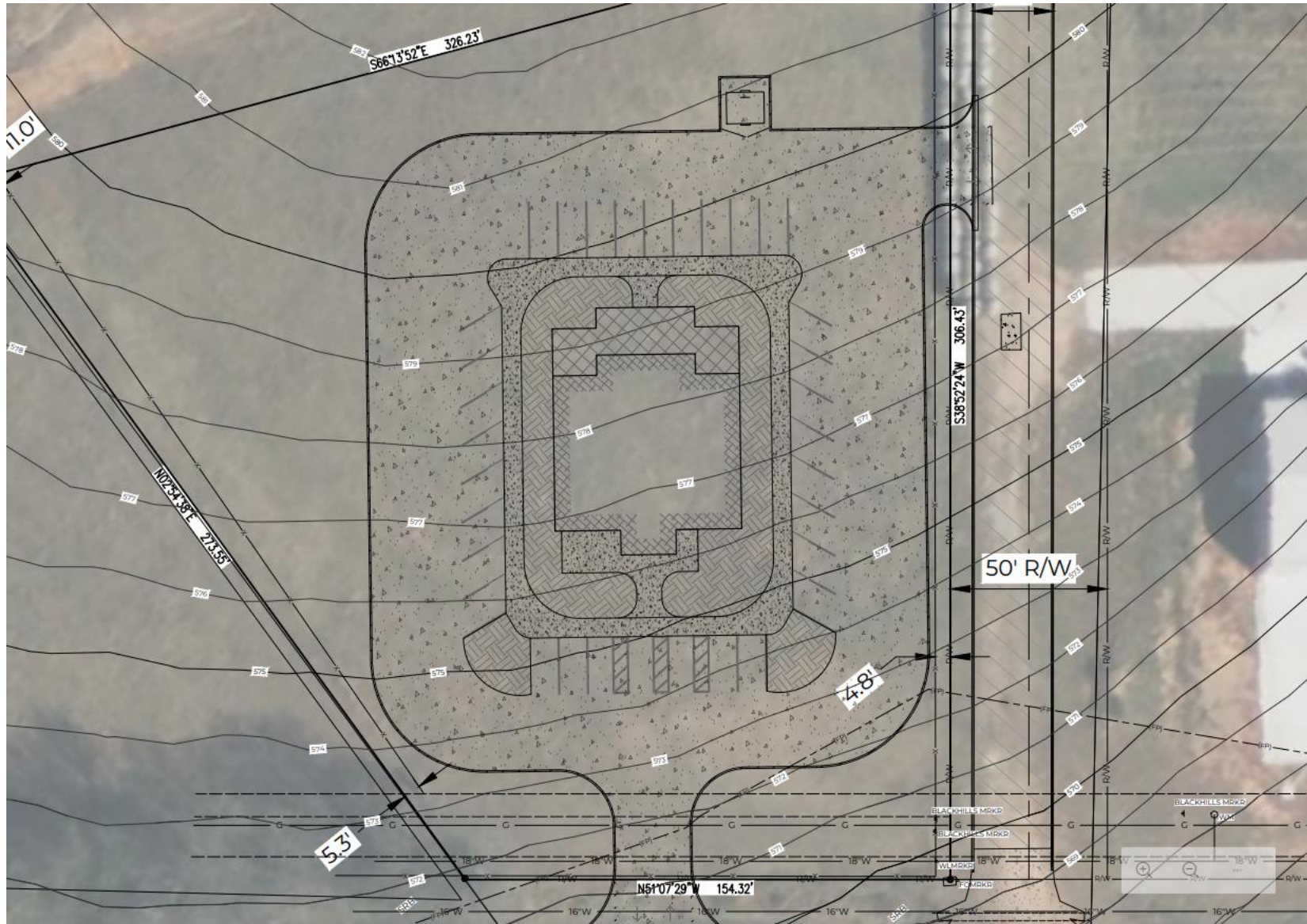
The right to rely upon this report and the data within may not be assigned outside of the releasability included on the cover page of this document without Data Testing, Inc.'s written permission.

Our conclusions and recommendations are based upon design information received, data obtained from the previously described exploration, testing programs and our past experience. They do not reflect variations in sub-surface conditions that may exist intermittently from our borings or in unexplored areas of the site. Should such variations become apparent during construction, it will be necessary to reevaluate our conclusions and recommendations based upon "on-site" observations of the conditions.

If the design or location of the project is changed, the recommendations contained herein must be considered invalid, unless the changes are reviewed by our firm, and our recommendations are either verified or modified in writing. When design is complete, we should be given the opportunity to review the foundation plan, grading plan, and applicable portions of the specifications to see if they are consistent with the intent of our recommendation.

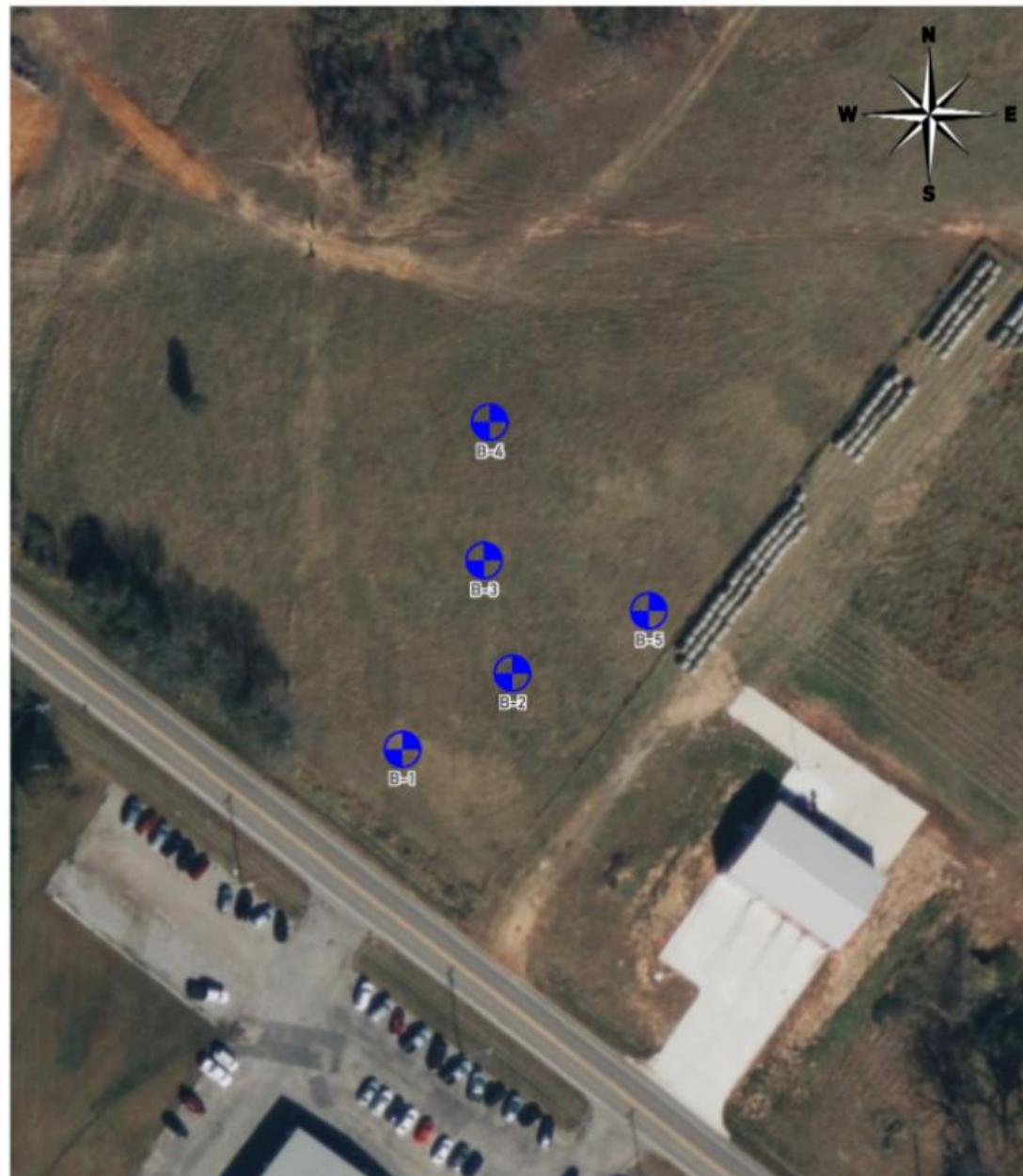
8. APPENDICES

FIGURE 1: PROVIDED SITE LOCATION - TOPOGRAPHICAL



Proprietary; Commercial Sensitive
Releasable only per restrictions on Cover Page.

FIGURE 2: BORING LOCATION DETAIL



Proprietary; Commercial Sensitive
Releasable only per restrictions on Cover Page.

APPENDIX II. BORING LOGS (5)



Borehole Record: B-1

Project: Farm Credit Ozark
Location: Ozark, AR
Loc Comment: Front Pavement
Job No.: G2025086

Position: Lat: 35.50950
Long: -93.84724
Elevation: 576.94 ft

Date Drilled: 09-25-2025
Drill Rig: Geoprobe 7822DT
Drill Supplier: Data Testing Inc.
Logged/Checked: Zach Craig / Dustin Cathey

Drilling Method	Depth (ft)	Soil Symbol	Classification Code	Material Description	P.I.	L.L.	% Fines (<#200)	Moisture Content	Depth Scale	Standard Penetration Test	Standard Penetration Test (SPT)
											20 40 60 80
GroundSurface EL 576.94 ft											
Auger (Solid-Stem)	0		Topsoil	<u>ORGANIC SOIL with SAND (OL)</u> ; Medium; Dark brown with tan gray; Dry to Moist. 0.25 ft EL 576.69 ft				13.5	0	2	
	1		SM	<u>SILTY SAND with GRAVEL (SM)</u> ; Medium; Brown, Orange; Dry to Moist.	0	0	35.1	15.8	1	2	
	2		SC	<u>CLAYEY SAND (SC)</u> ; Tan, Brown, Orange, Gray; Dry.	11	26	40.9	19.6	2	5	
	3		CL-ML	<u>GRAVELLY lean CLAY with SAND (CL/ML)</u> ; Stiff; Tan, Brown, Gray; Dry to Moist.				25.3	3	6	
	4			Terminated at 6.5'					4	7	
	5								5	13	
	6								6	50	
	7								7		
	8								8		
	9								9		
	10								10		
	11								11		
	12								12		
	13								13		
	14								14		
	15								15		
	16								16		
	17								17		
	18								18		
	19								19		
	20								20		
	21								21		
	22								22		
	23								23		
	24								24		
	25								25		



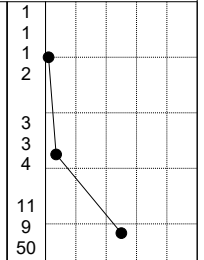
Borehole Record: B-2

Project: Farm Credit Ozark
Location: Ozark, AR
Loc Comment: SE' Corner of Building
Job No.: G2025086

Position: Lat: 35.50962
Long: -93.84702
Elevation: 578.16 ft

Date Drilled: 09-25-2025
Drill Rig: Geoprobe 7822DT
Drill Supplier: Data Testing Inc.
Logged/Checked: Zach Craig /

Drilling Method	Depth (ft)	Soil Symbol	Classification Code	Material Description	P.I.	L.L.	% Fines (<#200)	Moisture Content	Depth Scale	Standard Penetration Test	Standard Penetration Test (SPT)
											20 40 60 80
GroundSurface EL 578.16 ft											
Auger (Solid-Stem)	0		Topsoil	ORGANIC SOIL (OL); Soft; Dark Brown; Dry to Moist.					0	1	
	0.25			EL 577.91 ft					1	1	
	1		SC-SM	SILTY, CLAYEY SAND (SC-SM); Loose; Dark Brown, Red, Orange; Saturated.	0	0	39.7	15.4	2	2	
	2			2 ft					3	3	
	3		CL-ML	GRAVELLY lean CLAY with SAND (CL/ML); Stiff; Tan, Brown, Orange, Gray; Dry to Moist.	17	32	52.1	18.4	4	4	
	3.5			EL 574.66 ft					5	5	
	4		CL-ML	GRAVELLY lean CLAY with SAND (CL/ML); Stiff; Tan, Brown, Orange, Gray; Dry to Moist.				19.5	6	6	
	5			5 ft					7	7	
	5			EL 573.16 ft					8	8	
	6			Refusal at 5'					9	9	
	7								10	10	
	8								11	11	
	9								12	12	
	10								13	13	
	11								14	14	
	12								15	15	
	13								16	16	
	14								17	17	
	15								18	18	
	16								19	19	
	17								20	20	
	18								21	21	
	19								22	22	
	20								23	23	
	21								24	24	
	22								25	25	
	23										
	24										
	25										





Borehole Record: B-3

Project: Farm Credit Ozark
Location: Ozark, AR
Loc Comment: NW Corner of Building
Job No.: G2025086

Position: Lat: 35.50981
Long: -93.84708
Elevation: 580.21 ft

Date Drilled: 09-25-2025
Drill Rig: Geoprobe 7822DT
Drill Supplier: Data Testing Inc.
Logged/Checked: Zach Craig /

Drilling Method	Depth (ft)	Soil Symbol	Classification Code	Material Description	P.I.	L.L.	% Fines (<#200)	Moisture Content	Depth Scale	Standard Penetration Test	Standard Penetration Test (SPT)
											20 40 60 80
GroundSurface EL 580.21 ft											
Auger (Solid-Stem)	0		Topsoil SM	<u>SANDY ORGANIC SOIL (OL)</u> ; Soft; Dark Brown; Dry to Moist. 0.3 ft EL 579.91 ft	0	0	34.9	12.5	0		1 2 14 5 6 7 5 5 6 19 24 50
	1		<u>SILTY SAND (SM)</u> ; Dark Brown; Moist. 0.75 ft EL 579.46 ft	1							
	2		CL-ML	<u>SANDY lean CLAY with GRAVEL (CL/ML)</u> ; Stiff; Tan, Brown, Red/Orange, Gray; Dry to Moist.				12.4	2		
	3								3		
	4				21	40	73	20.7	4		
	5							18	5		
	6			6.3 ft EL 573.91 ft					6		
	7			Refusal at 6.3'							
	8										
	9										
	10										
	11										
	12										
	13										
	14										
	15										
	16										
	17										
	18										
	19										
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	22										
	23										
	24										
	25										



Borehole Record: B-4

Project: Farm Credit Ozark
Location: Ozark, AR
Loc Comment: North Pavement
Job No.: G2025086

Position: Lat: 35.51003
Long: -93.84707
Elevation: 582.01 ft

Date Drilled: 09-25-2025
Drill Rig: Geoprobe 7822DT
Drill Supplier: Data Testing Inc.
Logged/Checked: Zach Craig /

Drilling Method	Depth (ft)	Soil Symbol	Classification Code	Material Description	P.I.	L.L.	% Fines (<#200)	Moisture Content	Depth Scale	Standard Penetration Test	Standard Penetration Test (SPT)
											20 40 60 80
GroundSurface EL 582.01 ft											
Auger (Solid-Stem)	0		Topsoil	<u>SANDY ORGANIC SOIL (OL)</u> ; Soft; Dark Brown; Dry to Moist. 0.25 ft / EL 581.76 ft	0	0	29.6	16.6	0	2	
	1		SM	<u>SILTY SAND (SM)</u> ; Medium; Dark Brown, Red; Dry to Moist. 2 ft / EL 580.01 ft					1	3	
	2		SC	<u>CLAYEY SAND with GRAVEL (SC)</u> ; Medium; Red, Orange, Brown Tan Grey; Dry to Moist. 4.5 ft / EL 577.51 ft	4	23	27.6	16.6	2	5	
	3								3	7	
	4		CL-ML	<u>SANDY lean CLAY with GRAVEL (CL/ML)</u> ; Stiff; Tan, Brown, Grey; Dry to Moist. 7.1 ft / EL 574.91 ft					4	9	
	5								5	13	
	6							15.9	6	10	
	7							13.5	7	36	
	8							17.6		21	
	9									50	
	10			Refusal at 7.1'							
	11										
	12										
	13										
	14										
	15										
	16										
	17										
	18										
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	20										
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	22										
	23										
	24										
	25										



Borehole Record: B-5

Project: Farm Credit Ozark
Location: Ozark, AR
Loc Comment: East Pavement
Job No.: G2025086

Position: Lat: 35.50973
Long: -93.84675
Elevation: 580.75 ft

Date Drilled: 09-25-2025
Drill Rig: Geoprobe 7822DT
Drill Supplier: Data Testing Inc.
Logged/Checked: Zach Craig /

Drilling Method	Depth (ft)	Soil Symbol	Classification Code	Material Description	P.I.	L.L.	% Fines (<#200)	Moisture Content	Depth Scale	Standard Penetration Test	Standard Penetration Test (SPT)
											20 40 60 80
GroundSurface EL 580.75 ft											
Auger (Solid-Stem)	0		Topsoil	SANDY ORGANIC SOIL (OL); Soft; Dark Brown; Dry to Damp. 0.3 ft EL 580.45 ft	6	22	36.7	14.8	0	1	
	1		SC	CLAYEY SAND with GRAVEL (SC); Very Dense; Tan, Brown, Orange; Dry to Moist; Sandy 2 ft EL 578.75 ft					1	3	
	2		SM	SILTY SAND with GRAVEL (SM); Very Dense; Tan, Brown, Orange; Dry to Moist. 3.5 ft EL 577.25 ft	0	0	21.7	13.6	2	20	
	3			Refusal at 3.5'					3	36	
	4								4	40	
	5								5		
	6								6		
	7								7		
	8								8		
	9								9		
	10								10		
	11								11		
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	23								23		
	24								24		
	25								25		

SECTION 02 32 01

SITE AND SUBSURFACE INVESTIGATION BY CONTRACTOR

PART I GENERAL

1.1 SECTION INCLUDES

- A. Surface reconnaissance and evaluation of existing site conditions.
- B. Sub-surface evaluation by contractor's chosen method of investigation.

1.2 RELATED SECTIONS

- A. Sections 00 72 00 - General Conditions.
- B. Section 00 73 00 - Supplementary conditions.

PART 2 GENERAL

2.1 EXECUTION

- A. The Contractor is responsible for having a thorough knowledge of all Drawings, Specifications, General and Supplementary Conditions, and other Contract Documents. Failure to acquaint himself/herself with this knowledge does not relieve him/her of the responsibility for performing his/her work in a manner acceptable to the Owner. No additional compensation will be allowed because of conditions that occur due to the failure by the Contractor to familiarize himself/herself and all work with this knowledge.
- B. The Contractor shall be responsible for determining the existing conditions of the site and shall thoroughly examine all factors reasonably available to him/her, including but not limited to the Drawings, Specifications, geotechnical report, site boundary and topography, site conditions, site history, local information, and seasonal weather conditions. Geotechnical report data is not considered all conclusive and it is the Contractor's responsibility to further investigate site conditions as he determines necessary. The Contractor shall be totally responsible for acceptance of the site and preparation of the site to the proper grade and compaction requirements as indicated by the Contract Documents including Construction Drawings and Specifications. Any construction performed by the Contractor on the project will constitute acceptance of the site.

END OF SECTION

02 32 01-1

SECTION 03 11 00

CONCRETE FORM WORK

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. All concrete and related items required to complete the building, provide off-sets, bulkheads, recesses, openings, chases, etc., and install any inserts, sleeves, etc., required by other trades.

1.2 RELATED WORK SPECIFIED ELSEWHERE:

- A. Concrete: Section 03 30 00
- B. Concrete Reinforcement: Section 03 21 00

1.3 WORK INSTALLED BUT FURNISHED BY OTHER SECTIONS:

- A. Built-in anchors, inserts and bolts for connection of other materials.
- B. Built-in sleeves, thimbles, dovetail slots, and water-stops.

1.4 DEFINITIONS:

- A. Architectural Concrete Surfaces: Formed surfaces where appearance is of major importance.
- B. Non-Architectural Concrete Surfaces: Formed surfaces where appearance is not of major importance.

1.5 QUALITY ASSURANCE:

- A. Design Criteria:
 - 1. General: Conform to ACI 347-Current Edition Chapter 1, Design.
 - 2. Plywood: Conform to tables for form design in APA Form V 345- Current Edition, including strength.
- B. Requirements of Regulatory Agencies: Erect forms to meet the requirements of the Local Building Code.
- C. Allowable Tolerances:
 - 1. Non-Architectural Concrete: Conform to ACI 347- Current Edition.
- D. Contractor shall assume full responsibility for earthwork, or an existing structure used as a form and such form work must meet all requirements of this section.

03 11 00-1

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING:

- A. On delivery to the job site, place materials in area protected from weather.
- B. Store materials above ground on framework or blocking and cover with protective waterproof covering providing for adequate air circulation or ventilation.
- C. Handle materials to prevent damage.

PART 2 PRODUCTS

2.1 MATERIALS:

- A. Conform to ACI 347- Current Edition, Chapter 3, Materials and Form Work.

2.2 LUMBER:

- A. Softwood framing lumber: Kiln dried, PS 20-70.
- B. Boards less than 1 1/2" thick, used for basic forms and form liners: Kiln dried.
- C. Grade marked by grading rules agency approved by American Lumber Standards Committee.
- D. Light framing or studs for plywood forms, 2 in. to 4 inches in width and thickness, construction grade.

2.3 PLYWOOD:

- A. Exterior type softwood plywood, PS 1-66.
- B. Each panel stamped or branded indicating veneer grades, species, type and identification.
- C. Wood faced plywood for architectural concrete surfaces. Panel veneer grades: A-C. Mill-oiled sides and mill-sealed edges of panels.

2.4 CORNER FORMERS:

- A. Profile type: chamfered face.
- B. Material: Wood

2.5 TIES:

- A. Material: Carbon Steel
- B. Type: Snap ties

03 11 00-2

- C. Depth of break back: 1 inch
- D. Maximum diameter: 1/4 inch

2.6 FORM COATINGS:

- A. Plywood and wood forms shall be sealed against absorption of moisture from the concrete with an approved non-staining form oil or sealer.
- B. Form sealer, lacquer or any form of release agents containing wax, oil, or other materials that would interfere with adhesion shall not be used on form work for concrete which is to receive exposed aggregate coatings.

PART 3 EXECUTION:

3.1 GENERAL

- A. The design, engineering, bracing and construction of form work shall be the responsibility of the Contractor.
- B. Form work shall conform to shapes, lines and dimensions of members as shown on contract plans and shall be sufficient to prevent mortar leakage and to maintain position and shape during and after placing of concrete. Form work for exposed surfaces shall be constructed of undamaged materials that will result in an unblemished, flush surface when removed.
- C. Shoring and bracing of form work shall be adequate to resist all construction loads, wet concrete, stored and lateral loads due to earthwork. Shoring and bracing of elevated slabs shall remain in place until the concrete has reached a minimum compressive strength of 2,650 psi. (75% of the specified 28-day design strength, f'_c .)
- D. Preparation of forms. Edges of exposed concrete work, exterior and interior shall be pointed up to present a good square appearance.
- E. Provide temporary openings in framework for concrete placement.
- F. Removal of forms is subject to weather conditions after concrete is poured. Remove formwork in manner to ensure complete safety of structure. Do not place building materials on slabs until they are strong enough to carry the imposed load. The contractor shall decide when to remove and accept full responsibility for their removal.
- G. Do not run reinforcement, corner protection angles, or related fixed metal items, embedded in or bonded into concrete through expansion joints. Provide filler strips for expansion joints between slabs on grade and all joints between slabs on grade and vertical surfaces. Construct joints 1/2 inch wide and full depth of slab unless noted otherwise.

END OF SECTION

03 11 00-3

SECTION 03 21 00

CONCRETE REINFORCEMENT

PART 1 GENERAL

1.1 Section Includes:

- A. All steel reinforcement, mesh, dowels, and related items to comply with drawings and specifications including materials, labor, and equipment to complete the building and work shown.
- B. Observation and Required Special Inspections

1.2 RELATED WORK SPECIFIED ELSEWHERE:

- A. Section 01 40 00 – Quality Control: Required Special Inspections
- B. Section 03 35 20 – Polished Concrete Finish System
- C. Section 03 11 00 - Concrete Form Work: Section
- D. Section 03 30 00 - Cast-In-Place Concrete

1.3 QUALITY ASSURANCE:

- A. Acceptable Manufacturers: Regularly engaged in manufacture of steel bar and welded wire fabric reinforcing.
- B. Installer Qualifications:
 - 1. Three years experience in installation of steel bar and welded wire fabric reinforcing.
- C. Requirements of Regulatory Agencies: Conform to requirements of local Building Code.
- D. Allowable Tolerances:
 - 1. Fabrication:
 - a. Sheared length: + or - 1 inch
 - b. Stirrups, ties and spirals: + or - 1/2 inch
 - c. All other bends: + or - 1 inch
 - 2. Placement:
 - a. Concrete cover to form surfaces: + or - 1/4 inch
 - b. Minimum spacing between bars: + or - 1/4 inch
 - c. Top bars in slabs and beams:
 - (1) Members 8 inches deep or less: + or - 1/4 inch
 - (2) Members more than 8 inches, but not over 2 feet deep: + or - 1/2 inch
 - (3) Members more than 2 ft. deep: + or - 1 inch
 - d. Crosswise of members: Spaced evenly within 2 inches of stated separation.

03 21 00-1

- e. Lengthwise of members: + or - 2 inches.
- 3. Maximum bar movement to avoid interference with other reinforcing steel, conduits, or embedded items: 1 bar diameter.

1.4 SHOP DRAWINGS:

- A. Comply with Section 01 33 00.
- B. Show sizes and dimensions for fabrications and placement of reinforcing steel and bar supports.
- C. Indicate bar schedule, stirrup spacing, and diagrams of bend bars.
- D. All detailing, fabrication and erection of reinforcing bars shall comply with the ACI Manual of Standard Practice for Detailing Reinforced Concrete Structures. (ACI 315R). ACI 315R is titled "Guide to Presenting Reinforcing Steel Design Details."
- E. Manufacturer's Literature: Manufacturer's specifications and installation instructions for splice devices.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING:

- A. Deliver reinforcement to project site in bundles marked with durable tags indicating bar size and length.
- B. Handle and store materials to prevent contamination.

PART 2 PRODUCTS

2.1 MATERIALS

- A. REINFORCING STEEL. Reinforcing steel for concrete shall be deformed, clean, free from rust and new. It shall conform to ASTM Standard A 615 and shall be Grade 60.
- B. SMOOTH STEEL DOWEL BARS. Plain steel dowel bars for reinforcing concrete slab joints shall meet the requirements of ASTM A 615, Grade 60. These plain round dowel bars shall be free from burrs or other deformations restricting slippage in the concrete.
 - 1. Smooth Dowel bars shall be held in position parallel to the surface and centerline of the slab by a metal assembly of sufficient strength and anchorage to prevent displacement during concrete placement operations.
 - 2. Immediately prior to placement of concrete, each bar shall be field coated for a minimum distance of 2 inches greater than half the length of the bar with an approved lubricant. Lubricated ends of adjacent bars shall be on alternating sides of the slab joint.

03 21 00-2

- C. WIRE FABRIC. Wire fabric shall be electrically-welded wire fabric of cold-drawn wire (70,000 psi yield point) of the diameter and spacing required and shall conform to ASTM Standard A 185. Welded wire fabric or mesh shall be of gauge and mesh shown on plans and shall conform to "Standard Specifications for Welded Steel Wire Fabric for Concrete REINFORCEMENT: (ASTM A1064-Current Edition). Furnish mesh in flat sheets. ASTM A1064/A1064M is titled "Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete."
- D. TIE WIRE: FS-QQ-W-461, annealed steel, black, 16 gauge minimum
- E. BAR & WIRE MESH SUPPORTS: Conform to "Bar Support Specifications", CRSI Manual of Standard Practice. Metal bolsters required. No bricks or CMU allowed. Bars supports used over or against concrete surfaces which are exposed shall be plastic protected. The plastic shall have a thickness of 3/32" or greater at points of contact with the form work. The plastic shall extend upward on the wire to a point at least 1/2" above the form work. Provide following support types (CRSI Designation):
1. Woven Wire Mesh: Type "SBU", linear, longest length possible.
 2. Steel reinforcement bars: Type "SBU", length as required to fit in trench and properly support bars.
 3. Note: "SBU" type supports to have two (2) bottom runners and one (1) top runner, all continuous.
- F. DIAMOND PLATE DOWEL SYSTEM: Provide Diamond Dowel System manufactured by PNA construction technologies, "Speed Plate" System by SIKa Corp. or approved alternate. Plates are manufactured from steel certified to meet ASTM A36 (1/4" and 3/8") or ASTM A108 (3/4")
1. Install at all construction joints at building slabs-on-grade.
 2. Provide diamond plate thickness as follows, depending on slab thickness:
 - a. 1/4" (6mm) – typically used in 4"- 6" slab depths
 - b. 3/8" (10 mm) – typically used in 7"- 8" slab depths
 - c. 3/4" (20 mm) – typically used in 9" plus slab depths
- G. FIBER REINFORCEMENT Refer to Section 03 30 00.

PART 3 EXECUTION

3.1 FABRICATION

- A. In accord with CRSI Manual of Standard Practice.

3.2 INSTALLATION:

- A. Placements:
1. Bar Supports: CRSI Placing Reinforcing Bars (10th Edition)
 2. Reinforcing Bars: CRSI Supports for Reinforcement Used in Concrete (2016).
Support footing reinforcement bars with SBU type supports. Space at no more than 4'-0" on center. Support reinforcement bars at each footing corner and intersection.

03 21 00-3

- Rebar chairs will not be acceptable.** For large double layer reinforcement pad footing mats, provide doubling of the SBU supports. Concrete bricks may be used as an option at large double-matted footings, **but only upon Architect's approval.**
3. Details shall be in accordance with "Building Code Requirements for Structural Concrete" (ACI 318-Current Edition)
 4. **Place sufficient length supports for wire mesh concrete slab reinforcement no more than 3'-0" on center, or stagger at 2'-0" on center. Do not cut supports into small lengths.** Do not extend support through control joints.
 5. Install #4 reinforcement hoops around slab penetrations 3" or larger in diameter. This would include, but not be limited to plumbing pipes, electrical conduit, floor drains, electrical floor boxes, etc.
 6. Where groups of electrical conduits exceed 3" in diameter, install #4 reinforcement hoops around groups, or provide straight #4 bars around linear groups.
- B. Steel Adjustment:
1. Move within allowable tolerances to avoid interference with other reinforcing steel, conduits, or embedded items.
 2. Do not move bars beyond allowable tolerances without concurrence of Architect/Engineer.
 3. Do not heat, bend, or cut bars without concurrence of Architect/Engineer.
- C. Concrete covering over reinforcement shall not be less than the following:
1. Where concrete is deposited directly against earth: 3"
 2. Where formed concrete surface will be exposed to weather or ground: 2"
 3. Where formed concrete surface will not be exposed to weather or ground: for walls and slabs: 3/4"
 4. For beams, girders, and columns: 1-1/2"
 5. All covering: Nominal bar diameter
- D. Splices:
1. Lap splices: Tie securely with wire to prevent displacement of splices during placement of concrete.
 2. Splice devices: Install in accordance with manufacturer's written instructions.
 3. Welding: Do not weld reinforcement.
 4. Do not splice bars except at locations shown on drawings without concurrence of Architect/Engineer.
- E. Wire Fabric:
1. Install in the longest practicable length.
 2. Lap adjoining pieces one full mesh minimum, and lace splices with 16-gauge wire.
 3. Do not make end laps midway between supporting beams, or directly over beams of continuous structures.
 4. Offset end laps in adjacent widths to prevent continuous laps.
 5. Do not continue wire fabric through control joints

F. Diamond Plate Dowel System:

1. Install Diamond Plate Dowel System, following manufacturer's instructions.
2. Provide diamond plate dowel spacing as follows, depending on slab thickness:
 - a. 4" -6" slab thickness: 1/4" thick at 18" O.C.
 - b. 7" -8" slab thickness: 3/8" thick at 18" O.C.
 - c. 9" -11" slab thickness: 3/4" thick at 20" O.C.

3.3 CLEANING:

- A. Remove dirt, grease, oil, loose mill scale, excessive rust, and foreign matter that will reduce bond with concrete.

3.4 . PROTECTION DURING CONCRETING:

- A. Keep reinforcing steel in proper position during concrete placement.

3.5 OBSERVATION AND SPECIAL INSPECTIONS

- A. Reinforcement and placement shall be observed by the Architect/Engineer prior to placing concrete. Inspection of reinforcement for conformance to the construction documents shall be completed by the designated third-party Special Inspector.

3.6 INSTALLATION OF MISCELLANEOUS ITEMS:

- A. Contractor shall coordinate and check that all work required to be embedded in concrete is in place prior to pouring. Placement of such work is to be done without disturbing reinforcement in place.

END OF SECTION

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SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SCOPE:

- A. This Contractor shall furnish all material and labor necessary to complete execution of all concrete portions of this project, including the following items and other items of concrete or cement work which may be essential to complete that portion of the work as shown on the contract drawings and as hereinafter specified.
 - 1. Footings, foundations and structural members as shown, including piers if required.
 - 2. Concrete finish floor slabs.
 - 3. All concrete steps, landings, walks, curbs, etc.
 - 4. Non-Shrink and Epoxy Grout
 - 5. Concrete Floor Densifier/Hardener
 - 6. Clear Sealer (Water and Oil Repellent)
 - 7. Micro-Fiber Concrete Admixture
 - 8. Concrete Minimum Finish Tolerances & Standards
 - 9. Concrete Slab Moisture Mitigation
 - 10. Observation and Required Special Inspections
 - 11. Concrete Mix Design Submittal Form

1.2 RELATED WORK SPECIFIED ELSEWHERE:

- A. Section 01 40 00 – Quality Control: Required Special Inspections
- B. Section 03 11 00 - Concrete Form Work
- C. Section 03 21 00 - Concrete Reinforcement
- D. 03 35 20 Polished Concrete Finish System
- E. Section 04 22 00 Concrete Unit Masonry
- F. Section 09 91 00 - Painting
- G. Section 31 23 00 - Structural Excavation, Backfill and Compaction
- H. Section 32 16 00 - Walks and Curbs

1.3 QUALITY ASSURANCE:

- A. Standards: Provisions of American Concrete Institute "Building Code Requirements for Structural Concrete" (ACI 318-Current Edition). American Concrete Institute "Specifications for Structural Concrete" (ACI 301-Current Edition), Concrete

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Reinforcing Steel Institute "Manual of Standard Practice" (Current Edition), American Concrete Institute "Guide to Presenting Reinforcing Steel Design Details" (ACI 315-Current Edition) and " Guide to Formwork for Concrete" (ACI 347-Current Edition) are adopted except that where additional or more stringent requirements are required by these specifications.

- B. Tests: As listed in Standard Practice for Sampling Freshly Mixed Concrete ASTM C 172-Current Edition.
- C. Control Joints and Expansion Joints: Follow Provisions of American Concrete Institute concerning maximum area for placement of expansion and control joints unless shown or noted otherwise on drawings and specifications. If contractor requests adjustments to control joint placement or additional control joints and/or expansion joints, consult Architect prior to concrete placement.
- D. **Slabs must be replaced that have a crack(s) with a width of 0.05" or greater. In high visibility areas all cracks in slabs will be subject to replacement of slab sections at the discretion of the Architect.**

1.4 SUBMITTALS:

- A. Test Reports: Reports of concrete compression, yield, and slump tests.
- B. Certificates:
 - 1. Manufacturer's certification that materials meet specification requirements.
 - 2. Material content per cubic yard of each class of concrete furnished:
 - a. Dry weights of cement.
 - b. Saturated surface-dried weights of fine and coarse aggregate.
 - c. Quantities, type and name of admixtures.
 - d. Weight of water.
 - 3. Ready-mix delivery tickets, ASTM C 94-Current Edition.
- C. Fully completed concrete mix design submittal form found at the end of this section for each type of concrete to be placed.

1.5 PRODUCT AND ENGINEERING DATA:

- A. Submit data for design mixes, proposed admixtures, etc. per Section 01 33 00.
- B. The Contractor shall be responsible for checking quantities and dimensions in accordance with contract drawings and field conditions. Where discrepancies in dimensions are noted, the Contractor shall notify the Architect of such discrepancies and corrected dimensions noted on submittal drawings.
- C. Contract drawings receive precedence over shop drawings unless authorized in writing.

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- D. Shop drawings furnished for reinforcing steel shall contain fabrication details as well as placement drawings which are to be used in conjunction with contract drawings.
- E. Detailing and fabrication of reinforcing shall conform to " Guide to Presenting Reinforcing Steel Design Details", (ACI 315-Current Edition).

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING:

- A. Cement: Store in weather tight enclosures and protect against dampness, contamination, and warehouse set. Any cement damaged by moisture, or which fails to meet any of the specified requirements shall be rejected and removed from the work.
- B. Aggregates:
 - 1. Stockpile to prevent excessive segregation, or contamination with other materials or other sizes of aggregates.
 - 2. Use only one supply source for each aggregate stockpile.
- C. Mixing: Ready-mixed concrete shall be mixed and delivered in accordance with Standard Specifications for Ready-Mixed Concrete" (ASTM C94-Current Edition).

1.7 ENVIRONMENTAL REQUIREMENTS:

- A. Allowable Concrete Temperatures
 - 1. Cold Weather: Minimum 40 degrees. With temperatures lower than 40 degrees, approval by the Architect shall be required.
 - 2. Hot Weather: Maximum 90 degrees F.
- B. Do not place concrete during rain, sleet, or snow unless protection is provided which is approved by Architect.

1.8 CONCRETE SLAB MOISTURE MITIGATION:

- A. It will be the responsibility of the Contractor to obtain moisture levels at or below the required percentages as required for installation of all floor covering products by the time the products are ready to be installed. If moisture levels are not reached at the scheduled time to install floor coverings, the Contractor will pursue other means to meet floor covering moisture requirements at no additional cost to owner. This will not be a reason to delay project completion.

1.9 CERTIFICATION

- A. Ready Mix concrete batch plant to be NRMCA (National Ready Mixed Concrete Association) certified. Submit proof of certification with submittals.
- B. Concrete Flatwork Finishers to be ACI certified. Submit proof of certification to the Architect for approval.

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PART 2 PRODUCTS

2.1 MATERIALS

A. Concrete:

1. Portland Cement: Type 1 Portland, meeting "Standard Specifications for Portland Cement", (ASTM C150-Current Edition) shall be used.
2. Aggregates: All aggregates shall be limestone, clean, hard strong and durable particles free of chemicals or foreign material that may affect the bonding of cement paste and shall conform to "Specifications for Concrete Aggregates" (ASTM C33-Current Edition). Coarse aggregate gradation shall be within the limits of 1 inch to No. 4 standard sieve analysis. Alternate aggregate materials must be reviewed and approved by the architect.
3. Mixing Water: Water shall be fresh, clean, and potable.
4. Slump: 5 inch maximum: plus, tolerance 0 inches, minus tolerance 2 inches.
5. Mix proportioning: To produce 28-day minimum compressive strength of moist cured laboratory samples. Provide the following minimum compressive strengths at listed locations unless noted otherwise in other specification sections or on drawings:
 - a. 3000 psi for all footing and foundation stem walls.
 - b. 3000 psi for all exterior sidewalk/stoop/patio locations.
 - c. 3500 psi for all interior slabs-on-grade.
 - d. 3500 psi for all elevated slabs

B. Curing Material: Products and material as required to apply and maintain slab in moist condition during curing period per this specification. Constant water sprinkling or water curing covers kept wet are acceptable.

1. Under no circumstances are chemical curing compounds to be used in slabs on grade unless prior approval is obtained from the Architect.
2. Do not use polyethylene vapor barrier or similar membrane for curing membranes when water curing in areas where exposed concrete finish is scheduled.
3. At Polished Concrete Slab-on-Grade a full wet cure is required. No covers allowed. Refer to Specification 03 35 20 Polished Concrete Finish System.

C. Below-slab vapor barrier shall be as specified in Section 07 10 00, but no less than 15 mils thick.

D. Reinforcement: See Section 03 21 00

2.2 CONCRETE FLOOR DENSIFIER/HARDENER AND SEALER

A. Penetrating Hardener/Densifier: (Clear liquid reactive lithium-silicate based.)

1. Retroplate 99 by Advanced Floor Products.
2. Consolideck LS, by Prosoco.
3. 3D HS, by Ameripolish
4. Approved alternate by other manufacturer specified herein.

B. Clear Sealer: Refer to specification 09 91 00 Paint & Finishing

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2.3 MIXES:

- A. Proportions: Ready-mix concrete shall meet "Specifications for Ready-Mixed Concrete" (ASTM C94). Proportions of concrete shall produce the required strength and be workable to the extent that it can be worked into the corners and angles of forms and around reinforcement. Collection of excess free water on the surface will not be permitted nor a segregation of the materials in the mixture.
- B. Free surface moisture on aggregates shall be included as part of the mixing water.
- C. Water-cement ratios for project concrete mix shall be such that the relationship between the required strength and water-cement ratio of ingredients used has been previously established by reliable tests and data. Copies of previous test data, along with design mix data shall be submitted to the Architect by the Contractor for approval. Where such data is not available or is insufficient, water-cement ratios shall meet the requirements of Table 4.2.2 of ACI 318-Current Edition. Cementitious content shall be the total weight of all Portland cement and fly ash in a given mix.
- D. Microfiber Admixture: UltraFiber 500, manufactured by Solomon, 4050 Color Plant Road, Springfield IL 62702, 800-624-0261.
 - 1. Unless shown otherwise on structural drawings, provide microfiber admixture for **all** interior slab-on-grade concrete for standard and polished concrete floors.
 - a. Refer to structural drawings for slabs with additional means of reinforcement.
 - b. Refer to Civil drawings for reinforcement at sidewalks and concrete paving.
 - 2. Microfiber admixture will be added to concrete at batch plant. Adding admixture to mix at jobsite will not be permitted. Follow normal mixing, time, and speed, as recommended by ASTM C94.
 - 3. Application Rate: 2.0 pounds per cubic yard of concrete.
- E. Admixtures shall comply with the ASTM Specifications for Chemical Admixtures. (ASTM C494-Current Edition).
 - 1. Mid-Range Water Reducing Admixture: Mira 110, manufactured by Grace Concrete Products, 877-423-6491, Master Builders Polyheed 1720, manufactured by BASF or approved alternate product. Non-chloride, non-corrosive. Admixture to meet ASTM C494 Type A & F requirements. **Required when using microfiber admixture.** Comply with manufacturer's instructions for dosage. Admixture to be incorporated with mix at batch plant.
 - a. other admixtures may be used as a concrete mix component only with approval of the Architect.
 - b. Use all admixtures in accordance with recommendations of the manufacturer.
 - 2. For concrete containing HRWR admixture (super- plasticizer) when approved by Architect: slump shall be 6"-8".
 - 3. In no case shall the use of the admixtures produce a compressive strength less than that specified in this section.

4. Fly ash (Type C or F per ASTM C618) may be used as an admixture in concrete which is **not exposed to view** and does not require surface finish. Use of only one type of fly ash throughout the project shall be permitted. Such areas are limited to footings, below grade foundation walls, filled masonry voids, etc. The use of fly ash as an admixture **shall not be permitted** in concrete where surface finish is required. Such areas as floor slabs, exposed concrete walls, exposed concrete structure, etc., shall not be poured with concrete containing fly ash. Other admixtures may be used only with the approval of the Architect. Each delivery record shall indicate mix design. Concrete will be subject to rejection if mix design is not called out on invoice at time of delivery.
5. All concrete installed at the exterior on a permanent basis shall be air entrained. Interior slabs shall not contain air entrainment. If admixture is desired, obtain approval through Architect.
6. Air-entraining admixture if used, shall meet "Specifications for Air-Entraining Admixtures" (ASTM C260-Current Edition) and shall produce air content by volume between 5 to 7%.

- F. Use same Portland cement manufacturer throughout project for all interior concrete. Portland cement manufacturer may be different for exterior concrete but must be the same Portland cement manufacturer for all exterior concrete.

2.4 NON-SHRINK AND EPOXY GROUT

- A. Non-Shrink Grout, Non-Metallic Grout: Factory premixed grout conforming to CRD-C-621-80, "Corps of Engineers Specification for Non-Shrink Grout".
1. Acceptable Manufacturers:
 - a. EUCO NS, the Euclid Chemical Company
 - b. SonogROUT, Sonneborn-Contech
 - c. Masterflow 713, Master Builders
 - d. DuragROUT, L & M Construction Chemical Co.
- B. Epoxy Grout: Structural epoxy adhesive conforming to ASTM C881.
1. Acceptable Manufacturers:
 - a. Sikadur 32 Hi-Mod by Sika Corporation
 - b. Sonneborn Epogel by Chemrex, Inc.
 - c. Epcon C6 by ITW Ramset/Redhead
 - d. Hilti HY-200

2.5 ACCESSORIES

- A. Pre-cast Concrete Wheel Stops: Furnish and install, as shown on the drawings, a pre-cast concrete wheel stop at each designated parking space where no cast-in-place curb or turn-down sidewalk occurs. Anchor units as shown on drawings.
- B. Water-stops: pre-molded thermoplastic of types and styles shown on drawings, as manufactured by Sika., (800) 325-9504 or approved alternate.
1. Provide Split-flange Dumbbell or Labyrinth waterstops where needed.

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2. Provide Sika "Hydrotite DSS" expandable waterstop wrapped around pipe or conduit where penetrating concrete wall or floor below grade or where shown on drawings. Also install Hydrotite DSS around the annulus where cored through or sleeved through concrete wall or floor prior to grouting opening. Where sleeve is set in place prior to concrete placement, install Hydrotite DSS around outside perimeter of sleeve. Follow manufacturer's instructions for each application.
 3. Waterstops are to be continuous. All splices are to be welded together to provide a watertight seal. Use manufacturer's splicing irons, type as recommended for each type of waterstop.
 4. Continuous Waterstop Installation: Waterstops are to be set securely in place prior to concrete placement. "Wetstick" method of installation or installation after concrete placement will not be allowed. Provide minimum 1 inch space between reinforcement and waterstop, so concrete can encapsulate both sides of the waterstop.
- C. Bentonite Waterstops: Surface applied Bentonite waterstop to be Volclay RX Waterstop by American Colloid Company or approved alternate.
- D. Furnish concrete splash block at each downspout approximately 12" wide x 24" long. Slope from back to front for proper drainage.

PART 3 EXECUTION

3.1 OBSERVATIONS AND SPECIAL INSPECTIONS

- A. All reinforced concrete construction shall be performed under the personal supervision of the Building Superintendent. This superintendent shall keep a record of all concrete poured on the job. The record shall show in detail the area placed, the time and date of the placement and weather conditions which existed at the time of the placement. Upon completion of the work, this record of Concrete Placement shall be included in the close out documents.
- B. The Contractor shall plan his work so that adequate time is allowed for the Architect to properly observe all embedded work prior to actual placement of concrete. The Contractor shall notify the Architect of his intent to placement at least 24 hours prior to the time that he estimates the work will be ready for observation. The Contractor shall not place any reinforced concrete without the approval of the Architect.
- C. Contractor shall plan work and coordinate with independent testing lab to be present on-site throughout concrete placement.
- D. Inspection of concrete and concrete preparation for conformance to the construction documents and IBC shall be completed by the designated third-party Special Inspector.

3.2 INSTALLATION:

A. Placing Concrete:

1. Convey concrete from mixer to final position by method which will prevent separation or loss of material.
2. Maximum time permitted before a placement of concrete after adding mixture water shall be as follows:
 - a. Air temperature above 78 degrees F. - 60 minutes.
 - b. Air temperature below 78 degrees F. - 90 minutes.
3. Concrete shall not be placed until an observation by the Architect has been made and reinforcement placement, vapor barrier, etc., is approved.
4. Excavations for footing shall be free of debris, loose dirt, mud and water just prior to placing of concrete.
5. All forms shall be clean of debris and all embedded items shall be in place and secured prior to concrete placement.
6. Wood forms shall be sprinkled with water and wet when concrete is placed, but pooling of water in forms is to be prevented.
7. Maximum height of concrete free fall, 3 feet.
8. Regulate rate of placement so concrete remains plastic and flows into position.
9. Deposit concrete in continuous operation until panel or section is completed.
10. **Concrete Placement Tolerances & Standards:**
 - a. Submit proposed slab pouring plan for review and approval by Architect prior to forming. For purposes of planning layout, approximately 5,000 to 7,000 sq.ft. is the maximum area allowed. Pending crew size and equipment larger square foot pour areas may be allowed by Architect. Provide diamond plate dowels at construction joints between placements. Refer to Section 03 21 00.
 - b. **Control joints:** Saw cuts are to be performed within 12 hours after finishing. Use 1/8" thick blade, cutting no less than 1/3 of the slab thickness, unless noted otherwise.
 - c. Place control joints for concrete slabs (slab-on-grade and elevated concrete slabs) no more than 8'-0" o.c. each way.
 - i. For other concrete slab thicknesses, refer to structural drawings for control joint spacing.
 - d. **Note: Other placement methods may be considered only with approval of Architect.**

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11. Concrete Slab Levelness and Flatness:
 - a. Levelness: FL=35 for polished slabs. FL=20 for non-polished slabs.
 - b. Flatness: FF = 50 for polished slabs. FF = 25 for non-polished slabs
 - c. In areas with floor drains, maintain finished floor level elevation at walls and slope surfaces uniformly to drains.
12. Place concrete in horizontal layers, 18 inches maximum thickness.
13. For concrete on grade or fill, sub-grades shall be properly prepared and maintained as specified previously. Where concrete is placed in direct contact with the earth, the subgrade material shall be wet but not muddy at time of placement.
14. Under all slabs, provide crushed stone choked off with fines per specification Section 31 23 00, meeting ASTM C33-Current Edition, which shall be leveled and compacted. A vapor barrier, as specified in Section 07 10 00 and shown on the drawings shall be placed under all interior slabs-on-grade.
15. Removal of forms. Do not remove forms until concrete has hardened sufficiently to support its own weight and imposed construction loads. Remove forms in such manner as to ensure the complete safety of the structure and to prevent spalling or chipping of concrete. When removing forms, conform to the following:
 - a. Non-Weight Supporting Forms: Form work for columns, walls, sides of beams and other parts not supporting the weight of the concrete may be removed as soon as concrete has hardened sufficiently to resist damage from removal operations, but in no case sooner than 24 hours.
 - b. Weight Supporting Forms: Do not remove form work for beam soffits, supported slabs or other parts which support the weight of concrete until concrete has reached 75% of its specified 28-day strength based on the lab cured concrete cylinder tests, but no sooner than 7 days.
16. Wall tie treatment. Wall ties shall be broken off after forms are removed and sealed against water penetration.
17. Slope all concrete floors to trench, or floor drains from corners of room, or as shown on drawings. Provide total slope of 1/2", unless noted otherwise on drawings.
18. Follow procedures as listed below for placement and routing of pipes, sleeves, and electrical conduit:
(If any of these items are not met, pouring of concrete will not be allowed until corrected.)
 - a. **Do not** route groups of conduit, pipes or sleeves above footings, unless noted to do so. If conflict occurs, consult Architect/Engineer.
 - b. **Do not** route conduit, pipes, and sleeves below bearing walls when running parallel with wall.
 - c. Limit width of conduit, pipes and sleeves not to exceed 3'-0" in width as it passes under wall footing. As much as possible, align the items perpendicular to the footing as it passes below footing.

- d. Provide a minimum spacing of 2'-0" between conduit or pipe groups as items pass under footings.
- e. **Do not** route conduits, pipe or sleeves under or through column footings or pad footings unless prior approval is given by Architect/Engineer.
- f. At elevated slab work, conduits will not limit slab depth to any less than one half of an inch of the total thickness. Conduits will not be within one inch of any reinforcing materials.
- g. The top of all conduits, sanitary drain pipe, water supply pipe, etc. shall be installed at or below bottom of concrete slab where slab is on grade.
- h. Where in-slab electrical floor boxes occur, the conduit shall slope down to below-slab elevation as soon as possible on exterior sides of floor box.

B. Consolidating Concrete at Steel Reinforcement:

- 1. Use mechanical vibrating equipment for consolidation.
- 2. Vertically insert and remove hand-held vibrators having minimum 1" diameter at points 18 inches to 30 inches apart.
- 3. Do not use vibrators to transport concrete in forms.
- 4. Minimum vibrator speed, 3600 rpm.
- 5. Vibrate concrete minimum amount required for consolidation, 3 to 5 seconds maximum.

C. Construction Joints:

- 1. Clean and roughen the surface of concrete and remove laitance.
- 2. Wet concrete surface and flush with neat cement grout before placing additional concrete.
- 3. Construction Joints for slabs on ground (floor joints) shall be plate dowel system. Plate dowel system sleeves shall be attached to 2 x wood members matching the depth of the slab for removal and reuse with steel stakes @ 2'-0" o.c. Form boards must have clean smooth top surface so finishing machines can pass over the top of the form.
- 4. Construction Joints for elevated slabs shall be a straight edge pour stop. 2 x wood members matching the depth of the slab secured to the metal deck. Wire mesh is not to continue through the form board. Form boards must have clean smooth top surface so finishing machines can pass over the top of the form.

D. Plate Dowel System: Provide Diamond Dowel System manufactured by PNA construction technologies, "Speed Plate" System by Sika. or approved alternate. Refer to Section 03 21 00.

- 1. Install at all slab on grade construction joints.

E. Expansion joints: Expansion joint filler, where indicated, shall meet "Specifications for pre-formed Expansion Joint Fillers for Concrete Paving and Structural Construction, Non-extruding and Resilient, Non-bituminous. (ASTM D1752-Type 1). Provide "Zip Strip" type filler so that top 1/2" can be provided for sealant installation.

F. Isolation Joint Material:

1. Provide ½" thick closed cell foam material, separating steel or concrete columns from concrete slab at slabs-on-grade and at elevated slabs to prevent bonding and cracking of concrete from structure movement. Hold down from top of slab ½" and fill with sealant.
2. At perimeter steel edge angles and other floor or wall penetrations where steel angles or framing exists, apply bituminous material on steel where concrete is to be placed to create bond breaker.

G. Column Block-Outs:

1. Unless noted otherwise on drawings, provide round blockouts created by a "Sonotube form" section or other means. **Diamond shaped blockouts will not be accepted.**
2. Provide same Portland cement manufacturer and mix design for concrete fill in column block-outs as surrounding concrete slab.

H. Finishing:

1. Floor Finish

- a. Edge forms and intermediate screed strips shall be placed accurately to give the desired elevations and contours. Strike-off templates or straight edges shall be used to give all floor slabs an even surface. Screeds are to be of such type not to interfere with reinforcing.
- b. Troweled finishes shall be applied to floors where concrete is the walking surface, or to have floor coverings. Troweling shall begin after all surface water has disappeared naturally and surface has wood floated to a plane smooth surface. Initial troweling shall be done after concrete has hardened sufficiently to prevent excess fines from working to surface, to produce a smooth surface free from defects and a final troweling shall be done after sufficient hardening to remove trowel marks and give a hard, dense smooth surface. Drying shall be natural. The use of "dryers" by dusting cement or sand is not permitted.
- c. Floors to receive tile or other bonded cementitious finishes shall, after wood floating to a smooth plane surface, be roughened with stiff brushes before final set.
- d. All exterior concrete ramps, stairs, and landing slabs shall have a light broom finish of sufficient texture to prevent slipping.

2. Walks: See Section 32 16 00

3. Exposed Concrete Surfaces

- a. Areas not receiving special coatings shall be wetted and rubbed with carborundum bricks or other abrasive to give a smooth finish with a uniform color and texture. All edges shall be eased to give a good appearance.
- b. Areas receiving special coatings shall be free from imperfections such as voids and protrusions and shall be finished to a smooth and level surface.

I. Curing: Provisions shall be made for maintaining all concrete surfaces in a continuously moist condition immediately following finishing operations for a period of seven days by one of the following methods when exposed or immediately following removal of forms:

1. Sprinkling
2. Absorptive fabric kept continuously wet.

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3. Maintain concrete within 40 degrees F. temperature range while curing for length of time shown below:
 - a. Three (3) days for footings.
 - b. Seven (7) days for flatwork.
 4. Chemical curing will be considered only when water curing is not practical, such as threat of freezing weather conditions. Unless specified otherwise in this specification section, **absolutely no chemical curing** is to occur on slab areas that are to receive carpet, resilient and synthetic floor coverings, or any other specified floor covering that prohibits chemical curing in their requirements.
 5. Polished Concrete at Slab-on-Grade is to be fully wet cured per specification section 03 35 20 Polished Concrete Finish System.
 6. Elevated Concrete Floor Slab Curing: AmeriPolish PCA curing agent, manufactured by AmeriPolish Architectural Concrete Products, (800) 592-9320. 1100-CLEAR, manufactured by W.R. Meadows Inc, (800)342-5976. L&M CURE, manufactured by Laticrete (800)243-4788. Products must be approved for concrete floor slabs receiving Polished concrete finish. Contractor to verify with floor covering manufacturers that they will warrant their product if a curing agent is applied where the floor covering is to be installed. Provide 20'x20' test sample to confirm curing agent does not cause dis-coloration to the concrete slab.
- J. Patching: After removal of forms, all honeycomb areas, voids, air pockets, tie holes and surface cracks shall be immediately patched.
- K. Application of Floor Densifier/Hardener:
1. Apply to **polished and unpolished** interior concrete slabs and exterior porch or patio areas scheduled to be exposed to view.
 2. Apply per manufacturer's instruction to all exposed trowelled concrete floor areas and other areas as called out on finish schedule. Product to be applied as soon after curing period as manufacturer's instructions allow. Application must be smooth and even. No excess application or puddling of the product will be allowed.
 - a. Clean floors where densifier/hardener is applied with manufacturers cleaners.

3.3 GRIND ONLY AT SEALED CONCRETE FLOORS

- A. At sealed concrete floors
1. Progressively polish slab surface with 200 grit resin-bonded, phenolic diamond heads. 1 pass.
 2. Seal with DNS-400 Sprayable Acrylic Sealer by Ameripolish.

3.4 ACCEPTANCE OF CONCRETE:

- A. Concrete not meeting the strength requirements of these specifications shall be tested at critical locations designated by the Architect by a laboratory approved by the Architect. These tests shall be at the Contractor's expense. Such tests performed shall be in accordance with the Building Code Requirements for Structural Concrete: (ACI 318-Current Edition). If these tests still indicate below required strengths, or if inconclusive, then the Contractor shall proceed at his own expense as follows:

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Remove and replace or reconstruct all under strength concrete in an approved manner or perform load tests in accordance with the "Building Code Requirements for Structural Concrete" (ACI 318-Current Edition). If load test results are not acceptable then Contractor shall remove and replace or reconstruct all designated under strength concrete to meet requirements of these specifications.

- B. Concrete improperly placed, cured, reinforced, damaged or not meeting testing tolerances shall be considered potentially deficient and shall be tested and replaced if necessary, in accordance with Paragraph a) above.
- C. Concrete not meeting the tolerances of "Recommended Practice for Concrete Formwork: (ACI 347) and concrete not formed as shown on plans shall be considered as not acceptable and shall be removed and replaced by Contractor at his own expense unless Architect permits patching and repairing of such work. Finished repair work shall meet criteria mentioned above or shall be removed and replaced.

3.5 TESTING AND SAMPLING:

- A. Slump Tests: A minimum of two (2) slump tests shall be made each day concrete is placed with one (1) test being made at the time test cylinders are made. Slump tests are to be made in accordance with "Standard Test Method for Slump of Hydraulic-Cement Concrete" (ASTM C-143-Current Edition). Where slump exceeds five inches (5") or the average 28 day strength of the three (3) test specimens falls below the strength specified for the class of concrete tested, or below proportional minimum seven (7) day strengths, (80 percent of specified 28 day strength) the proportions, water content or temperature conditions shall be changed to secure the required properties, and, at the discretion of the Architect, portions of the structure containing such concrete shall be removed and replaced, or reinforced as necessary. No concrete below 3" slump shall be accepted. Follow guidelines of ASTM C94 for water added to mix on site. Do not exceed design specifications.
- B. Strength Tests. The compression strength test shall be performed in accordance with "Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens" (ASTM C39-Current Edition). Samples for concrete cylinders shall be made in accordance with "Method of Sampling Fresh Concrete" (ASTM C172-Current Edition), and test cylinders shall be prepared, and laboratory cured in accordance with "Method of Making and Curing Concrete Compression and Flexure Test in the Field" (ASTM C31-Current Edition).
- C. Cylinders. Five (5) cylinders from the same batch shall be prepared by a certified technician for each 50 cubic yards or fraction thereof placed, but not less than four (4) cylinders for each day of concrete operations shall be made. **Location of batch as to placement on the subject and supplier mix ID# shall be noted on report, and cylinders so designated. Maximum and minimum initial curing temperatures as recorded per ASTM C31 shall be included in this report.** No tests shall be required for sidewalks. One (1) cylinder shall be tested at seven (7) days and three (3) at 28 days. **If cylinder break is lower than required, the testing company to contact Contractor**

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and Architect immediately for direction. The remaining cylinder shall be maintained in proper curing conditions until specified 28-day compressive strength has been affirmed.

- D. A minimum of nine (9) cylinders shall be tested for each class of concrete used on the project and the average of any three (3) consecutive strength tests at 28 days shall be equal to or greater than the specified strength with no test less than 500 psi below the design strength.
- E. The Construction Manager shall bear expense of all testing by a Laboratory approved by the Architect prior to award of the contract. Testing results shall be sent directly to the Architect's office, Contractor, and the Concrete Producer. Architect is to be notified of high slump concrete or low early strength (<75% of design at 7 days) immediately.
- F. Floor Flatness and Floor Levelness test shall be performed in accordance with "Standard Test Method for determining FF Floor Flatness and FL Floor Levelness Numbers" (ASTM E1155- Current Edition) for entire interior slab on grade.
- G. Floor Flatness test shall be performed in accordance with "Standard Test Method for determining FF Floor Flatness Numbers" (ASTM E1155- Current Edition) for entire elevated slab.

END OF SECTION

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CONCRETE MIX DESIGN SUBMITTAL FORM
(Section 03 30 00 - Cast-in-Place Concrete)

Submitted Mix Design

Date Submitted: _____

Location and Type (pump or chute) of Placement

Concrete Information

Supplier Mix Design #: _____

Design Strength (f'c), psi _____

Water/Cementitious Ratio _____

Total Air Content, % _____

(Entrapped or Entrained) _____

Density: _____

Wet, pcf _____

Dry, pcf _____

Slump: _____

Without WR, in. _____

With WE, in. _____

Admixture Information

		ASTM Designation	Product & Manufacturer	Dosage (oz/cy)
Water Reducing				
Accelerating				
Retarding				

Architect's Approval _____

Structural Engineer's Approval _____

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Mix Design Proportions Per Cubic Yard

	Identification (Type, size, source)	Weight (lbs)	Density (SSD)	Volume (cubic ft)	% Aggregate Absorption
Cement					
Fly Ash					
C.A. #1					
C.A. #2					
C.A. #3					
F.A. #1					
F.A. #2					
Water					
% Air					
	Totals				

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Coarse and Fine Aggregate Gradation

Sieve Size	% Passing Each Sieve (All sieve sizes must be entered)					Combined% Passing	Combined % Retained	
	C.A. #1	C.A. #2	C.A. #3	F.A. #1	F.A. #2		Cumulative	Individual
1-1/2"								
1"								
3/4"								
1/2"								
3/8"								
#4								
#8								
#16								
#30								
#50								
#100								
#200								
% of Vol.								

Required Attachments and Supplemental Documentation

_____ Portland Cement mill test
 report/certification
 _____ Fly ash mill test
 report/certification
 _____ Separate aggregate gradation reports including all required sieve sizes
 Note: * All gradation reports shall be dated within 60 days of submittal
 * Separate gradation reports required for each coarse and fine
 aggregate material in the
 mix
 _____ Product data for all admixtures including, but not limited
 to:
 * WR
 * Set retarder
 * Set accelerator
 * Air entrainer
 _____ Concrete compressive strength data used for standard deviation
 calculations

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Concrete Supplier Information

Supplier Name:			
Technical Contact:		Cell #	
Sales Contact:		Cell #	

Primary Plant:

Location:

Miles from Site:

Travel Time to Site:

NRMCA Certified (Y/N):

AHTD Certified (Y/N):

Batch Mixing Typer (Dry/Central Mix):

Secondary Plant:

Location:

Miles from Site:

Travel Time to Site:

NRMCA Certified (Y/N):

AHTD Certified (Y/N):

Batch Mixing Typer (Dry/Central Mix):

SECTION 03 35 20

POLISHED CONCRETE FINISH SYSTEM

PART 1 GENERAL

1.1 WORK TO INCLUDE:

- A. Grinding and Polishing of interior concrete slab.
- B. Application of reactive surface densifier.
- C. Joint filler and installation
- D. Application of stain guard surface treatment.
- E. Progressive polishing of slab surface.
- F. Protection of polished concrete floors.

1.2 RELATED WORK:

- A. Section 03 21 00 – Concrete Reinforcement: Tapered plate dowel system
- B. Section 03 30 00 - Cast-in-place Concrete

1.3 PROTECTION:

- A. Finished system shall be protected against undue soilage and damage by other trades by the use of reasonable care and precaution during process of installation and after completion of installation, prior to substantial completion of project.

1.4 SUBMITTALS:

- A. Color samples shall be submitted for consideration and selection in accordance with Section 01 33 00, Submittals.
- B. Provide shop drawings showing pattern layout and locations of selected colors.
- C. Letter of Certification: Provide Letter of Certification by the manufacturer that Contractor is a current qualified installer.
- D. Product Data: Manufacturer's technical literature for each product indicated, specified, or required. Include manufacturer's technical data, application instructions, and recommendations.

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- E. Installer Qualifications: Data for company, principal personnel, experience, and training specified in PART 1 “Quality Control” Article.
- F. Maintenance Data: For inclusion in maintenance manual required by Division 01.
 - 1. Include instructions for maintenance of installed work, including methods and frequency recommended for maintaining optimum condition under anticipated use.
 - 2. Include precautions against cleaning products and methods which may be detrimental to finishes and performance.

1.5 JOB MOCK-UP:

- A. Prior to installation of polished concrete finish system, contractor shall provide minimum 12’ x 12’ mock-up at the job site in area where the floor will always be visible such as a storage or mechanical room. Provide larger mock-up area if required to accommodate pattern and number of colors. Architect shall approve color and workmanship of the mock-up, then retain as a standard for judging completed work. This shall not become part of the finished work. Mock-up to be polished for approval.

1.6 QUALITY CONTROL

- A. Installer Qualifications:
 - 1. Provide list of a minimum of 5 projects performed within last three years of similar type, size, and complexity. Submit project names, addresses, contacts, and phone numbers for each project. This is to be provided with data submittal.
 - 2. Company experienced in performing specified work similar in design, products, and extent to scope of this Project; with a five-year record of successful in-service performance; and with sufficient production capability, facilities, and personnel to produce specified work.
 - 3. Submit letter of certification from manufacturers of all products and equipment specified herein, stating that the applicator is a certified applicator of the system and is familiar with proper procedures and installation methods as required by the manufacturer. All certifications must accompany the bid.
 - 4. Polished concrete contractor has to have been regularly performing Polished Dyed Concrete work for at least 3 years prior to bid with manufacturer certifications or job history verifying this point. This is to be provided with data submittal.
 - 5. **INSTALLERS NOT MEETING THE AFORE-MENTIONED QUALIFICATION REQUIREMENTS WILL NOT BE APPROVED TO INSTALL POLISHED CONCRETE SYSTEM.**
- B. All components of the polished concrete finish system shall be provided by one single system supplier / installer.
- C. Do not apply polished concrete finish system when temperature is at or below 32 degrees Fahrenheit or temperatures are projected to go below freezing before dye can have time to cure.

- D. Curing agents may only be used at elevated slabs where polished concrete system is to be installed. Test sample required per specification 03 30 00.
- E. Power and water to be available prior to beginning of work.

1.8 PRE-INSTALLATION MEETING

- A. The Contractor will schedule and conduct a pre-installation meeting **prior to pouring of concrete floors** where polished concrete is scheduled to be installed. Those attending are to include Contractor, Architect, Owner, Owner's floor maintenance representative, concrete finisher including supervisor, concrete ready-mix plant representative, polished concrete installer and foreman, and other trades affected by the polished concrete system. Items to be discussed are as follows but are not limited to these:
 - 1. Schedule
 - 2. Concrete slab preparation and pouring.
 - 3. Required concrete mix design strength
 - 4. Initial grinding and polishing procedures
 - 5. Speed of operations for correct refinement of polished concrete
 - 6. Protection of floors and damage prevention during construction
 - 7. Project phasing and scheduling for each step of grinding, honing and polishing operations including, but not limited to:
 - a. Quality of qualified personnel committed to project.
 - b. Quality and size of grinders committed to project.
 - c. Proper disposal of concrete slurry and/or concrete dust.
 - 8. Control joint cutting
 - 9. Control joint filler
 - 10. Maintenance
 - 11. Other items associated with polished concrete system.

1.9 WARRANTY

- A. Furnish a written warranty covering both material and workmanship for period of ten (10) years from Date of Substantial Completion.

1.10 MAINTENANCE

- A. Provide owner and owners cleaning company with on site training. Instructional training video to also be provided.
- B. Coordinate with owner a cleaning schedule.
- C. Provide owner with a 2-month starter kit of cleaning products and pads. Cleaning products to be Amerpolish brand.

PART 2 PRODUCTS

2.1 MATERIALS/MANUFACTURERS

- A. Subject to compliance with project requirements, provide products and equipment by the following:
 - 1. Ameripolish (479) 725-0033 www.ameripolish.com
- B. Penetrating Hardener/Densifier: (Clear liquid reactive lithium-silicate based.)
 - 1. 3D HSL, by Ameripolish
- C. Protective Surface Treatment (Stain Guard):
 - 1. 3D SP, by Ameripolish
- D. Joint Filler:
 - 1. 2-part polyurea, Spal-Pro RS 88 manufactured by Metzger/McGuire, 807 Route 3-A Bow, NH 03304, 1-800-223-6680
 - 2. 2-part polyurea, Versaflex SL/85, rapid curing, manufactured by Versaflex, Inc., 87 Shawnee Avenue, Kansas City, KS 66105 (913) 321-9000.
 - 3. 2-part polyurea, PE85, manufactured by Hi-Tech Systems, 1190 N. Del Rio Place, Onterio, CA 91764 (909)945-5530
 - 4. Approved alternate
- E. Crack Filler:
 - 1. 2-part polyurea, HT Spall-TX3, manufactured by Hi-Tech Systems, 1190 N. Del Rio Place, Onterio, CA 91764 (909)945-5530
 - 2. Approved alternate

2.2 EQUIPMENT

- A. Contractor is to furnish minimum three grinding/polishing machines (HTC 800, HTC 950, Sase Products or similar) in full operating condition during the duration of work.
 - 1. Planetary, counter rotating variable speed floor grinder (4 head).
 - 2. Minimum 700 pounds of downward pressure.
- B. Dust extraction system, pre-separator, and squeegee attachments with minimum flow rating of 322 cubic feet per minute.
- C. Generators are required to provide required power. The Polished Concrete Contractor is to provide a minimum of two, each capable of running two classic (HTC 800 or similar) grinding machines concurrently to expedite work.
- D. Allowable Grinding Heads:
 - 1. Metal Bonded Diamonds:
 - a. Grit Size: 16, 30, 70, 100.
 - b. Use of metal bonded diamonds shall be for removal of existing epoxy coating only, unless approved in writing prior to alternate use.

2. Hybrid and Resin Bonded, Phenolic Diamonds
 - a. Grit Size: 50, 100, 200, 400, 800, 1500
 3. Grinding/Polishing Pads:
 - a. Grit Size: 60, 100, 120, 200, 400, 800, 1500, 3000.
- E. Hand grinder with dust extraction attachment and pads.
- F. High speed propane burnisher:
 1. Minimum 27-inch head generating pad speeds of 1,500 RPM or higher, as verified with tachometer
- G. Diamond Impregnated Pads
 1. Twister Diamond Cleaning System Pads, by HTC.
 2. Diamond Polishing Pads, by Norton.
 3. SpinFlex Diamond Polishing Pads, by CPS.
- H. Applicator pad:
 1. Professional Mighty Mop 077, by Quickie.
 2. 24" Microfiber Wet Room Pad, by Rubbermaid.

PART 3 EXECUTION

3.1 ADDITIONAL CONCRETE SLAB PROCEDURES FOR POLISHED CONCRETE

- A. Refer to Specification 03 30 00 Cast-In-Place Concrete for concrete slab requirements
- B. Additional Polished Concrete Floor Troweling Requirements:
 1. Final troweling shall be performed with finish blades.
 2. Finish blades shall be new or used steel finish blades that are in good shape.
 3. Finish blades may be steel reinforced plastic for the final pass only.
 4. Trowel as many times as possible.
 5. Lead finisher/foreman who finished the field sample shall be present for entire fresh concrete finishing process until final troweling is completed.
- C. Additional Control Joint Requirements:
 1. After saw cutting, immediately vacuum up and clean residues.
 2. Employ sufficient number of saws and workers to complete cutting saw joints before shrinkage produces cracking.
 3. Saw cut to width of 1/8 inch, depth at least 1/3 thickness of the slab.
 4. Use saws, blades, skid plates, and accessories by Soff-Cut International, Inc. or approved alternate.
 5. Start cutting sawed joints as soon as concrete has hardened sufficiently to prevent raveling or dislodging of aggregates. This will typically be from 1 hour in hot weather to 4 hours in cold weather after completing finishing of slab in that joint location.
 6. Provide at least two "Soff-Cut" saws on site with blades capable of achieving the required depth of saw cut.

7. Extend sawed joint to the slab boundaries and abutments, including columns, drains, and other penetrations in the path of a defined joint. Implement methods and timing of the saw cut beyond the limits of the Soff-Cut saw reach to provide a consistent depth of cut with minimal raveling of joint edges.
8. Connect a dust collection system directly to each Soff-Cut saw being used.
9. Remove all saw debris, either loose or compacted, from slab surface and joints prior to curing cover installation.

D. Additional Slab on Grade Concrete Curing Requirements

1. Start curing as soon as concrete surface will not be damaged by curing operations.
2. Continuously wet cure concrete for at least 7 consecutive days.
3. During curing period, do not allow any part of the concrete to become dry.
4. Do not use polyethylene sheets on exposed interior floors.
5. Wet Cure Only:
 - a. Use fine misting hoses to keep surfaces wet with a 1/8" nominal thickness film of water on concrete surface during entire curing period.
 - b. Provide continuous observation for 24 hours per day for the duration of the curing period.
 - c. Create a dam along the edge of pour to contain water on slab.
 - d. Employ methods to remove excess water from around site. Do not allow any part of the concrete surface to dry before end of curing period.

3.2 EXAMINATION

- A. Verify preparation conditions before beginning work.
- B. After concrete curing period (14 days minimum and 3500 psi cylinder break) has elapsed, surface must be clean and dry, physically sound and free of contamination. Surfaces must be free of holes, voids, or defects. Cracks and abrupt changes in surface profile must be corrected or accepted as is. Fins and projections must be removed.
- C. Contractor must report, in writing, surfaces left in improper condition by other trades. Application will constitute acceptance by the applicator.

3.3 PREPARATION

- A. Close areas to traffic during and after floor finish application for time period recommended by product manufacturer(s).
- B. Clean Substrate: Removal of surface contaminants to ensure penetration of reactive surface densifier. No hazardous, flammable, toxic or solvent based cleaning materials are permitted.
 1. Remove dust and loose material by brushing, sweeping, and vacuuming.
 2. Remove curing, sealing and coating agents, oil, breaking compound residue, wax, and grease by mechanically scraping off heavy deposits. Remove remaining residues using Wax and Curing Compound Remover.
 3. Remove deep-set oil and grease stains.

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4. Remove paint residue.
5. Remove grease and general soiling with cleaner/degreaser diluted as recommended by manufacturer in an auto scrubber.
6. Remove mildew by scrubbing with solution of trisodium phosphate and bleach. Rinse with clean water.
7. Thoroughly rinse floor surface to remove soap residue and contaminants.
8. Squeegee dry.

D. Repair all slab defects.

E. Ensure surfaces are clean, dry, and free of oil, grease, dirt, dust, and contaminants.

3.4 NEW CONSTRUCTION INSTALLATION PROCEDURE:

- A. System to be installed by approved and licensed applicators from manufacturer. Comply with flooring system manufacturer's recommendations and instructions regarding preparation and mixing of materials and application of each component of floor system. Coordinate with contractor, scheduling for installation of the polished dyed concrete finish system. **Initial grinding of polished floor system to be performed prior to wall installation to assure proper polishing of entire room or area.**
- B. For the initial grinding of the concrete slab, use coarse diamond segments bonded in a metallic matrix. These segments should be coarse enough to remove minor pits, blemishes, stains, or light coatings from the floor in preparation for final smoothing. A minimum of **4 passes** with 70 grit metal bonded diamond grinding heads is required. Depending on the condition of the concrete and the specified aggregate exposure additional passes and lower grit metal bonded heads may be required.
- C. Protect surrounding and adjacent surfaces in accordance with floor finish manufacturer's written recommendations.
- D. **Joint and/or crack filler to be installed in control joints, cracks, pitted, spalls and holes prior to final grinding and polishing.** Joint filler must bond to clean, exposed concrete for the full intended filler depth. Joints must be free of saw laitance, dirt, debris, coatings, sealers, etc. The only effective means of proper joint cleaning is the use of a dry cut saw, vacuum-equipped, with a diamond blade. The blade depth should extend to the intended filler depth. Run blade against each side wall on separate passes. After cleaning joints with saw, vacuum any remaining dust/debris from joint. Joint filler is designed to be placed to the full depth of the joint in saw-cut contraction/control or construction joints or at 2" minimum if joint depth exceeds 2". **DO NOT USE COMPRESSIBLE BACKER ROD IN SAWCUT JOINTS.** Follow all additional manufacturers installation instructions.
- E. Grind slab surface with 150 grit metal-bonded OR 50 grit hybrid resin metal-bonded diamond grinding heads. **2 passes.**
- F. Clean slab with wet auto scrubber with PH cleaner between **all** polishing passes.

- G. Progressively polish slab surface with 100 and 200 grit resin-bonded, phenolic diamond heads. 2 passes each grit level minimum for a total of **4 passes**.
- H. Apply reactive surface densifier per manufacturer's instructions to rejection.
- I. Polish slab with 400 and 800 grit resin-bonded, phenolic diamond heads. 2 passes each grit level minimum for a total of **4 passes**.
- J. Polish slab with 1,500 grit resin-bonded, phenolic diamond heads. **2 passes**.
- K. Burnish slab with 3,000 grit resin-bonded, phenolic diamond heads. **2 passes**.
- L. Gloss and DOI readings are required to be taken prior to the application of surface treatment (stain guard)
- M. Apply protective surface treatment (stain guard) per manufacturer's instructions. Draw out material to thin film with applicator pad.
- N. Slowly burnish slab with 3,000 grit diamond impregnated pad. **1 pass**.
 - 1. Burnisher, pad and pace of forward movement shall combine to develop a minimum floor surface temperature of 91° F directly below the burnishing pad, as measured by the operator during installation.
- O. A minimum of **19 passes** are required. Additional passes may need to be provided dependent on condition of concrete, specified aggregate exposure and operation of machinery. Slurry being produced should become slightly milky to clear.
- P. Progressive edge grinding will be necessary along all vertical abutments.
- Q. At installer's option, water polishing can be implemented to aid in achieving specified reflective and finished requirements

3.5 FINISH REQUIREMENTS:

- A. Aggregate Exposure:
Class D – Large Aggregate: Large aggregate with little or no fine aggregate exposure. Similar in appearance to terrazzo. Approximate surface cut of 1/4"
- B. Gloss Level: All gloss levels are to be measured using a Rhopoint IQ Gloss & DOI reader. Reader must be factory calibrated yearly.
Level 3: Polished. Objects being reflected are sharp, crisp and easily identified. Gloss readings should range from 50 to 65 prior to surface treatment (stain guard)
- C. DOI Value: All DOI (distinctness of image) values are to be measured using a Rhopoint IQ Gloss & DOI reader. Reader must be factory calibrated yearly.
DOI, Image Clarity Values should range from 70 to 85 prior to surface treatment (stain guard)

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- D. Slip Resistance: Measured dynamic coefficient of friction (DCOF) shall be 0.42 or greater as measured in accordance with ANSI A137.1. Testing apparatus shall be the BOT 3000E
- E. Leave work complete and ready for final inspection by Architect.

3.6 PROTECTION:

- A. Contractors shall be advised that the concrete slab is the finished floor. Do not allow marking of the floor (even with pencil). Do not apply chemicals of any kind. No chemical process or cleaning system is known that will remove petroleum stains and certain other chemicals from concrete surfaces.
- B. Polished floor areas are to be protected by the general contractor/construction manager with taped hardboard or ram board for duration of project until time of final cleaning. Periodically inspect protection board for damage and keep it free from debris.
- C. Perform final cleaning of polished floor area after protection is removed.
- D. Coordinate with Contractor to protect exposed edges of construction joints immediately following form removal.
- E. Coordinate with Contractor to assure smooth, clean sawing of control joints to prevent chipping or aggregate pullout during sawing process.
- F. DO NOT allow trades to park vehicles on the slab without protection, such as plastic or non absorbent drop clothes, under the vehicles.
- G. ALWAYS DIAPER any hydraulic equipment used on the floor during the construction process. No exceptions.
- H. NO PIPE FITTING/cutting will take place on the floor slab.
- I. DO NOT place steel on the slab without protection beneath.
- J. Protect wet cured surfaces as follows:
 - 1. Barricade concrete surfaces immediately after finishing
 - 2. Do not allow light traffic, except for curing purposes, on concrete surfaces until concrete has obtained 1800 psi (approx 3 days).
 - 3. Do not allow heavy traffic on concrete surface until concrete has obtained, by test, its design strength, but not sooner than 9 days after placement.
 - 4. Permit concrete to dry minimum of 2 additional days after curing is completed before removing barricades.
- K. Provide access ramps of compacted earth or other means along exposed concrete edges of floor slabs to prevent equipment and machinery from impacting edges. Barricade all other exposed edges to vehicular traffic which may damage edges. Broken or chipped edges along construction joints will not be tolerated.

- L. When traffic is allowed on the slab tires must be WHITE. Tires shall be inspected to insure no foreign objects are embedded in tires such as rocks, screws, nails, etc., which could damage polished floor finish.
- M. DO NOT ALLOW BLACK TIRES on polished concrete slabs. If black tire equipment must access the slab the tires must be fitted with protective tire socks.
- N. Do not allow clay gravel, etc. to be tracked onto bare unpolished or polished concrete slab.
- O. Do not allow work resulting in oils dripping onto concrete slabs to occur without floor protection.

3.7 TESTING

- A. Using a Rhopoint IQ Gloss & DOI reader randomly test the floor with architect and contractor present. Floor polisher to provide instrument and show calibration. Equipment to be calibrated yearly by manufacturer. The minimum number of tests distributed across the polished surface should be three test for areas up to 1000 sf and one additional test for each 1000 sf or fraction thereof. This applies to both Gloss and DOI.
- B. Gloss readings at 60 degrees shall average a minimum of 55 with no area measuring less than 45 prior to stain guard application.
- C. Gloss readings at 60 degrees shall average a minimum of 70 with no area measuring less than 60 after stain guard application.
- D. Minimum DOI reading to be 70 or higher prior to stain guard application
- E. Minimum DOI reading to be 85 or higher after stain guard application
- F. Slip Resistance: Measured dynamic coefficient of friction (DCOF) shall be 0.42 or greater as measured in accordance with ANSI A137.1. Testing apparatus shall be the BOT 3000E

3.8 CLOSEOUT ACTIVITIES

- A. Maintenance Training: Polish concrete company shall train Owner's designated personnel in proper procedures for maintaining polished concrete floor. Training must include hands on demonstrations of all cleaning steps. Contractor must provide 2 months of care and maintenance products to the owner.

END OF SECTION

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SECTION 03 48 43

ARCHITECTURAL PRE-CAST CONCRETE TRIM

Part 1 GENERAL

1.1 REFERENCES:

- A. Pre-stressed Concrete Institute MNL 117 "Manual for Quality Control for Plants and Production of Architectural Pre-cast Concrete Products."
- B. Pre-stressed Concrete Institute's "Architectural Pre-cast Concrete Design Manual, 2nd Edition".
- C. ASTM standards as stated herein.

1.2 SUMMARY

- A. This specification covers all labor, materials and services for the furnishing and setting of the integrally colored architectural pre-cast concrete units as indicated on the drawings and specifications herein.
- B. The Fabricator shall have a minimum of 5 years successful experience in fabrication of architectural pre-cast concrete units, similar to units required for this project. Fabricator must adhere to procedures outlined in PCI MNL-117 and the PCI Design Manual (2nd Edition) that are applicable to the manufacturing of Architectural Pre-cast Concrete trim pieces.
- C. The setting contractor shall unload, store, protect, and install as covered by this Specification and shall provide and install all anchors and accessories for same. The setting contractor shall have a minimum of 3 years successful experience in erection of architectural pre-cast concrete units similar to units required for this project.

1.3 SUBMITTALS: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

- A. Fabricator information as listed above under section 1.2-B if the proposed fabricator is not listed as a qualified manufacturer.
- B. Shop Drawings:
 - 1. Prepared by an experienced professional detailer showing complete information for fabrication and installation of pre-cast concrete units.
 - a. Show layout, dimensions, and identification of each pre-cast unit corresponding to sequence and procedure of installation.
 - b. Make design modifications only as necessary to meet field conditions and to ensure proper fitting of the work and only as acceptable to the Architect.

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2. The Fabricator shall submit the shop drawings to the General Contractor who shall verify all drawing dimensions and coordinate the shop drawings with field conditions and other trades. The General Contractor shall submit the shop drawings to the Architect for approval. The Fabricator shall not start production until the shop drawings are approved by the Architect and General Contractor in writing.

C. Samples

1. Minimum size - 6" x 6" x 2" to illustrate the quality, color, and surface finish texture.
2. Color: Fabricator must develop a custom colored mix to match a colored sample provided by the Architect. The color sample to match would either be an earth-tone color shade (such as: Indiana limestone color, off-white, buff, brown, brick orange, brick red, light gray, dark gray, dull yellow) or pure white. Painted, stained, or coated pre-cast is not acceptable. Unless otherwise noted, all the pre-cast units on the project will be the same color and of the same mix design.
3. Texture: Smooth, dense, fine-grained texture achieved by lightly sandblasting to thoroughly remove all surface cement paste.

1.4 DELIVERY, STORAGE, AND HANDLING.

- A. Deliver pre-cast concrete units to project site in such quantities and at such times to assure continuity of installation. Store units at project site to prevent cracking, distortion, warping, staining, or other physical damage and so that markings are visible. Lift and support units only at designated lifting or supporting points as shown on final shop drawings.

PART 2 PRODUCTS

2.1 FORMWORK

- A. Provide forms and, where required, form-facing materials of metal, plastic, wood, or other acceptable material that is nonreactive with concrete and will produce required finish surfaces per the approved sample. Maintain form work to provide completed pre-cast concrete trim units within specified fabrication tolerances.
- B. Provide dissipating polymerized solution for form release agent and curing agents containing no oils, waxes, paraffin, or silicones for tilt-up precast concrete or cast-in-place concrete scheduled to receive interior or exterior finishes.

2.2 REINFORCEMENT

- A. All pre-cast concrete units shall be reinforced with new billet steel reinforcing bars, as necessary for safe handling, setting and structural stress, and the size of the reinforcing shall be specified with a minimum area of steel equal to one quarter of one percent of the cross section area. If the surfaces are to be exposed to the weather, the reinforcement shall be galvanized or epoxy coated when covered with less than 2 inches of material for bars larger than 5/8 inch and 1-1/2 inches for bars 5/8 inch or smaller. The material covering in all cases shall be at least twice the diameter of the bars.

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1. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
 2. Epoxy-Coated Reinforcing Bars: ASTM A 775.
 3. Galvanized Reinforcing Bars: ASTM A 767, Class II (2.0 oz. zinc PSF), hot-dip galvanized after fabrication and bending.
 4. Welded Wire Fabric: ASTM A 185.
- B. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs that are plastic protected (CRSI, Class I) or stainless steel protected (CRSI, Class 2).

2.3 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type I or Type III, Color to be white or gray as required to achieve proper color as determined by the Architect.
- B. Coarse Aggregate: ASTM C 33, Color to be white. Darker aggregates may be used as long as the proper color mix is achieved as determined by the Architect.
- C. Fine Aggregate: ASTM C 33, Color to be white. Darker aggregates may be used as long as the proper color mix is achieved as determined by the Architect.
- D. Pigments: ASTM C 979; Inorganic, non-fading, resistant to lime and other alkalis. Pigments not to exceed 10% of the cement weight.
- E. Water: Potable, free from foreign materials in amounts harmful to concrete or cast in steel.
- F. Air-Entraining Admixture: ASTM C 260.
- G. Water-Reducing, Retarding, or Accelerating Admixtures: ASTM C 494, type as selected by Fabricator and containing not more than 0.1 percent chloride ions.

2.4 CONNECTION MATERIALS

- A. Anchors - Non-corrosive; galvanized, brass or stainless steel type 304.
- B. Finish of Other Steel Units (Plates, braces, etc.): Units exposed to weather to be hot-dip galvanized after fabrication, ASTM A 153; Units not exposed to weather to be painted with one coat of rust-inhibitive primer; threaded inserts cast into pre-cast units, hot-dip galvanized, electro-galvanized, or cadmium plated.

2.5 PROPORTIONING AND DESIGN OF MIXES

- A. Unless otherwise noted, all the pre-cast units on the project will be the same color and of the same mix design. Design mixes may be prepared by independent testing facility or by qualified pre-cast manufacturing plant personnel, at pre-cast fabricator's option.

- B. Mix Properties: Standard-weight concrete consisting of specified Portland cement, aggregates, pigments, admixtures, and water to produce the following properties;
 - 1. Compressive Strength: Minimum 5000 psi at 28 days using 6" x 12" cylinders per ASTM C39-86.
 - 2. Total Air Content: Not less than 4% nor more than 7%.
 - 3. Water Absorption: Not to exceed 5% by weight when tested per ASTM C 642.
 - 4. Color: As selected by Architect per the approved pre-cast concrete sample.

2.6 MORTAR

- A. Provide all setting mortar in standard gray mortar as specified for brick work.
- B. Rake out top ½" of mortar for installation of polyurethane sealant.

2.7 FABRICATION

- A. Tolerances of Finished Units: In accordance with Pre-stressed Concrete Institute MNL 117 "Manual for Quality Control for Plants and Production of Architectural Pre-cast Concrete Products and Pre-stressed Concrete Institute's "Architectural Pre-cast Concrete Design Manual, 2nd Edition".
- B. Fabricate units straight, smooth, and true to size and shape, with exposed edges and corners formed or stoned to a minimum radius unless otherwise indicated.
- C. Testing: Tests to be performed by a certified testing laboratory. Testing is to be paid for by the Fabricator. Results are to be kept on file for at least two years and submitted upon Architect's request. No testing is required on projects where the total volume of concrete is under 25 CF.
 - 1. Perform one set of 6" x 12" cylinder tests for every 500 cubic feet of concrete placed.
 - 2. Perform one absorption test for every 500 cubic feet of concrete placed.
- D. Curing: Cure units in a warm, moist, totally enclosed curing room for a minimum of 20 hours.
- E. Cast-In Items: Fabricator to provide reglets, slots, holes, inserts, and other accessories in units to receive dowels, reglets, waterstops, flashings, anchors and other similar work as indicated.
- F. Surface Finish: Remove all surface cement paste by means of acid etching or lightly sandblasting to provide a smooth, dense, fine-grained texture with no streaks or blotches. Texture and quality of finish to be generally equal to the approved sample when viewed in direct daylight at a 10 foot distance.
- G. Color: The color shall be generally equal to the approved sample when viewed in direct daylight at a 10 foot distance. Color variation between pieces shall be minimal.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Anchorages: The Setting Contractor is to provide loose steel plates, clip angles, seat angles, anchors, dowels, clamps, hangers, and other miscellaneous loose steel shapes not provided by other trades, necessary for securing pre-cast units to supporting and/or adjacent members.
- B. Do not install any pre-cast units that have any defects that exceed the acceptable PCI MNL-117 tolerances for dimensions and color if installation would result in unsatisfactory performance or appearance in the opinion of the Architect.
- C. Install pre-cast concrete members plumb, level, and in alignment in accordance with PCI MNL-117 erection tolerances and the contract documents. Provide temporary supports and bracing as required to maintain position, stability, and alignment as members are being permanently connected.
- D. Protect the pre-cast units from discoloration and staining when washing down the surrounding masonry by covering the pre-cast units with plastic sheeting and/or by thoroughly soaking them with clear water to prevent dirty wash down water from being absorbed into them. If dirty wash down water gets on the pre-cast, hose it off immediately with clear water.
- E. Patching: The repair of chipped or damaged pre-cast shall be done with materials and instructions furnished by the Fabricator. The pre-cast shall show no obvious repairs or imperfections other than minimal color variations when viewed with the unaided eye under good typical day lighting at a 20 foot distance.
- F. Cleaning: Before caulking, the face of all pre-cast shall be scrubbed with a fiber brush, using mild detergent and water and shall then be thoroughly rinsed with clean running water. Any mortar on the face of the pre-cast shall be removed. No acids or prepared cleaners shall be used without the approval of the pre-cast Fabricator.

3.2 PERFORMANCE REQUIREMENTS

- A. Applicable standards for inspection and quality control shall be PCI MNL - 117 "Manual for Quality Control for Plants and Production of Architectural Pre-cast Concrete Products" and PCI's "Architectural Pre-cast Concrete Design Manual, 2nd Edition".
- B. The Architectural Pre-cast Concrete units shall show no obvious repairs or imperfections other than minimal color variations when viewed with the unaided eye at a 20 foot distance in good typical daylight illumination.
- C. Any unacceptable pre-cast units that can not be repaired to the Architect's satisfaction in accordance with the aforementioned criteria are deemed unacceptable and are to be replaced by the Contractor.

END OF SECTION

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SECTION 04 05 13

MORTAR

PART 1 GENERAL

1.1 SUMMARY

- A. Examine all Drawings, General Conditions, Supplementary Conditions, and General Requirements which are part of this Contract. Furnish all labor, materials, and equipment necessary for masonry mortar.

1.2 RELATED SECTIONS

- A. Section 04 22 00: Concrete Unit Masonry
- B. Section 04 72 00: Custom Cast Stone
- C. Section 04 43 00: Stone Masonry

1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM-most recent issue)
 - 1. ASTM C94, Specification for Ready-Mixed Concrete
 - 2. ASTM C109 Specification for Compressive Strength of Hydraulic Cement Mortars.
 - 3. ASTM C143, Test Method for Slump of Hydraulic Cement Concrete
 - 4. ASTM C144, Specification for Aggregate for Masonry Mortar
 - 5. ASTM C150, Specification for Portland Cement
 - 6. ASTM C207, Specification for Hydrated Lime for Masonry Purposes
 - 7. ASTM C270, Specification for Mortar for Unit Masonry
 - 8. ASTM C404, Specification for Aggregates for Masonry Grout
 - 9. ASTM C476, Specification for Grout for Masonry
 - 10. ASTM C780, Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
 - 11. ASTM C1019, Specification for Method of Sampling and Testing Grout
 - 12. ASTM C1142, Specification for Ready-Mixed Mortar for Unit Masonry
 - 13. ASTM C1329, Specification for Mortar Cement
 - 14. ASTM C1714, Specification for Pre-Blended Dry Mortar Mix for Unit Masonry
 - 15. TMS 402/602 Building Code Requirements and Specifications for Masonry Structures.
- B. TMS 402/602 Masonry Code: Recommended Practices and Guide Specifications for Cold Weather Masonry Construction and Hot Weather Masonry Construction .

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1.4 SUBMITTALS

- A. Comply with Section 01 33 00.
- B. Submit Certification of mortar components and type for pre-blended masonry mortars such as "Spec Mix" or other approved manufacturers, dated within 12 months of contract date.

1.5 GENERAL REQUIREMENTS

- A. Deliver materials in unbroken bags or containers, plainly marked and labeled with Manufacturer's name, brand and mortar type.
- B. Storage of Materials
 - 1. Cement and hydrated lime: Stored in a manner to afford ready access for inspection and in suitable building to protect material from dampness. Insure protection against inclusion of foreign materials in cements and limes. **MASONRY CEMENT WILL NOT BE ALLOWED IN MORTAR.**
 - 2. Aggregates - use only clean, dry materials. Use no frozen materials.
- C. Build in all sheet metal work, anchors, anchor bolts, hangers, sleeves, thimbles, frames, structural members, etc. as shown and as required for other trades.
- D. Environmental Requirements: See Section 04 22 00 for temperature and laying restrictions.
 - 1. Cold Weather Requirements
 - a. Comply with TMS 402/602 Masonry Code - Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.
 - b. When the ambient air temperature is below 40 degrees F, heat mixing water to maintain mortar temperature between 40 degrees F and 120 degrees F until placed. When the ambient air temperature is below 32 degrees F and holding, dropping, or predicted to drop below 32 degrees, no mortar is to be mixed.
 - 2. Hot Weather Requirements
 - a. Comply with TMS 402/602 Masonry Code - Recommended Practices and Guide Specifications for Hot Weather Masonry Construction.
- E. Remove any materials that have partially hardened or set. DO NOT USE.
- F. Build in door and window frames and their anchors. Slush steel door frame jambs and heads full of mortar. Slush cells full of mortar where excessive cutting for conduit or other devices has weakened masonry.

PART 2 PRODUCTS

2.1 MATERIALS

- A. The mortar for all masonry, block, and brick shall meet the minimum requirements of the International Building Code.
- B. Mortar shall conform to the minimum proportion requirements given in Table II of ASTM C270, based on 28-day laboratory testing ONLY. Select mortar type based on the criteria below:
 - 1. Type "S": For walls in contact with earth or below grade, and load-bearing interior and exterior walls.
 - 2. Type "S": For load-bearing interior and exterior walls above grade.
 - 3. Use Type 'N' only for masonry veneer.
- C. Where ground-face and/or integral color CMU exterior units are to be laid, use mortar with integral water repellant admixture, "Dry-Block" manufactured by W.R. Grace or approved alternate.
- D. Pigment should NOT exceed 10 percent of the weight of Portland cement. Limit carbon black, if used, to 2 percent of the total allowed color additive.
- E. The mortar for all masonry shall be standard gray color, color pigmented mortar where exposed to view, match existing color where final appearance will be exposed mortar. Use standard gray color in other areas.
- F. Provide only pre-mixed mortar of types specified manufactured by "Spec-Mix" or approved alternate substitution. **Mixing of any mortar on-site will not be allowed.**
- G. Use same manufacturer's products throughout project.
- H. Use of anti-freeze compound or other additives are not to be used without written approval of the Architect.
- I. Bond Beams and cells with vertical reinforcement shall be filled with 2000 psi grout - NOT MORTAR.
- J. Mortar for simulated masonry to be Laticrete Hi Bond Masonry Vneer Mortar

2.2 MORTAR MATERIALS

- A. Portland Cement: ASTM C150, normal. Type I or III; gray color. Fly ash, slag, and pozzolans are NOT permitted as substitutes for Portland Cement.
 - 1. For pigmented mortars, use premixed, colored cements of formulation required to produce color indicated, or if not indicated, as selected from manufacturer's standard formulations. Pigments shall not exceed 5 percent of cement by weight for mineral oxides nor 1 percent for carbon black.

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- B. Hydrated Lime: ASTM C 207, Type S, and UBC 21-13 hydrated lime for masonry purposes.
 - 1. Manufactured by Chemstar of approved equal.
 - 2. For pigmented mortars, use colored Portland cement-lime mix of formulation required to produce color indicated, or if not indicated, as selected from manufacturer's standard formulations. Pigments shall not exceed 10 percent of Portland cement by weight for mineral oxides nor 2 percent for carbon black.
- C. Aggregate for Mortar: ASTM C 144; except for joints less than 1/4-inch (6.5 mm), use aggregate graded with 100 percent passing the No. 16 (1.18 mm) sieve.
 - 1. Colored-Mortar Aggregates: Natural-colored sand or ground marble, granite, or other sound stone, as required to match Architect's sample.
- D. Aggregate for Grout: ASTM C404 with 100 percent passing the 3/8" (9.5mm) sieve.
- E. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortars.
- F. Admixtures: NOT permitted unless approved by the Structural Engineer of Record, prior to construction.
 - 1. Calcium Chloride is NOT permitted in mortar. Admixtures and other chemicals containing Thiocyanates, Calcium Chloride or more than 0.1 percent chloride ions are NOT permitted.
- G. Water: Potable

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine conditions with installer present, for compliance with requirements for installation tolerances and other specific conditions, and miscellaneous conditions affecting performance of unit masonry.
- B. Examine rough-in and built-in construction to verify actual locations of piping and other penetrations prior to installation.

3.2 INSTALLATION

- A. Maintain an ambient temperature of the materials in contact with the mortar, of NOT less than 40 degrees F, unless otherwise required by TMS 402/602. Maintain this temperature limitation at every area and elevation of weather enclosures, when used.

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- B. Lay solid brick-sized masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. DO NOT slush head joints.
- C. Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells. Bed webs in mortar in starting course on footings, piers, columns, and pilasters, and where adjacent to cells or cavities which are to be reinforced or filled with grout. For starting course on footings where cells are not grouted, spread out full mortar bed including areas under cells.
- D. In existing construction, maintain joint widths shown, to match existing coursing, except for minor variations required to maintain bond alignment. If not shown, lay walls to match existing or 3/8" joints.
- E. Cut joints flush for masonry walls that are to be concealed or to be covered by other materials, unless otherwise indicated.
- F. Remove masonry units disturbed after lying; clean and reset in fresh mortar. DO NOT pound corners or jambs to shift adjacent stretcher units that have been set in position. If adjustments are required, remove units, clean off mortar and reset in fresh mortar.
- G. Grouting: DO NOT place grout until the entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.
- H. Refer to Section 04 22 00 for maximum allowable grouting heights.

3.3 MIXING OF MORTAR

- A. Machine mix in an approved type of mixer in which quantity can be accurately and uniformly controlled. Only small batches of mortar may be mixed at one time. Mixing time is not less than five (5) minutes and not less than three (3) minutes after water has been added. If hydrated lime is used, use dry-mixed method (optional) of first consistently mixing hydrated lime into putty.
- B. Dry Blended in Silos: Mixing shall be done using a continuous, self-cleaning mixer mounted at the apex of the silo. The water flow valve shall be set to provide desired workability.
- C. Keep all mixers and equipment clean. Do not deposit mortar on the ground.

3.4 WORKMANSHIP

- A. Mortar having stood for more than one hour shall not be used or re-tempered.
- B. Lay no masonry when danger of freezing conditions exists before mortar sets.

END OF SECTION

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SECTION 04 22 00

CONCRETE UNIT MASONRY

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Concrete masonry units. (standard and integral colored)
2. Reinforcement, anchorages, and accessories.
3. Procedure and preparation for exposed concrete and/or polished concrete floors
4. Observation and Required Special Inspections

B. Products Installed but not Furnished Under this Section:

1. Section 03 21 00 - Concrete Reinforcement
2. Section 05 50 00 - Metal Fabrications: Loose steel lintels.
3. Section 07 62 00 - Sheet Metal Flashings and Trim.

C. Related Sections:

1. Section 01 40 00 – Quality Control: Required Special Inspections
2. Section 03 30 00- Cast-In-Place Concrete: grout.
3. Section 03 35 20 - Polished Concrete Finish System
4. Section 04 05 13 – Mortar
5. Section 07 27 26 – Fluid-Applied Weather Barrier System
6. Section 07 21 00 – Insulation
7. Section 07 92 00 - Joint Sealers: Rod and sealant at control joints.
8. Section 09 91 00- Painting and Finishing.
9. Section 09 97 26 - Special Coatings

1.2 REFERENCES

- A. ASTM C90 - Hollow Load-Bearing Concrete Masonry Units.
- B. ASTM C145 - Solid Load-Bearing Concrete Masonry Units.
- C. TMS 402/602 Masonry Code - Recommended Practices and Guide Specifications for Hot & Cold Weather Masonry Construction.
- D. ASTM A153 – Zinc Coating (Hot Dip)

1.3 PERFORMANCE REQUIREMENTS

- A. Provide unit masonry that develops the following installed compressive strengths (f'_m) at 28 days.
 1. For Concrete Unit Masonry: As follows, based on net area:
 - a. $f'_m = 2000$ psi.

04 22 00-1

1.4 SUBMITTAL

- A. Submit samples of actual units to be used for Architect's approval.
- B. Submit to Architect the insulation type proposed.
- C. Submit mix design for concrete grout

1.5 MOCK-UP SAMPLE PANEL

- A. Before commencing any work, Contractor shall erect a 4' x 4' panel of each type of CMU specified with correct mortar color. Lay in pattern to simulate wall pattern. The panel is NOT PART OF THE BUILDING and is to remain in place until removal is authorized by the Architect. The contractor shall have sufficient brick on site to erect two panels if necessary.
- B. Panel face shall show mortar, bond, widths, and tooling of joints.
- C. Approval of Architect is required before proceeding with any part of the building.
- D. Panel is to remain in place until completion of the work.
- E. Construct mock-up panel in "cut-away" view, exposing all wall assembly components. Refer to Section 01 40 00 Quality Control-Mock-Ups.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Cold Weather Requirements: Hot and Cold Weather Masonry Construction Guide - Recommended Practices and Specifications for Cold Weather Masonry Construction.
- B. Lay no masonry when the temperature is below 40 degrees F. without Architect's permission. Such permission shall not relieve the Contractor of responsibility for the work, however. If permitted to work below 40 degrees F., but above 32 degrees F., make provisions to heat and dry materials and protect work from freezing during the installation and curing period. No masonry is to be laid when temperatures are holding, dropping or are predicted to go below 32 degrees F. unless heated protection is provided during installation and curing period and has been approved by the Architect.
- C. External exposed CMU: Provide units with integral water repellent

1.7 PRE-INSTALLATION MEETING

- A. The Contractor will schedule and conduct a pre-installation meeting **prior to construction of cmu walls**. Those attending are to include Contractor, Architect, Owner, Structural Engineer, mason, cmu grout-mix representative and 3rd party special inspector. Items to be discussed are as follows but are not limited to these:
 - 1. Schedule

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2. Installation of rebar
3. Required grout mix design strength.
4. Frequency of testing and inspections
5. Placement of grout
6. Construction height of CMU walls
7. Control joints and corners
8. Other items associated with cmu wall construction.

PART 2 PRODUCTS

2.1 CONCRETE MASONRY UNITS

- A. Hollow Load Bearing Units: ASTM C90:
 1. Common CMU: Light weight (ASTM C331) above grade; normal weight (ASTM C33) below grade.
 2. Split face & single scored CMU: Normal weight, use only above grade.
- B. Solid Load-Bearing Units: ASTM C145, Grade N, Type 1:
 1. Common CMU: Light weight (ASTM C331) above grade; normal weight (ASTM C33) below grade.
 2. Split face & single scored CMU: Normal weight, use only above grade.
- C. Masonry Units: Modular units sized as required to achieve details shown; provide special units for bond beams, control and expansion joints, and lintels.
 1. Common CMU: Where indicated on drawings.
- D. Quality Control: All standard masonry units shall be manufactured by one manufacturer and shipped from the same plant. All units are subject to inspection and rejection by the Architect for defects such as excessive porous surface, chipped corners, irregular faces or sizes, etc. Sample units submitted shall be retained and shall set the standard for quality expected. Meeting ASTM C90 minimum requirements is not considered to be adequate in the areas mentioned.
- E. Fire Resistance Classification: CMU walls and partitions shall have fire resistance ratios as indicated on the drawings. Units shall be of minimum equivalent thickness (ASTM C140) specified for the fire rating and corresponding aggregate type.

2.2 REINFORCEMENT AND ANCHORAGES

- A. **CMU Horizontal Joint Reinforcement:** Install horizontal joint reinforcement 16 inches on center, except space at 8 inches in parapet walls and below finished floor, or where otherwise indicated on Drawings. 120 Truss or 220 Ladder-Mesh LoxAll design, manufactured by Hohmann & Barnard, Inc., or approved alternate. Minimum 9-gauge welded steel wire; hot-dip galvanized after fabrication to 1.5 oz. Per ASTM A153 Class B-2 for use in exterior walls, mill galvanized wire for interior walls. Reinforcement width to be 1 1/2 to 2 inches less than wall thickness.

04 22 00-3

- B. **Stone Veneer Anchoring System to CMU Walls:** Provide 170 2X-SH Truss Adjustable Eye-Wire in masonry wall coursing with 3/16" diameter H&B SH 2X Adjustable Veneer Anchor hook ties at 16" o.c. horizontal with continuous "Pencil Rod", 9 gage, continuous reinforcement at brick. Provide veneer coursing at 16" O.C. vertically. Weld eyes at max. 16" o.c. is to receive adjustable wall tie sections.
- C. Provide reinforcement with receiver eyes for brick veneer. See Section 04 21 13.
- D. Miscellaneous Masonry Anchors: Fabricated from 16 gage steel sheet or 3/8 inch steel rod, 1.5 oz. hot-dip galvanized after fabrication.
- E. Construction/Control Joints: Construction/Control joints shall be spaced as shown on the drawings. Caulk joints in accordance with Section 07 92 00. Unless shown otherwise less than 24'-0" on center, space joints for CMU veneer no more than 24'-0" on center along same plane. Provide control joints at corners no more than 12'-0" from corner or closer if shown on drawings. Coordinate locations with Architect and Structural Engineer.

2.3 ACCESSORIES

- A. Joint Filler: Closed cell foam, oversized 50 percent; self-expanding joints.
- B. Preformed Control Joint Filler:
 - 1. VS Series by Hohmann & Barnard, Inc.
 - 2. No. 2901 by Wire Bond.
- C. Cavity Wall Flashing System: Mortar Net "Totalflash" masonry flashing system or equivalent thru wall system components by Hohmann & Barnard, See Section 07 10 00.
- D. Weep Vents:
 - 1. Manufactured by Mortar Net, 1/2" thick, size as required to match brick head dimension. Refer to Section 07 10 00.
 - 2. Install at 16" o.c. horizontally.
 - 3. Provide ventilation vents at top of wall in same location and centering as weep vents.
- E. Masonry Drainage Mat: Masonry mat, manufactured by CavClear, or approved alternate product/manufacturer. Provide thickness as required to fill masonry wall cavity with required tolerances.
- F. Reinforcing Bar Positioners:
 - 1. D/A 811; Dur-O-Wal, Inc.
 - 2. D/A 816; Dur-O-Wal, Inc.
 - 3. No. 376 Rebar Positioner; Heckman Building Products, Inc.
 - 4. #RB Rebar Positioner; Hohmann & Barnard, Inc.
 - 5. #RB-Twin Rebar Positioner; Hohmann & Barnard, Inc.
 - 6. Double O-Ring Rebar Positioner; Masonry Reinforcing Corporation of America
 - 7. O-Ring rebar Positioner; Masonry Reinforcing Corporation of America.

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8. Hot-dip galvanized after fabrication.

2.4 CONCRETE GROUT OR SPEC MIX GROUT

- A. Concrete grout to be produced at a ready-mix batch plant, capable of producing specified concrete grout or spec mix grout, each as listed below.
- B. Concrete Grout:
 1. Portland Cement: Type I Portland, meeting "Standard Specifications for Portland Cement", (ASTM C150-Current Edition) shall be used.
 2. Aggregates: All aggregates shall be clean, hard strong and durable particles free of chemicals or foreign material that may affect the bonding of cement paste and shall conform to "Specifications for Concrete Aggregates" (ASTM C33). Nominal maximum aggregate size for concrete grout shall be 3/8" diameter.
 3. Mixing Water: Water shall be fresh, clean and potable.
 4. Slump: 9 inch maximum: plus tolerance 1 inch, minus tolerance 1 inch.
 5. Mix proportioning: To produce 28 day minimum compressive strength of moist cured laboratory samples, 2,000 psi at all locations.
- C. Spec Mix Grout:
 1. Spec Mix Core Fill Grout, Coarse (CF-02), preblended product containing cementitious materials and dried aggregates to meet ASTM C 476 and CSA A179.
 2. Packaging: 80lb packages or 3,000lb bulk bags for use in Spec Mix silo system.
 3. Mixing Water: Water shall be fresh, clean and potable.
 4. Slump: 9 inch maximum: plus tolerance 1 inch, minus tolerance 1 inch.
 5. Mix proportioning: To produce 28 day minimum compressive strength of moist cured laboratory samples, 2,000 psi at all locations.

PART 3 EXECUTION

3.1 PREPARATION

- A. Verify items provided by other sections of work are properly sized and located.
- B. Establish lines, levels, and coursing. Protect from disturbance.
- C. Provide temporary bracing during erection of masonry work. Maintain in place until building structure provides permanent bracing.

3.2 COORDINATION WITH OTHER TRADES

- A. It will be a requirement of this section to verify and coordinate work with other trades and specification sections. Do not begin work on concrete slabs on grade or elevated concrete slabs until minimum strength and cure time has been reached.

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B. Procedure and preparation for exposed concrete and/or polished concrete floors

1. Concrete floors in whole or in part as shown on drawings, are scheduled to be Polished. No masonry walls constructed on slab-on-grade are to begin erection until concrete slab has received initial grind from floor polishing contractor. Refer to Sections 03 35 20 for requirements. This requirement includes slabs-on-grade.
2. Where sealed concrete floors, polished or dyed polished concrete finish is scheduled, floor areas at the base of CMU walls are to be protected from concrete and mortar droppings during construction of CMU walls. Floors at base of CMU walls are to be cleaned at the end of each work day, free of concrete and mortar droppings.
3. Any equipment used on slabs to be sealed or polished, shall meet the requirements of Sections 03 35 20 concerning diapering of equipment to prevent fluid leak stains and utilizing tire socks to prevent tire marks.

3.3 COURSING

- A. Place masonry to lines and levels indicated.
- B. Maintain masonry courses to uniform width. Make vertical and horizontal joints equal and of uniform thickness.
- C. Lay concrete masonry units in running bond unless adjoining work is involved, or called out on drawings otherwise. Course one block unit and one mortar joint to equal 8 inches vertically. Form flush mortar joints where joint will be covered by other construction.
Mortar joints on concealed areas where fluid applied cavity wall weather barrier is to be applied must be fully filled with no voids, holes, or cracks, struck flush with the face of CMU. Provide tooled, concave joints where wall will be left exposed and painted, or is a finished product, unless specifically called out to be otherwise.

3.4 PLACING AND BONDING

- A. Lay solid concrete masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not slush head joints. Remove excess mortar.
- B. Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells. Bed webs in mortar in starting course on footings and foundation walls and in all courses of piers, columns and pilasters, and where adjacent to cells or cavities to be reinforced or filled with concrete or grout. For starting courses on footings where cells are not grouted, spread out full mortar bed, including areas under cells.
- C. Fully bond intersections, and external and internal corners.
- D. Do not shift or tap masonry units after mortar has taken initial set. Where adjustment must be made, remove mortar and replace.
- E. Perform job site cutting with proper tools to provide straight unchipped edges. Take care to prevent breaking masonry unit corners or edges.

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- F. Isolate masonry partitions from vertical structural framing members with a control joint.
- G. Where masonry is installed, all vertical and horizontal joints to align according to bond types. Where differing masonry types are installed in same wall, joints are to align between each masonry unit type unless noted otherwise.

3.5 TOLERANCES

- A. Tolerances to conform to requirements of TMS 402/602 and below, whichever is more stringent:
 - 1. Alignment of Pilasters: Maximum 1/4 inch from true line.
 - 2. Variation from Unit to Adjacent Unit: 1/32 inch.
 - 3. Variation from Plane of Wall: 1/4 inch in 10 feet and 1/2 inch in 20 feet.
 - 4. Variation from Plumb: 1/4 inch per story non-cumulative.
 - 5. Variation from Level Coursing: 1/8 inch in 3 feet; 1/4 inch in 10 feet; 1/2 inch maximum.
 - 6. Variation of Joint Thickness: 1/8 inch in 3 feet.

3.6 REINFORCEMENT AND ANCHORAGES

- A. Install horizontal joint reinforcement 16 inches on center, except space at 8 inches in parapet walls and below finished floor, or where otherwise indicated on Drawings.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend 24 inches minimum each side of opening. Place joint reinforcement continuous in first and second joint below top of wall.
- C. Lap joint reinforcement ends minimum 6 inches. Discontinue at control joints. Extend 24 inches minimum each side of openings. Place reinforcing bars supported and secured against displacement. Maintain position within 1/2 inch of true dimension.
- D. Cells that contain vertical reinforcing are to be grouted full. Lap vertical reinforcing a minimum of 48 bar diameters and ensure bar is positioned in the cell as indicated on the structural plans. **Fill cells in 5'-4" lifts maximum**. Power vibrate grout in each cell full height of each lift. Maximum diameter of power vibrator for grout consolidation is 3/4". Maximum allowable CMU height for installing grout in cells is **5'-4"** or to course immediately below bond beam, whichever is lower. Contractor's option to grout to course immediately below bond beams and provide 4" tall block outs at interior walls and standard size block outs on exterior side of CMU for visual confirmation by 3rd party special inspector that cells are grouted.
- E. Bar Positioners: As vertical reinforcing is being placed, the use of reinforcing bar positioners for correct bar positioning in the wall is required. Install at each bar, locating at maximum 8'-0" o.c vertical, and/or at each bar splice point.
- F. Verify that anchorages embedded in concrete or attached to structural steel members are properly placed.

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- G. Reinforce joint corners and intersections with strap anchors 16 inches on center.

3.7 LINTELS

- A. Install loose steel lintels as scheduled.
- B. Install reinforced unit masonry lintels over openings where steel or pre-cast concrete lintels are not scheduled. Construct lintels using concrete fill and reinforcing. Maintain minimum 8 inch bearing on each side of opening.
- C. Use reinforcing bars of one piece lengths only.
- D. Place and consolidate grout fill without disturbing reinforcing. Allow lintels to reach strength before removing temporary supports as affirmed by laboratory compressive strength testing of field-cast grout prisms.

3.8 CONTROL JOINTS

- A. Do not continue horizontal joint reinforcing thru control joints. Continue bond beams across control joints by use of "Slip Joints" as detailed on plans. Ensure use of asphalt paper wrap to create bond break. 3/4" diameter x 24" dowels with expansion cap at each bond beam at each control joint.
- B. Install preformed control joint filler at locations indicated on Drawings. Space no further than 24'-0" o.c. or less if shown on drawings. Provide control joints at corners no more than 12'-0" or closer if shown on drawings. Use proper size material to create sealant joint space; See Section 07 92 00 for sealant performance.

3.9 MASONRY WEEPS AND CAVITY WALL FLASHING MEMBRANE TERMINATION

- A. Install weep joints at brick head joints, 32" o.c. at CMU head joints at 16" o.c. (horizontally). If masonry is to receive paint, stain, or special coating, vents are not to be coated.
- B. It will be the responsibility of the Contractor and the Mason to coordinate installation elevation of all weeps and cavity wall flashing membrane terminations in masonry walls at specified locations. Adjust as needed to terminate above concrete walks. Where masonry cavity walls occur at slab-on grade conditions, Locate weeps 1/2 CMU course below finished floor elevation unless items such as a sidewalk, etc, interferes, in which case the weeps would be located at finished floor elevation. If finish grade elevation extends beyond 16 inches below finished floor elevation, locate weeps approximately 2-4" above finish grade unless noted otherwise. Finish grade to be a minimum 2" below weeps. **WEEPS ARE TO REMAIN EXPOSED. DO NOT COVER WEEPS WITH SOIL, FLASHING, OR ROOFING MATERIAL.**

3.10 BUILT-IN WORK

- A. As work progresses, build in metal door frames, fabricated metal frames, window frames, wood nailing strips, anchor bolts, plates, and other items to be built in the work supplied by other Sections.
- B. Build in items plumb and level.
- C. Bed anchors of metal door and glazed frames in mortar joints. Fill masonry cores with grout minimum 12 inches horizontally from framed openings.
- D. Build in door and window frames and their anchors. Slush steel door frame jambs and heads full of mortar. Slush cells full of mortar where excessive cutting for conduit or other devices have weakened masonry
- E. Do not build-in organic materials subject to deterioration.

3.11 CUTTING AND FITTING

- A. Cut and fit for chases, pipes, conduit, sleeves, and grounds. Cooperate with other Sections of work to provide correct size, shape, and location.
- B. Obtain approval prior to cutting or fitting any area not indicated or where appearance or strength of masonry work may be impaired.
- C. **Do not** thin CMU walls to accommodate plumbing piping, electrical conduit of other items routed in CMU walls. Consult Architect if conditions are found that do not allow proper installation of CMU.

3.12 TESTING CMU CONCRETE GROUT OR SPEC MIX GROUT

- A. Strength Tests:
 - 1. Testing per ASTM C 1019.
 - 2. Three (3) test specimens shall constitute one (1) sample. A strength test shall be the average of the strengths of the specimen tested at the age specified.
 - 3. Slump to be 9 inches, plus or minus one inch.
 - 4. Specimens shall be tested at 7 and 28 days.
 - 5. The compression strength will be considered satisfactory if the average of three consecutive tests of the grout is equal to or greater than the specified strength and no individual strength test falls below the specified strength by more than 500 psi.
- B. Frequency: Minimum of Two (2) times a week from start of production.
- C. Testing Laboratory: The testing laboratory, in addition to meeting requirements of ASTM E-329, and must be an approved laboratory competent to perform cement physical testing. All tests must be performed in strict accordance with the applicable ASTM standard.

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- D. Distribution of Results of Tests: Within 24 hours of results of tests, copies of the results shall be submitted to the Architect, Contractor, masonry contractor, and the grout supplier if applicable.
- E. Test mix design prior to beginning construction of CMU walls. The compressive strength test of the laboratory mix design must meet or exceed the specified 28 day design compressive strength of **2,000** psi grout unless noted otherwise.
- F. Construction Manager shall bear costs for all masonry testing.

3.13 CLEANING

- A. Remove excess materials, mortar droppings. Remove mortar droppings on connecting or adjoining work before its final set.
- B. Exposed Masonry: At completion of work, point holes in joints of exposed masonry surfaces, completely fill with mortar, tool properly. After pointing has set, hardened, wet exposed masonry surfaces. Clean soiled surfaces with a non-acidic solution which will not harm masonry or adjacent materials equal to Sure Klean 600 at brick, and Custom Masonry Cleaner at CMU, as manufactured by ProSoCo, Inc. Cleaner must be approved by masonry manufacturer. Apply with stiff fiber brush, leave masonry clean, free of mortar daubs, with tight mortar joints throughout. Immediately after cleaning, rinse masonry surfaces with clear water. **DO NOT USE PRESSURE SPRAY WASHER TO CLEAN OR RINSE OFF MASONRY.**
 - 1. Mockup to be cleaned with same cleaner and methods as finished work to confirm compatibility.
- C. Protect all other trade's work and other items set into wall.
- D. Remove, replace defective materials, correct defective workmanship, and leave masonry clean.
- E. Replace defective mortar. Match adjacent work.
- F. Remove excess mortar and smears.
- G. Use non-metallic tools in cleaning operations.

3.14 WATERPROOFING

- A. At completion of cleaning, apply waterproof coating at exposed exterior CMU walls and where called for unless noted otherwise. Refer to Section 09 97 26, Special Coatings.
- B. At completion of cleaning, apply water repellent coating at exposed exterior CMU walls. Refer to Section 07 19 00, Water Repellent Coating.

3.15 AIR / MOISTURE BARRIERS

- A. Prior to installation of veneer at cavity wall construction with CMU backup, or metal panel system with CMU backup, apply Liquid-Applied Cavity Wall Moisture/ Air Barrier on all CMU walls where concealed in cavity wall. Refer to Section 07 27 26, Fluid Applied Weather Barrier System.
- B. Refer to Section 07 24 16 Exterior Finish and Insulation System for fluid-applied weather barrier required for E.I.F.S. applications

3.16 PROTECTION

- A. Maintain protective boards at exposed external corners which may be damaged by construction activities.
- B. Provide protection without damaging completed work.
- C. At day's end, cover unfinished walls to prevent moisture infiltration. Secure cover down to prevent blow-off and maintain protection for fresh masonry work.

3.17 OBSERVATION AND SPECIAL INSPECTIONS

- A. CMU placement and CMU reinforcement and placement shall be periodically observed by the Architect/Engineer during laying of CMU units. Inspection of CMU placement and CMU reinforcement and placement for conformance to the construction documents shall be completed by the designated third-party Special Inspector at a minimum frequency of two (2) times per week from start of production.
- B. Special Inspector Qualifications: As required per TMS 402/602

END OF SECTION

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SECTION 04 43 00

STONE MASONRY

PART 1 GENERAL

1.1. SCOPE:

- A. The work required under this specification shall include all labor, materials, equipment and services necessary for and reasonably incidental for the furnishing and installing all exterior stone veneer, including all anchors and similar materials necessary for a complete installation.

PART 2 PRODUCTS

2.1. MATERIALS:

- A. All materials on the job shall be stored and handled to preclude the invasion of foreign matter, and so as to prevent any damage from the weather or ground.
- B. All stone shall be Smokey Mountain Blue, 40% Blue and 60% Blue/Brown Blend, split face, provided by Schwartz Stone, Scranton, AR, and 191 N. Thompson Street, Springdale, AR 72764, (479) 927-3965, free from all defects that would materially impair its strength, durability or appearance.
- C. Sizes of stone vary in length and height but a full bed depth of approximately 4 inches. Heights are to range from 2"-6", with 75% of stones 2" – 4", 25% of stones from 4" – 6" and lengths to range from 6" – 24", except that within any 100 square foot area there can be up to (3) stones that have a length of 33" in length. No more than 10% of the stones are to be 10-12" in height.
- D. Stone is to be cut at face and end, sawn top and bottom. A blend of both natural and cut face are to be used.
- E. All corners are to be prefabricated and vary in size vertically and horizontally.

2.2. MORTAR

- A. Non-staining cement-lime mortar shall be one part Portland Cement, one part hydrated lime, six parts sand. All stone work shall be protected at all times and shall be in first-class condition at completion of job. Stone work shall be cleaned only with soap powder, clean water, and fiber brush. No acids, wire brushes, etc., will be permitted.
- B. Sealer: Water-based siloxane masonry sealer.
 - 1. Type: As specific in Section 07 19 00 Water repellent Coating

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- C. Mortar color is to be selected from manufacturer's standard colors as manufactured by CDI Industries. Product locally available thru Acem Brick.

2.3. METAL TIES:

- A. Stone will be anchored with 22 gauge, strap anchors or rod anchors made especially for the purpose. All anchors shall be 16" vertically and 32" on center horizontally. Provide "Dove tail" anchors minimum 16 gauge where called for. All anchors to be made especially for intended purpose, by Hohmann & Barnard, Inc., AA Wire Products Co., or approved equal.

PART 3 EXECUTION

3.1 STONE WORK

- A. All veneer stone work shall be laid in a random coursed linear pattern - no face stones allowed. Architect shall approve sample pattern prior to actual construction.
- B. All veneer stone shall conform to appearance noted above. All stone shall be set in non-staining mortar as specified below.

Sample: Contractor shall submit two samples for approval of the Architect. The samples shall show the extreme range as to finish, texture, and color.

- C. Lay no Stonework when temperature is below 40 degrees F. without Architect's permission. Such permission shall not relieve the Contractor from responsibility for the work, however. If permitted to work below 40 degrees F., but above 32 degrees F., make provisions to heat and dry materials and protect work from freezing during the installation and curing period. No masonry is to be laid when temperatures are holding, dropping on, or predicted to go below 32 degrees F. unless heated protection is provided during installation and curing period and has been approved by Architect.

3.2. CLEANING AND WATERPROOFING

- A. Keep face of stone free of mortar as work progresses.
- B. If residual mortar is on face of stone, allow to dry partially and brush mortar off surface and sponge off residue.
- C. When work is completed and mortar has set for 2 to 3 days, clean surface from top to bottom using mild masonry detergent acceptable to natural stone manufacturer.
- D. Do not use harsh cleaning materials or methods that could damage stone.
- E. Do not use metal brushes or acids for cleaning. Do not power wash.

END OF SECTION

04 43 00-2

SECTION 04 73 00

SIMULATED MASONRY – ALTERNATE #1

PART 1 GENERAL

1.1 SUMMARY

- A. Manufactured Stone Veneers.
- B. Metal Lath and Accessories.

1.2 RELATED SECTIONS

- A. Section 06 10 00 - Rough Carpentry
- B. Section 07 19 00 - Water Repellent Coating
- C. Section 07 27 26 – Fluid Applied Weather Barrier
- D. Section 07 92 00 - Joint Sealant

1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM C67 Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile.
 - 2. ASTM C91 Standard Specification for Masonry Cement.
 - 3. ASTM C150 Standard Specification for Portland Cement.
 - 4. ASTM C482 Standard Test Method for Bond Strength of Ceramic tile to Portland Cement.
 - 5. ASTM C567 Standard Test Method for Density Structural Lightweight Concrete.
- B. Underwriters Laboratories, Inc. (UL):
 - 1. UL 723 Standard for Safety for Surfacing Burning Characteristics of Building Materials

1.4 SUBMITTALS

- A. Submit product data under provisions of Section 01 33 00.
- B. Submit samples for selection under provision of Section 01 33 00.
- C. Submit manufacturer's installation instructions under provisions of Section 01 33 00.

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1.5 QUALITY ASSURANCE

- A. Applicator: company experienced in installation of manufactured stone veneers of the type specified, with three years experience.
- B. Materials and installation to conform to all applicable local and state codes.

1.6 MOCK-UP

- A. Erect mock-up under provisions of Section 01 40 00.
- B. Erect sample panel at job site at location as directed. See drawers for mock-up design.
- C. Illustrate field pattern of stone field cutting of units where required] and color and tooling of joints.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01 60 00.
- B. Store and protect products under provisions of Section 01 60 00.
- C. Store mortar and other moisture-sensitive materials in protected enclosures; handle by methods which avoid exposure to moisture.

1.8 PROJECT CONDITIONS

- A. Maintain materials and surrounding air temperature to minimum 40 degrees F, 4 degrees C prior to, during, and for 48 hours after completion of work.
- B. Protect materials from rain, moisture, and freezing temperatures prior to, during, and for 48 hours after completion of work.
- C. Allow no construction activity on opposite side of wall during installation, and for 48 hours after completion of work.

1.9 WARRANTY

- A. Provide manufacturer's standard warranty
 - 1. Warranty period: Fifty (50) years commencing on date of substantial completion.

PART 2 PRODUCTS

2.1 MANUFACTURE

- A. Arriscraft
- B. Approved alternate.

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2.2 MATERIALS

- A. Arris – Stack thin clad units. 3-5/8” face size, 1-1/2” bed, color to be selected
Texture type: Split face, sawn
- B. Trim Products:
 - 1. Watertable/Sill: to be selected from standard colors.
- C. Mortar: Refer to Section 04 05 13, Mortar, Laticrete Hi Bond Masonry Veneer
- D. Masonry Sealer: Refer to Section 07 19 00, Water Repellant Coating
- E. Weather-Resistant Barrier: Refer to Section 07 10 00, Waterproofing and Dampproofing
- F. Metal Lath: 18 gauge galvanized woven wire mesh or galvanized 2.5 lb. flat diamond mesh.
- G. Insulation and Base: ProGuard Concrete Faced Insulation System.

PART 3 EXECUTION

3.1 PREPARATION

- A. Apply metal lath to surfaces, attach with galvanized concrete nails which penetrate a minimum of 1”. Apply 6 inches apart, 16 inches on center.

3.2 MORTAR MIXING

- A. Thoroughly mix mortar ingredients in quantities needed for immediate use in accordance with ASTM C 270, Type N.
- B. Do not use anti-freeze compounds to lower the freezing point of mortar.

3.3 APPLICATION

- A. Apply in accordance with manufacturer’s installation instructions.
- B. Apply 1/2” to 3/4” of mortar to [lath] [dampened masonry, stucco, or concrete surfaces], covering a maximum of 10 square feet at one time. Press the units firmly into position in soft mortar bed, wiggle and apply slight pressure to unit to ensure firm bonding causing mortar to extrude slightly around edges of units.
- C. Install hearth pieces in a full 1/2 to 3/4 inch deep mortar setting bed.

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- D. Place unit with uniform mortar joints. Stone joints should not be over 1/2 inch in width. When installing 'pre-fitted' stone textures, units should be fitted tight against each other with no allowance for mortar joints. Install outside corner return units with short and long lengths alternated.
- E. Plan work to minimize job site cutting. Perform necessary cutting with proper tools to provide uniform edges; take care to prevent breaking unit corners or edges.
- F. Remove excess mortar; do not allow mortar to set up on face of units. Point, [rake] and tool joints before mortar has set. Clean and finish joints in accordance with manufacturer's instructions.

END OF SECTION

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SECTION 05 12 23

STRUCTURAL STEEL

PART 1 GENERAL

1.1 SUMMARY

- A. This section shall cover the furnishing, fabrication, erection and connection of all structural steel complete.

1.2 WORK INCLUDED & FURNISHED

- A. All labor, tools, materials, scaffolding, bracing, cranes, hoist, and other construction equipment required for the completion of the structure.
- B. Preparation of shop drawings.
- C. Furnishing and fabrication of all structural steel and miscellaneous metal work including beams, columns base plates, cap plates, bearing plates, angles, struts, bracing, girts, girders, connection material, fasteners, anchor bolts, shims, loose lintels, stiffeners, hangers, brackets, rods, and welding material.
- D. Shop and field painting.
- E. Shop and field connections including temporary bracing.
- F. Section 01 40 00 – Quality Control: Required Special Inspections

1.3 QUALITY ASSURANCE

- A. Fabricator's Qualifications: **A qualified fabricator that is AISC Certified for conventional steel building structures. If fabricator is not an AISC certified plant, then the fabricator must meet the protocol for special inspection requirements of IBC, Section 1704, paragraphs 1704.2.5 and 1704.2.5.1.** Documentation that one of the above requirements is met must be submitted to the Architect before starting shop drawings.

1.4 RELATED SECTIONS

- A. Section 01 40 00 – Required Special Inspections
- B. Section 03 30 00- Cast-in-Place Concrete

1.5 FURNISHED BUT INSTALLED ELSEWHERE

- A. Anchor Bolts, Loose Bearing Plates: Refer to Sections 2 and 7d of AISC Code of Standard Practice.
- B. Loose Lintels: Refer to Section 7f of AISC Code of Standard Practice.

1.6 STANDARDS

- A. Structural Steel fabrication, connections, detailing and erection shall be in accordance with the specifications for the "Design Fabrication and Erection of the AISC Manual of Steel Construction, unless indicated otherwise in these specifications or on plans.
- B. All structural steel shall conform to standard specifications for structural steel, ASTM A36, except:
 - 1. Wide Flanges and WT Tees - ASTM A992, $F_y=50$ ksi
 - 2. Structural steel tubing - ASTM A500, $F_y=50$ ksi.
 - 3. Structural Steel Pipe - ASTM A501, $F_y=35$ ksi.
 - 4. Anchor Rods – ASTM F1554, Grade 36
 - 5. Headed Stud Anchors - ASTM A108, $F_y=50$ ksi.
 - 6. High Strength Bolts – ASTM A325

1.7 SHOP DRAWINGS

- A. Comply with Section 01 33 00. When corrections are required, reproducibles will be returned noting such. Drawings will then be corrected and resubmitted until final approval is received. Items not noted as requiring corrections may be fabricated after return of a previous submittal even though drawings shall be such that corrections noted on one sheet that affect another drawing will be transmitted and made on all sheets and also resubmitted.
- B. The Contractor will be responsible for checking quantities and dimensions in accordance with contract drawings. Where discrepancies in dimensions are noted, the Contractor shall notify the Architect of such discrepancies and corrected dimensions then will be furnished by the Architect. Contractor shall coordinate any dimension changes or additions with fabricator.
- C. Contract drawings receive precedence over shop drawings unless authorized in writing. Approval of shop drawings does not grant authorization of change to contract.
- D. Standard AWS symbols shall be used and shown for all welded connection details for both shop and field welds. Joint reference numbers as noted in part 4 of 7th Edition of AISC "Manual of Steel Construction" shall be shown where full strength welds are required.
- E. All splices and connections, both shop and field, shall be detailed on shop drawings.

1.8 PRODUCT HANDLING

- A. Delivery of materials to be installed under other sections:
 - 1. Anchor bolts and other anchorage devices which are embedded in cast-in-place concrete or masonry construction shall be delivered to the project site in time to be installed before the start of cast-in-place concrete operations or masonry work.
 - 2. Provide setting drawings, templates, and directions for the installation of the anchor bolts.
- B. Storage of Materials
 - 1. Structural steel members which are stored at the project site shall be above ground on platforms, skids or other supports.
 - 2. Steel shall be protected from corrosion.
 - 3. Other materials shall be stored in a weather-tight and dry place, until ready for use in the work.
 - 4. Packaged materials shall be stored in their original unbroken package or container.

1.9 COOPERATION WITH OTHER WORK

- A. Fabricator shall punch all necessary holes and provide the connection material required for the attachment of miscellaneous items, such as nailers, hangers and mechanical equipment framing. Contractor shall coordinate such work with all plans.

1.10 WORKMANSHIP

- A. All welding, both shop and field welding, shall be made by welders qualified by tests as prescribed in the "Code for Welding in Building Construction" (AWS D1.1-Current Edition).
- B. All fabrication and erection work shall be performed by skilled workmen, working under experienced supervision.

1.11 CERTIFICATION

- A. Submit copy of certificate with shop drawings or upon request by Owner or Architect.

1.12 UNIT PRICES

- A. Provide allowance of \$10,000 per ton for one (1) ton of miscellaneous beams, channels, and angles in addition to the steel framing shown on the plans and details. Contractor shall include additional allowance cost for fabrication, design, installation and erection cost for the additional framing. Construction Manager is to record use and credit back unused cost to Owner.

PART 2 PRODUCTS

2.1 MATERIALS

- A. All structural steel shall meet the specifications for "Structural Steel" (ASTM A36). Except wide flanges and tees shall conform to ASTM A992, $F_y=50$ ksi, steel tubes shall conform to ASTM A500, Grade C, $F_y=50$ KSI, and steel pipe shall conform to ASTM A501.
- B. Filler Metal for Welding shall conform to one of the following:
 - 1. Manual Shielded Metal Arc Welding - E70 Series of the "Specifications for Mild Steel covered Welding Electrodes" (AWS A51-Current Edition).
 - 2. Submerged Arc Welding - F70 AWS-flux Series of the "Specifications for Bare Mild Steel Electrodes and Fluxes for Submerged Arc Welding" AWS 5.17-96.
- C. Bolts
 - 1. High Strength Bolts shall be A325 bolts meeting the requirements of "Specification for Structural Joints Using ASTM A325 or A490 Bolts", including suitable nuts and plain hardened washers.
 - 2. Other bolts shall conform to "Specification for Low-Carbon Steel Externally and Internally Threaded Standard Fasteners" (ASTM A307).

2.2 CONNECTIONS

- A. Type
 - 1. Unless indicated and detailed otherwise on plans, all connections shall be detailed and designed by the fabricator as unrestrained flexible connections described as Type 2 construction in Section A2.2 of the most current edition of the AISC manual of Steel Construction, but provisions must be made for excessive eccentric connections. All connections shall be in accordance with Part 4 and Part 5 of the above cited AISC Manual.
 - 2. Bolted Connections
 - a. All bolted connections, unless noted otherwise, shall be A325 high strength steel bolts, nuts and harden washers, conforming to the "Specification for Structural Joints Using ASTM A325 or A490 Bolts".
 - b. All bolted connections, unless noted otherwise, shall be of bearing type with threads included in the shear planes. These bolts shall be snug tightened. The snug-tight condition is defined as the tightness attained by a few impacts of an impact wrench or the full effort of a man using an ordinary spud wrench.
 - c. Bolts, nuts and washers shall conform to Tables 1 and 5 of Specifications and Commentary for "Structural Joints, Using ASTM A325 or A490 Bolts" of Current Edition of AISC Manual of Steel Construction.
 - d. Bolted parts shall be fitted tightly together before bolt installation.
 - e. All bolts shall have one nut and a hardened washer under the turning element.
 - f. When surface of bolted part in contact with nut or bolt head exceeds a slope of 1:20 with respect to a plane normal to the bolt axis, smooth beveled washers shall be used.

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- g. Bolt assembly and contact surfaces shall be free from scale, burrs, dirt and other foreign matter which might prevent solid seating.
 - h. Minimum bolt size, unless noted otherwise, shall be 5/8" in diameter. Adequate "stick through" for bolts must be provided in accordance with section C2 and Table 6, pages 5-201 and 5-202 of reference cited in part c) of the section.
 - i. All bolts at the column cap plates shall be installed with the bolt on top and the nut below the cap plate.
3. Welded
- a. Minimum size of fillet weld permitted shall be 3/16", unless noted otherwise.
 - b. All surfaces to be welded shall be free from loose scale, slag, rust, grease, paint and other foreign materials.
 - c. All welding shall be in accordance with AWS "Structural Welding Code" (AWS D1.1-Current Edition) and as illustrates and described in "Welded Joints" in Part 4 of the 7th edition of the AISC Manual of Steel Construction.
 - d. Shop welding and field welding shall be performed by a certified welder in accordance with AWS D1.1-2000, licensed in the State of Arkansas.

PART 3 EXECUTIONS

3.1 FABRICATION

A. Connections and Splices

- 1. Shop connections and splices may be bolted or welded.
- 2. All holes for bolts shall be punched or drilled without ragged or torn edges. Finished holes for bolts shall be 1/16 inch larger than nominal diameter of the bolt.

B. Metal Preparation

- 1. All metal shall be properly prepared before shop connections are made in accordance with welding and bolting requirements of these specifications, AISC and AWS standards.
- 2. All completed members shall be straight, without kinks, twists, bulges, bends and open joints.
- 3. Shearing, punching and cutting of materials shall be without torn or ragged edges.
- 4. Holes too small to meet above requirements shall be enlarged without distortion to the metal by reaming.
- 5. Bolted parts, when assembled, shall be fabricated so that the bolts will enter without distortion.
- 6. Compression members shall have milled or sawed shop ends and joints.
- 7. Open holes necessary for connection of other work shall be provided at time of fabrication. Contractor shall coordinate work with that of other trades.
- 8. Grind all factory or field welds where exposed to achieve smooth consistent surface. Field-apply primer (or galvanized paint if metal is galvanized) immediately following grinding.

C. Painting

1. All steel work except that encased in concrete or otherwise noted, shall receive one shop coat of a rust inhibitive paint meeting Federal Specification TT-P-636 with a minimum dry paint film thickness of 2.0 mils.
2. All metal shall be free of dirt, grease, rust, mill scale, oil and other foreign material, and shall be wire brushed before painting.

D. Tolerances

1. Fabrication tolerances shall be in accordance with AISC Manual of Steel Construction- Current Edition.

3.2 ERECTION

A. Precautions

1. The Contractor shall take necessary precautions to secure all steel against movement during erection and that bracing as noted in the remainder of this section of the specifications is installed.

B. Base Connections

1. Anchor rods shall be placed and accurately located in footings, piers, and walls in advance of column erection.
2. Column bases shall be set level, using steel shims on four corners and grouted solid to ensure full bearing contact on foundation or support material.
 - a. Grout shall be a minimum of 1" thick, high strength, non-metallic, non-shrink, damp packed consistency construction grout.
3. Column bases are designed as unrestrained and all columns require temporary bracing until all framing and erection work is secure and in place.

C. Field Connections

1. Field connections may be either welded or bolted.
2. As erection work progresses, all steel work shall be secured and fastened with either temporary or permanent connections.
3. Bolts exposed to weathering or to earth shall be dipped in a rust inhibitive paint prior to installation.
4. Gas cutting: Field correcting of fabrication by gas cutting shall not be permitted on any major member in the structural framing without prior approval of the Architect.
5. All beams with or without bearing plates shall be set in 1 to 1 mix of sand and Portland cement so as to ensure full contact bearing.

D. Bracing - All structural steel shall be braced, guyed and stayed to prevent lateral or vertical movement against construction loads, dead loads, wind forces and erection forces. Such bracing shall remain in place until secured and all exterior walls are in place.

E. Field Painting

1. Damage of shop paint or exposed rusted metal spots shall be cleaned and painted before erection. Paint shall be same as applied by fabricator.

2. After erection, all steel exposed to earth or weather shall be painted with a 2nd coat of rust inhibitive paint.
 3. After erection, all abrasions or damaged paint marks, including bolts, nuts and welds, shall be touched up with shop paint by the erector.
 4. See Section 09 91 00 for finish coats required.
- F. Tolerances - Erection tolerances shall conform to part b) of section 7 of AISC "Code of Standard Practice for Steel Buildings and Bridges", as stated in the 7th Edition of AISC Manual of Steel Construction or most current edition.

3.3 IMPROPER FIT OF STEEL WORK

- A. All framing or connections that do not properly fit, or are not located according to plans, shall be modified or replaced at contractor's expense. Contractor shall submit to the Architect drawings and proposals for modifications and replacement, for approval. No work shall proceed until approval is received, but temporary shoring and bracing shall be placed until approved corrections are made.

3.4 SPECIAL INSPECTIONS

- A. Inspection of Steel structure placement and connections for conformance to the construction documents and the IBC shall be completed by the designated third-party Special Inspector.

END OF SECTION

05 12 23-7

SECTION 05 31 13

METAL DECKING - FLOOR

PART 1 GENERAL

1.1 SUMMARY

- A. All work under this section is subject to the General Conditions and Supplementary General Conditions and shall be governed by the requirements therein.
- B. This section shall cover the furnishing, connection and erection of metal floor decking, complete.

1.2 RELATED SECTIONS

- A. Section 01 40 00 – Quality Control: Required Special Inspections
- B. Section 05 12 23: Structural Steel

1.3 SHOP DRAWINGS:

- A. Submit to the Architect, prior to installation, shop drawings per Section 01 33 00.

1.4 DESIGN

- A. Design properties shall be computed in strict accordance with the latest edition of "Specifications for the Design of Light Gage Structural Members" of the AISI. Steel decking shall meet SDI Specifications and Certification.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Steel decking shall be as specified in the Structural Plans.

PART 3 EXECUTION

3.1 ERECTION:

- A. General: Install floor deck units and accessories in accordance with manufacturer's recommendations and shop drawings.
- B. Steel decking shall be placed with edges up and flutes at right angles to supports. End laps shall always occur over supporting members. Minimum end lap is 2" for welded attachment and is equal to top chord of support for clip attachment. All sheets shall be

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lapped one-half flute at side laps. Sheets shall be attached to top chord of supports by plug welding through special washers, or by self-drilling or self-tapping screws.

- C. Welding to conform to AWS D1.1-Current Edition.
- D. Steel decking configurations shall meet SDI Specifications. Installation and securing of steel decking system shall be in accordance with manufacturer's recommendations and structural drawings.
- E. All erection work shall be coordinated with other trades to provide the necessary vents, hangers, openings, etc., required.

3.2 PLACING FLOOR DECK UNITS

- A. Position floor deck units on supporting steel framework and adjust to final position with ends bearing on supporting members and accurately aligned end to end before being permanently fastened.
- B. Place deck units flat and square, and secure to adjacent framing without warp or deflection.
- C. After installation, deck shall be continuous, clean, dry surfaces ready for concrete and reinforcement.
- D. Special Inspector and Architect or Structural Engineer shall observe the finished floor deck prior to placing of concrete.

3.3 JOINT SEALING

- A. Remove dust, dirt and moisture from joint surfaces.
- B. Apply sealant in accordance with manufacturer's instructions.

3.4 CUTTING AND FITTING

- A. Make cuts neat, square, and trim.
- B. Cut openings in floor deck true to dimensions using metal saws, drills or cutting torches.
- C. Do not use cutting torches where a finished appearance is required.

3.5 TOUCH-UP PAINTING

- A. Wire brush, clean and paint scarred areas, welds, and rust spots on top and bottom surfaces of decking units and supporting steel members.
- B. Touch-up welded areas with Galvilite By ZRC Products Company, or approved alternate.

3.6 SPECIAL INSPECTIONS

- A. Inspection of steel deck placement and connections for conformance to the construction documents and the IBC shall be completed by the designated third-party Special Inspector.

END OF SECTION

05 31 13-3

SECTION 06 10 00

ROUGH CARPENTRY

PART 1 GENERAL

1.1 SUMMARY

- A. Furnish and install all wood framing members, stripping, blocking, grounds, pressure treated wood, fire treated wood, equipment curbs and cants, and other miscellaneous.
- B. Roofing Underlayment

1.2 PRODUCT HANDLING

- A. Protection:
 - 1. Store all materials in such a manner as to ensure proper ventilation and drainage, and to protect against damage and the weather. Store in a well-ventilated building where not exposed to extreme changes of temperature and humidity.
 - 2. Keep all materials clearly identified with all grade marks legible. Keep all damaged material clearly identified as damages, and store separately to prevent its inadvertent use.
 - 3. Do not allow installation of damaged or otherwise non-complying material.
 - 4. Use all means necessary to protect the installed work and materials of all other trades.
 - 5. Protect all metal products with adequate waterproof outer wrappings.
 - 6. Use extreme care in off-loading of lumber to prevent damage, splitting, and breaking of materials.

1.3 ECOLOGICAL PRESERVATION

- A. Contractor will not use old growth Western Red Cedar, Sitka Spruce, Western Hemlock, Pacific Fir, or Coastal Redwood unless it is recycled. Only upon written request, under unusual circumstances, will use of any of these species be considered by Architect.

PART 2 PRODUCTS

2.1 MATERIALS

- A. All materials herein specified: The best of their respective grades, conforming to grading rules of lumber association under which they are produced, thoroughly seasoned or kiln dried. Protect and cover in shipment and on job site.
- B. Framing lumber and miscellaneous blocking - No. 2 Grade Douglas Fir, or Southern Pine, S4S in conformance with ASTM 245- 69 grading, or as otherwise specified on plans.
- C. Pressure treated wood:
 - 1. Use arsenic-free pressure treated lumber, Copper Azole Type-B (CA-B), Alkaline Copper Quat (ACQ), or approved equivalent product conforming to American Wood Preservers

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Association standards for use above ground in all places where lumber is used in contact with masonry work and concrete. Where used with roofing, at roof curbs, parapet caps, roof edge member or roof cant strips, whether noted on plans or not, type MCA treatment is acceptable.

2. Use minimum 0.40 Lbs./Cu. Ft. retention for ground contact lumber, and 0.25 for above ground applications.
3. Pressure treated wood shall leave no apparent odor or stain in the completed work.
4. Fasteners shall be stainless steel or hot-dipped, galvanized conforming to ASTM A-153.

D. Plywood and Lumber:

1. Plywood to meet performance standards for its type as described in Product Standard PS 1 for Douglas Fir plywood. Provide exterior type plywood for permanently exposed plywood in outdoor applications.
2. Provide lumber for structural carpentry using the following species provided grade for each is not lower than minimum shown:
Fir, Douglas – WCLIB, Standard
Pine, Southern Yellow - SPIB Rules, No. 2 Common
3. Roof framing lumber for stressed members in bending: 1500 F_b and 1,600,000 E stress grade lumber using the following species and not lower than grade shown:
4. Southern Yellow Pine - No. 2 KD, Douglas Fir or Western Hemlock - Construction Grade
5. Pressure treat concealed wood including lumber, grounds, nailers, blocking, backing, rough framing, and lumber in contact with the ground, in contact with concrete or masonry within 24” of the ground, installed on or above roof deck, and as required, complying with published standards or the American Wood Preserver’s Association.
6. Plywood not otherwise specified or not on the drawings: Douglas Fir or Southern Yellow Pine panels, C-D grade for concealed applications and A-C grade for exposed applications, meeting US product standard PS1. Furnish plywood for underlayment using underlayment grade with exterior glue.
7. Exterior Plywood: APA CDX, exposure 2 with exterior glue thickness as called for. Butt joint and tongue & groove. See drawings.
8. Interior Plywood: Thickness & type indicated on drawings;
APA B-C INT, where exposed one side and painted finished as called for.

- E. Perimeter Underlayment (Ice and water barrier): Polyethylene-sheet-backed rubberized membrane, 40 mils thick. Provide primer when recommended by manufacturer. Refer to Section 07 65 26.

PART 3 EXECUTION

3.1 WORKMANSHIP

- A. Framing: Frame, fit closely, set framing according to required lines, levels and secure rigidly in place.

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- B. Grounds and Blocking: Provide wood grounds and blocking of size and shape required to secure other work or equipment in place. **NO METAL STRAPPING WILL BE ACCEPTED AS A SUBSTITUTE FOR WOOD BLOCKING.** Set grounds true to line, level or plumb and well secured in place. Wood blocking or nailer on steel framing shall be bolted thereto. Provide solid ground blocking in walls for wall hung or attached items and equipment (i.e. cabinets, countertop brackets and supports, wall mounted hardware, coat hooks, toilet accessories, etc.) Also provide wood blocking in walls and/or ceilings for all owner-provided items. Verify and coordinate with owner actual locations.
 - C. Nails, spikes, screws and other anchoring items shall be of the approved size and type to secure the member in place if not called out on drawings.
 - D. If approved by Architect, fir dimensional lumber and fir plywood may be used in lieu of pressure treated wood in concealed areas unless pressure treated wood is required by code. If pressure treated wood is used, secure with 304 or 316 stainless steel fasteners or other corrosive-resistant fasteners approved for use with pressure treated wood and approved by manufacturer. Install 30# felt paper over metal substrates or coat with bituminous material prior to installation of pressure treated wood products.
 - E. Metal products in contact with pressure-treated wood must be corrosion resistant. Examples include flashing, termite shields, fasteners (e.g. nails, screws, and bolts), and all connecting hardware (e.g. joist hangers, straps, hinges, post anchors, and truss plates). Provide non corrosive separation material between such as felt paper, bituminous material, etc.
 - F. Install weather-resistant barrier equal to Tyvek Commercial Wrap over exterior side of all plywood sheathing. Where abutting to other types of exterior sheathing board, extend beyond plywood sheathing a minimum of 6 inches.
 - G. Defective materials shall be removed from the job site and replaced with acceptable materials at no additional cost to the Owner.
 - H. Install metal "H" panel clips at all roof sheathing.
- 3.2 UNDERLAYMENT INSTALLATION: Comply with instructions and recommendations of shingle manufacturer, except to extent more stringent requirements are indicated.
- 3.3 PROTECTION OF INSTALLED PRODUCT
- A. Any exposed exterior or interior plywood sheathing to be covered with temporary or permanent weather barrier within 24 hours following sheathing installation to prevent exposure to moisture or sunlight. Gypsum sheathing to be covered with temporary or permanent weather barrier within minimum time allowed by sheathing manufacturer.
 - B. No plywood roof decking will be left exposed to moisture and sunlight. Weather barriers are to be installed immediately following installation of roof deck.

- C. Schedule work so that wood framing for roof and exterior walls are covered with decking or sheathing as soon as possible to prevent weathering and warpage of framing materials.

3.4 GRADE STAMPS

- A. Framing lumber: Identify all framing lumber by the grade stamp of the Southern Pine Inspection Bureau.
- B. Plywood: Identify all plywood as to species, grade, and glue type by the stamp of the American Plywood Association.
- C. Other: Identify all other materials of this Section by the appropriate stamp of the agency listed in the reference standards.

3.5 CLEAN UP

- A. Keep the premises in a neat, safe, and orderly condition at all times during execution of this portion of the work. Clean up and remove from site the debris, cut ends, and sawdust.

END OF SECTION

06 10 00-4

SECTION 06 17 53

PRE-ENGINEERED WOOD TRUSSES

PART 1 GENERAL

1.1. SUMMARY:

- A. Furnish and install all pre-engineered wood trusses, blocking, and related materials required by this section.

1.2. GENERAL

- A. The wood and fabrication criteria of all prefabricated wood trusses shall meet with National Design Specifications for Stress-Grade Lumber and its Fastenings, by National Forest Products Association (most current edition); Timber Construction Standards, by American Institute of Timber Construction (latest revision); and Design Specifications for Light Metal Plate Connected Wood Trusses, by Truss Plate Institute (most current edition), the same as if those specifications and all their references were set out in full herein.

PART 2 PRODUCTS

2.1. MATERIALS

- A. Manufacturer: All trusses referred to in this section, Division 6, shall be fabricated by "Gang-Nail"; Panel-Clip; Building Products, Inc; or approved alternate.
- B. All lumber used for the truss members shall conform to published stress ratings for species and grades as set out in the official grading rules of the appropriate lumber association or as listed in the reference specifications; except that, wherever this specification, or notes on the Plans, or truss engineering design calls for lumber which exceeds the minimums set forth therein, the specifications, plans and/or truss engineering designs shall be applicable.
- C. The moisture content of all lumber shall be within the proper limits, as stated in the reference specifications, but shall not, in any case, exceed 19% nor be less than 7% at the time of fabrication.
- D. All truss connector plates shall be manufactured from only prime commercial quality galvanized sheet metal of no less than 20 gauge thickness which has a minimum yield of 33,000 psi and a minimum ultimate tensile strength of 48,000 psi. The corrosion-resistant coating shall be G-60 commercial class, hot-dipped galvanized before stamping.
- E. All metal connectors shall have a series of nail-like projections which are designed to separate the fibers of the wood into which they are pressed, in accordance with accepted nailing practices.

- F. Where field connections of truss sub-assemblies are necessary, the connections shall be in accordance with the details shown on the truss design drawings and approved by a professional licensed engineer and the Architect.

2.2. DESIGN

- A. All truss designs shall bear the name and seal and/or registered number and state of registry of a licensed professional engineer. Registered in Arkansas.
- B. All wood truss shop drawings shall be submitted to the Architect for approval and contain the following: Design and fabrication data; metal connectors, their gauge thickness, nominal sizes and locations at all joints; lumber specifications such as pitch, span, spacing of trusses and the species and stress grades of lumber to be used as members; design loadings of trusses and allowable stress increase; and permanent bracing required to prevent compression buckling of individual truss members.
- C. All truss drawings shall be furnished by the fabricator. All critical dimensions for determining fit and placement shall be approved by the general contractor prior to fabrication. The exposed trusses shall maintain the web and panel points as illustrated on the bid document.
- D. Trusses shall be designed without camber.

2.3. FABRICATION

- A. All trusses and other roof structural components shall be fabricated in a properly equipped manufacturing facility of a permanent nature. They shall be manufactured by experienced workmen, using precision cutting and truss assembly methods and under the direct supervision of a qualified foreman. All trusses shall be fabricated under the strict rules of the Truss Plate Institute.

PART 3 EXECUTION

3.1. HANDLING AND ERECTION

- A. Fabricated trusses and sub-assemblies shall be handled with care so that they are not damaged.
- B. During erection, care shall be exercised to keep horizontal bending of the trusses to a minimum. Care must be taken to install trusses right side up and to have trusses positioned at their respective bearing points as indicated on the truss drawings. Lateral bracing shown on drawings must be installed as shown and securely fastened.
- C. The permanent structural cross-bracing, to insure the overall rigidity of the truss system, shall be in accordance with the architectural plans of the building structure.

- D. Proper erection bracing shall be installed to hold the trusses true and plumb and in safe condition until permanent truss bracing and bridging can be solidly nailed in place to form a structurally sound framing system. All erection and permanent bracing shall be installed and components permanently and securely fastened before the application of any loads to the trusses.
- E. All prefabricated wood trusses are to be installed in accordance with Bracing Wood Trusses Commentary (BWT-76 or HFT-80), as published by the Truss Plate Institute.
- F. Field erection of the trusses, including items such as proper handling, safety precautions, temporary bracing to prevent toppling or dominoing of the trusses during erection, and any other safeguards or procedures consistent with good workmanship and good building erection practices, shall be the responsibility of the General Contractor and/or the Framing Sub-contractor.

END OF SECTION

06 17 53-3

SECTION 06 20 23

FINISH CARPENTRY

PART 1 GENERAL

1.1 SUMMARY

- A. Furnish and install items of finish carpentry and miscellaneous millwork, including all finish trim; fitting and installing all wood doors and frames; installing all finish hardware, and construction of job-built shelving.

1.2 RELATED WORK

- A. Section 06 10 00 - Rough Carpentry
- B. Section 08 14 16 - Wood Doors
- C. Section 08 71 00 - Finish Hardware
- D. Section 08 81 00 - Glass and Glazing
- E. Section 09 91 00 – Finishes

1.3 SHOP DRAWINGS

- A. Submit complete shop drawings for Architect's approval prior to fabrication of any millwork or trim.

1.4 REFERENCES

- A. Comply with State of Arkansas Adopted ADA Accessible Guidelines in regard to accessible or handicapped features.

1.5 FIELD DIMENSIONS & COORDINATION

- A. The millwork manufacturer is responsible for details and dimensions set in accordance with field measurements. The Contractor and the Millwork Supplier shall coordinate and correct any discrepancies prior to fabrication or placement of any work.
- B. Coordinate clearances of door hardware items with lites and lite frames.

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1.6 PRODUCT HANDLING AND DELIVERY

- A. Contractor and Millwork Supplier are to coordinate all phases of the work provided in under this section to insure timely delivery and setting after building is sufficiently dry and climate controlled to protect the work.

PART 2 PRODUCTS

2.1 FINISH WOOD MATERIALS:

- A. All interior base trim where called for are to be painted as shown on drawings.
- B. When painted, material shall be close grained, smooth surface, suitable for painting. Species to be Poplar or other similar closed grain species with Architect's approval.
- C. All materials shall be of select material, with no splits, knots, or other defects.

2.2. LAMINATED PLASTICS

- A. Furnish laminated plastic as detailed on drawings in strict accordance with manufacturer's recommendations. Joints shall not be located in random fashion and entire, one piece application shall be used wherever possible. Provide plastic edges where shown. Laminated plastic: "Formica", "Pionite", "Nevamar", "Wilson Art", or alternate approved by Architect. Color, pattern and finish shall be as selected by Architect.

PART 3 EXECUTION

3.1 WORKMANSHIP

- A. Frame, fit closely, and set accurately to required lines, levels, and secure rigidly in place.
- B. All interior trim is to be sanded smooth at job so that no sand marks, scratches, blemishes, etc., are noticeable after finish is applied.
- C. All interior trim against concrete or masonry or solid backings is to have hollow backs.
- D. Joints are to be mitered or angled to conceal shrinkage. Butt joints are not acceptable.
- E. Trim and moldings are to be set with finish nails, screws or glue, where required. All fastening devices are to be set and holes filled with similar material not noticeable after finish.

3.2 FINISH HARDWARE: See Section 08 71 00.

- A. Installation only by this section. Cut, fit, and install without marring or injuring work. Examine hardware at completion of work; test, oil, grease, adjust, and perform all necessary work to insure correct operation.

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- B. Doorknobs, pulls, kick plates, push plates, etc., are to be fitted and installed before finishing, then removed and re- installed after finish work is completed.

3.3 WOOD DOORS: See Section 08 14 16

- A. Installation only under this section. Fit, hang, trim as required.

- B. Provide the following clearances:

Sides	1/16"
Top	1/16"
Base (with threshold)	3/16"
Base (without threshold)	3/8 "

- C. Install hardware as specified. Locksets and latches to have centers at 38" above finish floor unless otherwise stated. Coordinate location of locks with approved Hardware Schedule.

END OF SECTION

06 20 23-3

SECTION 06 40 23

INTERIOR ARCHITECTURAL WOODWORK

PART 1 GENERAL

1.1 SCOPE

- A. Furnish all labor, materials and accessories as specified herein and necessary for a proper and complete installation of interior exposed architectural woodwork as specified.
- B. This section includes wood cabinetwork, millwork, and trim for transparent finish as well as custom wood paneling. See the drawings for locations of the woodwork types.
- C. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items incidental to or necessary for a sound, secure and complete installation, including cabinet hardware.

1.2 SHOP DRAWINGS / SUBMITTALS

- A. Complete materials list of all items proposed to be furnished and installed under this section.
- B. Manufacturer's specifications, catalog cuts and other data as required to demonstrate compliance with the specified requirements.
- C. Samples panels, not less than 4"x 4", of the full range of finishes available from the proposed manufacturer and on the proposed wood species.

1.3 RELATED SECTIONS

- A. Coordinate work and scheduling of the work of this section with other trades for anchorage and location including work of:
 - Section 06 41 16 - Cabinet Work and Shelving
 - Section 06 61 20 - Quartz Surfacing
 - Section 08 71 00 - Hardware
 - Section 09 91 00 - Finishes
 - Section 10 00 00 - Miscellaneous Specialties

1.4 INSPECTION

- A. Examine all sub-surfaces to receive work and report in writing to the General Contractor, with a copy to the Architect, any conditions detrimental to the installation of the trade's work. General Contractor is responsible for correction of the conditions as required. Commencement of the work will be construed as acceptance of all sub-surfaces.

- B. The woodwork manufacturer is responsible for details and dimensions not controlled by job conditions and shall show on his shop drawings all required field measurements beyond his control. The General Contractor and the woodwork manufacturer shall cooperate to establish and maintain these field measurements.

1.5 DELIVERY AND STORAGE

- A. Deliver all cabinetwork, millwork, and wood trim, and store within building in locations directed by General Contractor. The woodwork manufacturer and the General Contractor shall be jointly responsible to make certain that woodwork is not delivered until the building and the storage areas are sufficiently dry so that the woodwork will not be damaged by excessive changes in moisture content. If wood work is not to be installed immediately, protect from damage, dirt and exposure to weather.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. The Manufacturer of products used in this section must have an established reputation and experience in production similar apparatus for at least five or more years, with a history of satisfactory production acceptable to the Architect.
- B. The Installer of products used in this section must use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and must have a history of installations rendering satisfactory service.
- C. The "Quality Standards" of the Architectural Woodwork Institute shall apply and by reference are hereby made a part of this specification. Any reference to Premium, Custom or Economy in this specification shall be as defined in the latest edition of the AWI "Quality Standards". Any item not stated as a specific grade shall be Custom grade as defined by the latest edition of the AWI "Quality Standards".

2.2 MATERIALS

Wood Cabinetwork and miscellaneous interior wood work for Transparent or Paint Finish

- A. Cabinet construction - AWI Premium grade
Fabricate from sound, kiln-dried lumber with frames, rails, stiles, and intermediate members, not less than 3/4" thick and of sufficient width to insure sturdy, rigid construction. (See details on plans.)
 - 1. All exposed lumber to be stained oak hardwood unless noted otherwise. Plywood surfaces exposed shall be oak veneer. All lumber exposed on interior of the millwork shall be oak veneer plywood Grade A-B where both sides are exposed and Grade A-D where only one side is exposed.
 - 2. All plywood exposed edges shall have hardwood nosing to match exterior materials, as detailed on plans.
 - 3. Veneer grains on all doors and drawer fronts to run vertically.

4. Tops, bottoms, and sides of interior partitions and shelves: 3/4" plywood.
5. Ends: 3/4" A-B plywood.
6. Backs: 1/4" A-D plywood.
7. Shelves: shall be 3/4" thick plywood core for spans to 36" and 1" thick for spans to 48".
For exposed shelves in open-front casework, all shelves shall have 3/4"x 1-1/2"
hardwood face edge in species to match face veneers.
8. Doors: As indicated on the drawings.
9. Drawers: bottoms of 1/4" nominal plywood, sides and backs of 1/2" nominal plywood,
fronts of 3/4" oak hardwood
10. Counter tops: 1-1/2" thick with minimum .050 thick high pressure laminate surface top,
exposed ends, edges, and back splash. Where indicated on drawings, provide 3/4" thick
hardwood edge on countertop instead of laminate. Species to match face veneers.
Provide solid surface tops, quartz, back splashes, aprons, edges, and accent pieces where
called for on drawings.

B. Hardware

1. Hinges: fully concealed, heavy-duty hinge with lateral, vertical and front-to-back
adjustment. Minimum opening angle of 110 degrees. Use hinge mounting suited to
cabinet construction type. Hinges are to be soft close.
2. Pulls: top knobs, Eurapa tap pull 5 inch. Finish: Black.
3. Drawer glides: KV heavy-duty, ball bearing. Glides are to be self-close.
4. Shelf hardware: shelves to be adjustable on metal support clips in 5mm holes at 32mm on
center vertically. Plastic support clips not acceptable.
5. Locks: (if required), fully recessed, rim or cam lock with 2 keys. Finish to match other
exposed hardware.
6. Cord grommets: 2" dia. plastic cord grommets in countertop. Doug Mockett Model SG-
2" in color as selected by Architect.

C. Laminated Plastics

1. Furnish laminated plastic as detailed in plans on countertops in strict accordance with
manufacturer's recommendations. Joints shall not be located in random fashion and
entire, one piece application shall be used wherever possible. Provide plastic edges
where shown. Laminated plastic: "Formica", "Pionite", "Nevamar", "Wilson Art", or
alternate approved by Architect. Color, pattern and finish shall be as selected by
Architect.

PART 3 EXECUTION

3.1 PREPARATION

- A. Beginning of installation means acceptance of substrate and existing conditions.
- B. Kerf the back side of all finished solid wood trim 4 inches in width or wider to prevent
cupping.

3.2 INSTALLATION

- A. Storage and Protection: Cabinets and millwork shall be protected in transit. Store under cover in a ventilated building not exposed to extreme temperature and humidity changes. Do not store or install cabinets in building until concrete, masonry, and drywall/plaster work and painting is dry and building temperature and humidity are stabilized. Exterior doors, windows and glass shall be installed prior to millwork storage and installation in building. If project calls for polished concrete floors, final polishing of floor shall be complete in areas where millwork is being installed.
- B. Install architectural woodwork plumb, true and with doors and drawers operating without bind, drag or noise.
- C. Anchor all units securely to walls. Fasteners are to be concealed.
- D. Contractor to be responsible for accurate field measurements prior to fabrication. Comply with Section 01 33 00.
- E. Coordinate equipment and fixture locations, scheduled to be installed in cabinets.
- F. Coordinate installation and anchoring of granite or cultured marble tops, backsplash aprons, and trim.
- G. Caulk between countertops and walls.

3.3 FINISHING

- A. For other than plastic laminate covered cabinet work. Surfaces shall be thoroughly sanded and prepared before finish is applied. No misfits, hammer marks, splinters, bruises, etc., set and fill all nail holes. Cabinets to be stained or painted as called out on plans.
- B. All priming and painting must be performed as specified under Section 09 91 00 - Painting and Finishing.

END OF SECTION

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SECTION 06 41 16

CABINET WORK AND SHELVING

PART 1 GENERAL

1.1 SCOPE:

- A. Furnish labor and materials for fabrication and installation of high-pressure laminate and/or thermally fused laminate (melamine) covered cabinetwork indicated and specified, including cabinet hardware.
- B. Fume Hood
- C. Thermoset Solid Polymer (solid surface) (countertops, backsplashes, windowsills)

1.2 RELATED SECTIONS

- A. Section 05 50 00 - Miscellaneous Metals
- B. Section 06 10 00 - Rough-in Carpentry - Blocking
- C. Section 06 40 23 - Interior Architectural Woodwork
- D. Section 09 65 13 – Rubber Base

1.3. QUALITY ASSURANCE

- A. All cabinets and millwork to conform to the **Architectural Woodwork Institute (AWI)** quality standards, **Custom Grade** in addition to requirements as specified this section.
- B. Manufactured casework is approved, but must meet requirements as shown on drawings and as specified in this section.
- C. Manufacturers, suppliers and fabricators to have minimum 5 years in the manufacturing and installation of cabinets and millwork.
- D. Subcontractor / supplier providing work under this section will fabricate and install work specified in this section with their company's own installers and fabrication department, employed by the company. **Subcontracting of fabrication and installation will not be allowed unless approved by Architect prior to bid.**
- E. ADA-Americans with Disabilities Act requirements: The special requirements of ADA shall be a requirement of this section and where specifically indicated on drawings in detail or notation. Comply with Federal Register published September 15, 2010, Title II (28 CFR Part 35) and Title III (28 CFR, Part 36), rules and regulations.

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- F. Comply with State of Arkansas Adopted ADA Accessible Guidelines in regard to accessible or handicapped features.
- G. Provide balanced construction for all high pressure laminated panels.

1.4 WARRANTY

- A. Provide manufacturer's warranty against defects in materials, fabrication and installation, excluding damages caused by physical or chemical abuse or excessive heat. Warranty shall provide for replacement or repair of material and labor for a period of one (1) year, beginning at Date of Substantial Completion.
- B. Maintain surfaces in accordance with manufacturer's care and maintenance instructions.
- C. Fabrications shall not have been moved from original place of installation.
- D. Warranty shall be transferable to subsequent owner.

1.5 SHOP DRAWINGS

- A. Submit accurately detailed shop drawings to Architect for approval prior to fabrication. Comply with Section 01 33 00 for submittal.
- B. Submit two copies of shop drawings and one reproducible set to Architect.
- C. Samples: Submit thermally fused laminate (melamine), and PVC edging, full color for Architect's selection.

1.6 COORDINATION & FIELD VERIFICATION

- A. Cabinet/millwork contractor to be responsible for coordination of installed equipment and fixtures specified in other sections and shown on drawings. Contractor to provide required specifications to cabinet/millwork contractor so he may make provisions for installation and attachment of equipment and fixtures, which are to be installed in cabinets. Contractor is responsible for field verifying accurate field measurements prior to fabrication and placement.

1.7 PRODUCT HANDLING & DELIVERY

- A. No delivery or installation shall be allowed until building is sufficiently dry; and climate controlled to receive such materials without risk or damage to same.

PART 2 PRODUCTS

2.1 EXPOSED PRE-ASSEMBLED CABINETS: Where indicated on drawings.

- A. Ends and Exposed Partitions: 3/4" thick 47 lb. density particle board with thermally fused laminate (melamine),. Selected TFL may be applied on ends and partitions not exposed to view. Ends are attached to top and bottom by AWI Premium dowelling or with special concealed 1/4" x 3-1/2" knife threaded hex headed screw connectors by Hafele or alternate.
- B. Exposed Edges: Ends, partitions, finished backs, tops, bottoms, sub-tops, shelves, drawer fronts and doors are protected with 3mm P.V.C. banding. Banding to be machine or clamp applied. Provide custom PVC banding colors to match plastic laminate colors selected on millwork panels or countertops. The bottom edge of the base and tall cabinets finished ends must have 3mm flat PVC banding.
- C. Tops and Bottoms: Minimum 3/4" thick, 47 lb. density particle board with thermally fused laminate (melamine), will be applied when called for on plans. Tops shall be prepped to receive sink clamps. Coordinate with plumbing contractor. Exposed bottoms of wall cabinets to have same material and color as door faces.
- D. Sub-tops: At all base cabinets top frame shall be minimum 3/4" thick solid particle board.
- E. Bases: 3/4" thick x 4" wide exterior Pine or Fir plywood applied separately to the bottom of base and tall storage cabinets. 4" coved Rubber base to be installed. Refer to Section 09 65 00 Resilient Flooring.
- F. Counter Tops: 1 1/8" thick 47 lb. density particle board or plywood with minimum .050 high pressure laminate surface one side and exposed edges, balance laminate applied to bottom side. Matching 3mm PVC banding from manufacturer's custom colors may be used on exposed edges in lieu of plastic laminate. Countertops shall be prepped to receive sink clamps where sinks are called for. Coordinate with plumbing contractor. Countertop to be plywood when used at wet areas, lavatory or sink. Provide quartz and solid polymer tops where called for on drawings. 2 layers of 3/4" particle board or plywood will be acceptable in lieu of 1 1/8" particle board or plywood.
- G. Backsplashes: 3/4" thick 47 lb. density particle board or plywood with minimum .050 high pressure laminate surface one side, balance laminate applied to back side. Provide plywood at wet areas, lavatory or sink. Matching 3mm PVC banding at exposed edges from manufacturer's custom colors may be used on exposed edges in lieu of plastic laminate. At countertop ends that abut adjacent wall provide backsplash full width of countertop.
- H. Concealed Shelves: Shelves 1" thick, 47 lb. density particleboard thermally fused laminate (melamine).
- I. Concealed Cabinet Interior Finish: unless called for otherwise, provide thermally fused laminate (melamine), color as selected.

J. Backs:

1. Exposed backs: will be same materials as ends.
2. Unexposed backs: 1/2" thick 47 lb density particleboard with .028 thick high pressure laminate, balanced construction. Back to be fully captured on all four sides and attached with glue. Provide 1/2" nailer strip.

K. Drawers: (Provide AWI premium grade construction as minimum requirement)

1. Fronts: 3/4" 47 lb. density particleboard with thermally fused laminate (melamine), both sides.
2. Drawer body: Sides, fronts and backs shall be 1/2" thermally fused laminate (melamine), laminate both sides (1/2" hardwood solid core plywood finger jointed or Dovetail jointed on all four corners, glued and cross pinned will be considered equal construction). (Dovetail joint will be considered equal construction). 1/2" plywood drawer bottoms shall be laminated with minimum .028 high pressure plastic laminate.
3. Drawer bottom: Minimum 1/4" plywood or hardboard, grooved in on all four sides, or 1/2" 47 lb. density particle board with thermally fused laminate (melamine). Provide minimum 1/2" 47 lb. density particle board with thermally fused laminate (melamine) for drawers 30 inches or wider.
4. Drawer slides:
 - a. Standard: Accuride #7432 or approved alternate, min. 75 pound capacity, ball bearing slide. All file drawer slides to be full extension.
 - b. Heavy duty full extension (equipment shelves and drawers over 24 " deep and 8" in height): Accuride #3832 or approved alternate.
 - c. Self Closing
5. Index followers: (file drawers) K.V. #476F.
6. Hanging File Rails: Blum Metafile for letter size hanging files to be provided at file size drawers. Refer to drawings for standard or lateral file hanging orientation.
7. Additional support to be provided for drawers 30" wide or more.

L. Doors:

1. Standards: 3/4" 47 lb. density particleboard with thermally fused laminate (melamine), both sides.

M. Filler Panels: 3/4" thick 47 lb. density particleboard core with thermally fused laminate (melamine). Fillers to be used as required, in colors to match other vertical laminate surfaces. **No filler panels more than 3" wide are to be used unless shown otherwise.**

N. Open Shelving Units: 1" thick 47 lb. density particleboard with .050 thick high pressure laminate. Exposed edges will be 3mm PVC or oak (refer to item No. "B" exposed edges). All shelves to be adjustable with holes at 32 mm on center.

O. Shelf Supports:

1. Adjustable shelves: Provide holes @ 32 mm o.c. vertical, provide minimum 4 polymer twin pin-locking shelf clips per shelf capable of receiving 3/4" or 1" thick shelving. Clips to withstand 500 lb. Static load per shelf.
2. Fixed shelves: Dowels and glue, AWI premium grade construction.

P. Hardware:

1. Pulls: Top knobs, Europa Tab pull 5-inch or equivalent pull.
2. Concealed Hinges: Concealed type, 170° Clip Top, Model 71T6580 with 175H7100 Hinge Plate, Manufactured by Blum. No substitutions allowed. Hinges to be self-closing.
3. Door Bumpers: Provide clear bumpers similar to 3M Bumpon at every door leaf as req., minimum 2 per leaf.
4. Locks: (When called for) If required, locks can be keyed different and master keyed. Otherwise, key each group of locks together. Verify with owner prior to cabinet fabrication.
 - a. Drawers and single leaf doors: CompX National #C8053 series, cylinder type, 5 disk tumbler mechanism.
 - b. Double leaf locking:
Lock - CompX National #C8053 series, cylinder type, 5 disk tumbler mechanism.
Latch: CompX Timberline DL series double door latching system with the DL-200 and DL300 activator and catch. Provide black color. Provide 1 latch system (bottom) for doors up to 48" in height and two latch systems (top & bottom) for doors over 48" in height.
 - c. Provide Chain-type door stop installed on inside of cabinet where unit butts up against sidewall to prevent door from opening into wall or possible other device mounted on wall.

Q. Additional Material: Furnish all fillers, scribes, etc., as shown on the drawings and/or as part of the cabinets but which may not be shown.

R. Miscellaneous Hardware Items:

1. Cord Grommets: 2" diameter plastic grommets in countertops, Doug Mockett, Model SG-2, color as selected by Architect.
2. Countertop Support Brackets: Chevron countertop bracket by Federal Brace, #40219, 20" x 20", stainless steel.

2.2 LAMINATED PLASTICS

- A. Furnish laminated plastic as detailed in plans on countertops and cabinetry in strict accordance with manufacturer's recommendations. Joints shall not be located in random fashion and entire, one piece application shall be used wherever possible. Provide plastic edges where shown. Laminated plastic. Color, pattern and finish shall be as listed on drawings and verified by Architect.
- B. Provide solid color plastic laminate and chemical resistant laminate where called for on drawings.
- C. Thermally Fused Laminate Melamine Board: Furnish thermally fused laminate as detailed in plans on cabinetry in strict accordance with manufacturer's recommendations. Color, pattern and finish shall be as listed on drawings and verified by Architect.
 1. When wood-grain designs of plastic laminate are selected, Direction of wood grain to be vertical on door, end panels, fascia panels, and exposed backs, horizontal on drawer faces, aprons, and top rails unless noted otherwise.

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2. As an alternate product to the particle board and plywood specified, “Woodstalk” Fiberboard MR, manufactured by Dow may be used upon approval by Architect in thicknesses as called for in this specification.

2.3 THERMOSET SOLID POLYMER (SOLID SURFACE)

- A. Refer to Section 06 61 16, Solid Surfacing.
- B. Furnish thermoset solid polymer (solid surface) as detailed in plans in strict accordance with manufacturer’s recommendations. Color, pattern, and finish shall be as listed on drawings and verified by the Architect.
 1. Basis of Design Selection: Manufacturer: WilsonArt solid surface, color, see schedule.
- C. Material shall be cast, filled, acrylic; not coated, laminated or of composite construction, meeting ANSI Z124 1980, type 6, and FS WW-P541E/GEN dated August 1, 1980. Superficial damage to a depth of 1/32 inch shall be repairable by sanding or polishing. Thickness of material shall be minimum ½” for countertops and horizontal surfaces (WITH UNDERMOUNT SINKS PROVIDE ¾” COUNTERTOP OR DETAIL TREATED PLYWOOD UNDER ½” COUNTERTOP FOR ATTACHMENT OF SINK.) Provide ¼” thickness for vertical surfaces with exception of backsplashes, which shall be ½” thickness. Total thickness of countertop including plywood sub top and solid polymer top is not to be less than 1 ½” thick. Exposed edges of countertops shall be solid polymer material full thickness of edges. Finish shall be matte.
- D. Window Sills: horizontal sill thickness shall be ½”. Front apron of sill is to be ½” thickness with a overall vertical height of 2”. Apron is to extend 1 inch past jambs.
- E. Joint Adhesive: Manufacturer’s standard two-part adhesive kit to create inconspicuous, non porous joints by chemical bond.
- F. Installation:
 1. Install fabricate components to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and manufacturer’s printed instructions and technical bulletins.
 2. Form joints between components using manufacturer’s standard joint adhesive; without conspicuous joints. Reinforce with strip of solid polymer material, 2” wide.
 3. Provide cutouts for plumbing, mechanical, and electrical as indicated on the drawings.
 4. Rout and finish component edges with clean, sharp returns. Rout cutouts, radii and contours to template. Smooth edges. Repair or reject defective and inaccurate work.
 5. All components shall fit tight, level and smooth. Deliver no components to site until ready for immediate installation. Store all material indoors in climate controlled environment.
 6. All perimeters of surfaces are to be sealed to adjacent surface.
- G. Warranty:
 1. Provide manufacturer’s warranty against defects in materials, fabrication and installation, excluding damages caused by physical or chemical abuse or excessive heat. Warranty

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- shall provide for replacement or repair of material and labor for a period of ten years, beginning at Date of Substantial Completion.
2. Maintain surfaces in accordance with manufacturer's care and maintenance instructions.
 3. Fabrications shall not have been moved from original place of installation.
 4. Warranty shall be transferable to subsequent owner.

2.4 SEALANTS

A. Sealant Applications

1. Plastic laminate to plastic laminate (i.e. countertop to backsplash)
 - a. "Color Matched Acrylic Latex (Match countertop color)
2. Solid surface to solid surface (i.e. countertop to backsplash)
 - a. Color Matched Acrylic Latex (Match countertop color)
2. Epoxy resin to epoxy resin-Black (i.e. countertop to backsplash)
 - a. 100% Silicone, Black
3. Stainless steel to walls (i.e. countertop to wall at concession areas)
 - a. 100% Silicone, Clear
4. Case work to walls
 - a. Acrylic Latex, clear, tinted with paint provided by the painters to create a color match sealant to match wall color.

2.5 CONSTRUCTION

- A. As a minimum requirement, conform to construction standards of AWI, premium grade and as specified this section.
- B. Millwork fabricator/supplier is responsible for proper construction of each item of millwork, including support of each unit and countertops. If fabricator/supplier finds conditions on millwork drawings that might affect proper operation or require additional support from that shown, notify Architect and provide recommendation so that proper operation or support is provided.
- C. ADA- Americans with Disabilities Act Requirements: The following special requirements shall be met, where specifically indicated on architectural plans as "ADA", or by General Note. To be in compliance with Federal Register Volume 56, No. 144, Rules and Regulations:
 1. Countertop height: with or without cabinet below, not exceed a height of 34 inches A.F.F., (Above Finished Floor), at a surface depth of 25 inches unless noted otherwise.
 2. Knee space clearance: to be minimum 27 inches A.F.F., and 30 inches clear span width.
 3. 12 inch deep shelving, adjustable or fixed: not to exceed a range from 9 inches A.F.F. to 54 inches A.F.F. unless noted otherwise.
 4. Wardrobe cabinets: to be furnished with rod/shelf adjustable to 48 inches A.F.F. at a maximum 21 inch shelf depth.
 5. Sink cabinet clearances: Upper knee space frontal depth to be no less than 8 inches, and lower toe frontal depth to be no less than 8 inches, and lower toe frontal depth to be no

lower than 11 inches, at a point 9 inches A.F.F., and as further described in Volume 56. Section 4.19 unless noted otherwise.

a. Catches to have a maximum resistance of 5 pounds.

D. Countertops

1. Underside to be properly balanced with backing sheet. Furnish counter tops with edge treatment and profile as shown on the shop drawings. Whenever possible, provide continuous lengths. Provide field joints as required using adhesive and tite-joint fasteners. No joints within 24" of a sink cut-out.
2. Provide proper support for all types of countertops at no more than 3'-0" on center unless noted otherwise.

E. Workmanship

1. Laminate surface/balancing liner to core under controlled conditions, by approved and regulated lamination. Natural-setting hybrid P.V.A. Type III water resistant adhesives that cure through chemical reaction, containing no health or environmentally hazardous ingredients, are required. Methods requiring heat are not allowed.
2. Cabinet parts shall be accurately machined and bored for premium grade quality joinery construction utilizing automatic machinery to insure consistent sizing of modular components. End panels shall be doweled to receive bottom and top.
3. Back panels shall be fully housed into, and recessed 7/8 inch from the back of cabinet sides, top, and bottom to insure rigidity and a fully closed cabinet. Cabinet back shall be shimmed from rear of body for tight interior fit.
4. 3/4 inch thick hang rails shall be mechanically fastened to end panels of wall, base, and tall cabinets for extra rigidity and to facilitate installation.
5. All cases shall be square, plumb, and true.
6. Provide removable back panels and closure panels for plumbing access where shown on drawings and required by code. Coordinate with plumbing, mechanical, and electrical trades.
7. Cutouts for plumbing piping in concealed rear, sides or bottom cabinet panels shall be no larger than 1/4" larger than the pipe diameter. Install sealant around all penetrations.

PART 3 EXECUTION

3.1 COORDINATION

- A. Coordinate work of this section with related work of other sections and drawings as necessary to obtain proper installation of all items.
- B. Field verify site dimensions of cabinet locations in building prior to fabrication.
- C. Coordinate all plumbing/mechanical item locations and openings with plumbing/mechanical contractor where items are related to millwork prior to routing and installation of plumbing/mechanical items.
- D. Coordinate all owner furnished items, which are to be installed in or adjacent to millwork.

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- E. Coordinate locations of wood grounds and blocking concealed in walls with cabinet anchoring requirements prior to installation of wall covering.

3.2 INSTALLATION

- A. Storage and Protection: Cabinets and millwork shall be protected in transit. Store under cover in a ventilated building not exposed to extreme temperature and humidity changes. Do not store or install cabinets in building until concrete, masonry, and drywall/plaster work and painting is dry and building temperature and humidity are stabilized. Exterior doors, windows and glass shall be installed prior to millwork storage and installation in building. If project calls for polished concrete floors, final polishing of floor shall be complete in areas where millwork is being installed.
- B. Workmen: Install under the supervision of manufacturer's or supplier's representative if manufactured casework is provided, factory-trained mechanics certified by manufacturer will be required.
- C. Workmanship:
 - 1. Erect cabinets and millwork straight, level and plumb and securely anchor in place. Scribe and closely fit adjacent work. Cut and fit work around pipes, ducts, etc.
 - 2. Install all items complete and adjust all moving parts to operate properly.
 - 3. Leave surface clean and free from defects at time of final acceptance.
- D. Maximum width of any filler to be 3" inches wide. Filler width dimension to be balanced on each side of cabinet length.
- E. Coordinate equipment and plumbing fixture locations, scheduled to be installed in cabinets.
- F. Install sealant between countertop and backsplash, and between backsplash and wall, and other locations where cabinet butts to walls or ceilings.
- G. Install grommets in countertops where shown on drawings and for each computer station or keyboard tray where computer stations are shown on drawings. Coordinate and provide access to electrical receptacles below tops and in panels below countertops.
- H. Anchors for cabinets to be countersunk and plugged with vinyl inserts to match back panel colors. **STICKERS ARE NOT ALLOWED.** Arrange anchors in uniform manner, anchoring to wood ground and/or masonry wall.

3.3 CABINET FINISH

- A. Provide finishes as selected on Finish Legend on drawings.
- B. For other than thermally fused melamine laminate or high-pressure laminate cabinet work, surfaces shall be thoroughly sanded and prepared before finish is applied. No misfits, hammer marks, splinters, bruises, etc., set forth all nail holes. Cabinets to be stained inside and out shall be called out on plans. See section 09 91 00.

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3.4 CLEANUP

- A. Remove all cartons, debris, sawdust, scrapes, etc. Leave cabinet surfaces and spaces clean, ready for owner's use.

END OF SECTION

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SECTION 06 61 16

SOLID SURFACING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Fabrication and installation of solid surfacing components including accessories indicated, specified, and required for installation.

1.2 RELATED SECTIONS

- A. Section 06 10 00 - Rough-in Carpentry – Blocking
- B. Section 06 41 16 – Cabinet Work and Shelving

1.3. QUALITY ASSURANCE

- A. Fabricator Qualifications:
 - 1. Experienced with successful fabrication of specified work similar to scope of this Project.
 - 2. Record of successful in-service performance.
 - 3. Sufficient production capability, facilities, and personnel to produce required work.
- B. Installer Qualifications:
 - 1. Experienced in installation of specified work similar to scope of this Project.
 - 2. Record of successful in-service performance.
 - 3. Sufficient installation capability, facilities, and personnel to produce required work.

1.4 SHOP DRAWINGS

- A. Product Data: Manufacturer's technical literature for each product indicated, specified, or required. Include manufacturer's written fabrication and installation instructions.
- B. Shop Drawings: Dimensioned and detailed plans, elevations, and large-scale details.
 - 1. Show locations of each component.
 - 2. Show materials, finishes, edge and splash profiles, and methods of joining.
 - 3. Show locations and sizes of cutouts and holes for plumbing fixtures, accessories and other items installed in countertops.
 - 4. Show attachment devices and other components to be incorporated into work.
- C. Samples for Verification: 4-inch square sample of selected material, in specified gloss, cut into 2 pieces and then joined together to represent an inconspicuous seam; indicate full range of color and pattern.

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D. Maintenance Data:

1. For inclusion in maintenance manual close-out documents
2. Include manufacturer's instructions for maintenance of installed work, including methods and frequency recommended for maintaining optimum condition under anticipated use.
3. Include precautions against cleaning products and methods which may be detrimental to finishes and performance.

1.5 COORDINATION & FIELD VERIFICATION

A. Field Measurements:

1. Where components are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings.
2. Locate concealed framing, blocking, and reinforcements that support components by field measurements before being enclosed, and indicate measurements on Shop Drawings.

1.6 PRODUCT HANDLING & DELIVERY

- A. Delivery: Do not deliver components until painting and similar activities have been completed in installation areas.
- B. Storage: Prior to installation, store in areas in which material will be installed.
- C. Handling: Handle components to prevent damage to finished surfaces.

1.7 WARRANTY

- A. Manufacturer's Warranty: Provide manufacturer's warranty against defects in materials. Warranty shall provide material and labor to repair or replace defective materials.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Specification and color selection are based on Wilsonart Solid Surface. Alternates will be reviewed by Architect for compliance with the selected product as specified.

2.2 SOLID SURFACING MATERIAL

A. Sheet Material:

1. Description: Continuously cast, non-porous, homogeneous solid sheets composed of acrylic polymer, aluminum trihydrate filler, and pigments that yield through-body color; not coated, laminated or of composite construction.

2. Basis of Design Selection:
 - a. Manufacturer: Wilsonart Solid Surface
 - b. Color Name: See schedule
 - c. Finish: Matte

2.3 ACCESSORIES

- A. Joint Adhesives: Adhesive capable of creating inconspicuous, non-porous seams; acceptable to material manufacturer.
- B. Fasteners and Mounting Hardware: Device type and size required sufficient to correctly attach or anchor specified item to substrate indicated without failure.

2.4 FABRICATION

- A. Shop Assembly:
 1. Fabricate shapes in sizes and profiles indicated according to approved shop drawings and manufacturer's instructions.
 2. Where necessary for fitting at Project, provide ample allowance for scribing, trimming, and fitting.
- B. Seams:
 1. Form inconspicuous joints between components.
 2. Reinforce on concealed side with strip of solid surfacing material not less than 1 inch on either side of joint by same thickness as components being joined.
 3. Locate more than 3 inches from cutouts.
- C. Cutouts:
 1. Use router to make openings according to templates and finish with clean and smooth edges.
 2. Provide not less than 1/8 inch clearance between cutout edges and appliance or plumbing fixture.
 3. Remove nicks and scratches.
- D. Overhangs: Support overhangs that are more than 6 inches.
- E. Thermoforming:
 1. Heat component and maintain between 275 and 325 degrees Fahrenheit during forming.
 2. Form pieces to shape prior to seaming and joining.
 3. Cut pieces to finished dimensions.
 4. Sand edges and remove nicks and scratches.

F. Inlays:

1. Rout groove approximately 1/8 inch deep according to design.
2. Fill groove using methods approved by manufacturer, avoiding air bubbles or voids.
3. Overfill inlay area.
4. Allow inlay to cure.
5. Do not allow inlay to overheat during sanding.
6. Finish and touch-up to uniform appearance.

G. Countertop Configuration:

1. General Provisions:
 - a. Fabricate with loose backsplashes for field assembly.
 - b. Accurately cut holes and drill countertop panels to receive plumbing, fixtures, soap dispensers and other accessories.
2. Countertop and Splashes Thickness: Not less than 1/2 inch.
3. Front Edge: Straight, slightly eased at top led. (WITH UNDERMOUNT SINKS PROVIDE 3/4" COUNTERTOP OR DETAIL TREATED PLYWOOD UNDER 1/2" COUNTERTOP FOR ATTACHMENT OF SINK.)
4. Splashes: Straight, slightly eased at corner.

PART 3 EXECUTION

3.1 EXAMINATION

A. Acceptance of Surfaces and Conditions:

1. Examine substrates to which solid surfacing components will be applied for compliance with requirements and other conditions affecting performance.
2. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents.
3. Starting work within a particular area will be construed as acceptance of surface conditions.

3.2 INSTALLATION

A. General:

1. Install components plumb, level, and scribed to adjacent substrates.
2. Leave space, not less than 1/8 inch for every 10 foot of length, between components and adjacent substrates.

B. Anchorage:

1. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Pre-drill holes for screws as recommended by manufacturer.
2. Secure backsplashes to tops and walls with adhesive.

C. Seams:

1. Clean surfaces to be seamed to remove oil, dirt, and dust.
2. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's instructions.

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3. Clamp until fully cured.
 4. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
 5. Buff and sand to produce a smooth uniform seamless surface.
- D. Tolerance: Install countertops level, accurately aligned, without sag, bow, or variation from a straight line to a tolerance of 1/8 inches in 8 feet.

3.3 CLEANUP

- A. Surface Finish:
1. Remove stains according to manufacturer's instructions.
 2. Sand and polish to remove nicks, scratches, and other imperfections.

3.4 PROTECTION

- A. Coverings: Cover installed components to prevent physical damage or staining until substantial completion.

END OF SECTION

SECTION 06 61 20

QUARTZ SURFACING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Fabrication and installation of quartz surfacing components including accessories indicated, specified, and required for installation.

1.2 RELATED SECTIONS

- A. Section 06 10 00 - Rough-in Carpentry - Blocking
- B. Section 06 41 16 – Cabinet Work and Shelving

1.3. QUALITY ASSURANCE

A. Fabricator Qualifications:

1. Experienced with successful fabrication of specified work similar to scope of this Project, and product by Manufacturer.
2. Record of successful in-service performance.
3. Sufficient production capability, facilities, and personnel to produce required work.

B. Installer Qualifications:

1. Experienced in installation of specified work similar to scope of this Project.
2. Record of successful in-service performance.
3. Sufficient installation capability, facilities, and personnel to produce required work.

1.4 SHOP DRAWINGS

- A. Product Data: Manufacturer's technical literature for each product indicated, specified, or required. Include manufacturer's written fabrication and installation instructions.
- B. Shop Drawings: Dimensioned and detailed plans, elevations, and large-scale details.
 1. Show locations of each component.
 2. Show materials, finishes, edge and splash profiles, and methods of joining.
 3. Show locations and sizes of cutouts and holes for plumbing fixtures, accessories and other items installed in countertops.
 4. Show attachment devices and other components to be incorporated into work.
- C. Samples for Verification: 4-inch square sample of selected material, in specified gloss, cut into 2 pieces and then joined together to represent an inconspicuous seam; indicate full range of color and pattern.

D. Maintenance Data:

1. For inclusion in maintenance manual close-out documents
2. Include manufacturer's instructions for maintenance of installed work, including methods and frequency recommended for maintaining optimum condition under anticipated use.
3. Include precautions against cleaning products and methods which may be detrimental to finishes and performance.

1.5 COORDINATION & FIELD VERIFICATION

A. Field Measurements:

1. Where components are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings.
2. Locate concealed framing, blocking, and reinforcements that support components by field measurements before being enclosed, and indicate measurements on Shop Drawings.

1.6 PRODUCT HANDLING & DELIVERY

- A. Delivery: Do not deliver components until painting and similar activities have been completed in installation areas.
- B. Storage: Prior to installation, store in areas in which material will be installed.
- C. Handling: Handle components to prevent damage to finished surfaces.

1.7 WARRANTY

- A. Manufacturer's Warranty: Provide manufacturer's warranty against defects in materials. Warranty shall provide material and labor to repair or replace defective materials.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Specification and color selection are based on Wilsonart Quartz. Alternates will be reviewed by Architect for compliance with the selected product as specified.

2.2 QUARTZ SURFACING MATERIAL

A. Sheet Material:

1. Composition: 93 percent quartz aggregate combined with polyester resin binders and proprietary pigments that are fabricated into slabs using vacuum vibrocompaction technology.

2. Basis of Design Selection:
 - a. Manufacturer: Wilsonart
 - b. Color Name: Cambria Whitendale
 - c. Finish: Matte
 - d. Finish: Satin or semi-gloss
 - e. Thickness: 2 cm OR 3 cm
 - f. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

2.3 INSTALLATION MATERIALS

- A. Joint Adhesive: Methacrylate-based adhesive for chemically bonding quartz surfacing seams. Color complementary to quartz surfacing sheet material. UL 2818 GREENGUARD Gold certified and complying with SCAQMD Rule 1168.
 1. Basis-of-Design Product: Wilsonart Hard Surface Adhesive.
- B. Elastomeric Sealant: Mildew-resistant silicone sealant for filling gaps between countertops and terminating substrates in wet environment applications. Complies with ASTM C920, Type S (single component), Grade NS (nonsag).
 1. Basis-of-Design Product: Wilsonart; Color Matched Caulk.
 2. Color: **Selected from sealant manufacturer's standard offerings.**
- C. Siliconized Acrylic Sealant: Siliconized acrylic latex sealant. For general applications to fill gaps between countertops and at terminating substrates. Complies with ASTM C 384, Type OP, Grade NF, and SCAQMD Rule 1168.
 1. Basis-of-Design Product: Wilsonart; Color Matched Caulk.
 2. Color: **[Complementary to quartz surfacing color] [Selected from sealant manufacturer's standard offerings].**
- D. Construction Adhesive: Countertop manufacturer's recommended silicone-based construction adhesive for backsplashes, end splashes, and other applications according to manufacturer's published fabrication instructions
- E. Solvent: Denatured alcohol for cleaning quartz surfacing to assure adhesion of adhesives and sealants.
- F. Cleaning Agents: Mild soap and water.

2.4 FABRICATION

- A. Shop Assembly:

1. Fabricate shapes in sizes and profiles indicated according to approved shop drawings and manufacturer's instructions.
2. Where necessary for fitting at Project, provide ample allowance for scribing, trimming, and fitting.

B. Seams:

1. Form inconspicuous joints between components.
2. Reinforce on concealed side with strip of solid surfacing material not less than 1 inch on either side of joint by same thickness as components being joined.
3. Locate more than 3 inches from cutouts.
4. Layout surface to minimize joints and avoid L-shaped pieces of quartz surfacing. Layout and fabricate with 'hairline' joints.

F. Cutouts:

1. Use router to make openings according to templates and finish with clean and smooth edges. Cutouts shall have a minimum of 3/8 inch (10mm) radius.
2. Provide not less than 1/8 inch clearance between cutout edges and appliance or plumbing fixture.
3. Remove nicks and scratches.
4. Where edges of cutouts will be exposed in finished work, polish edges.

G. Overhangs: Support overhangs that are more than 6 inches.

H. Countertop Configuration:

1. General Provisions:
 - a. Fabricate with loose backsplashes for field assembly.
 - b. Accurately cut holes and drill countertop panels to receive plumbing, fixtures, soap dispensers and other accessories.
2. Countertop and Splashes Thickness: Not less than 1/2 inch.
3. Front Edge: Straight, slightly eased at top with undermount sinks provide 3/4" countertop or detail treated plywood under 1/2" countertop for attachment of sink.
4. Splashes: Straight, slightly eased at corner.

I. Inspect materials for defects prior to fabrication.

J. Tools: Cut and polish with water cooled power tools.

PART 3 EXECUTION

3.1 EXAMINATION

A. Acceptance of Surfaces and Conditions:

06 61 20-4

1. Examine substrates to which quartz surfacing components will be applied for compliance with requirements and other conditions affecting performance.
2. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents.
3. Starting work within a particular area will be construed as acceptance of surface conditions.
4. Verify dimensions by field measurements prior to installation.
5. Verify that substrates supporting quartz surfaces are plumb, level, and flat to within 1/8 inch in 10 feet and that all necessary supports and blocking are in place.
6. Base Cabinets shall be secured to adjoining units and back wall.

3.2 INSTALLATION

A. Install materials in accordance with manufacturer's instructions and approved shop drawings.

B. Preliminary Installation:

1. Position materials to verify the correct size.
2. If size adjustments, or additional fabrication is necessary, use water cooled tools. Protect jobsite and surface from dust and water. Perform work away from installation site if possible.
3. Allow gaps for expansion of not less than 1/8 inch(1.5mm) per ten feet when installed between walls or other fixed structure.

C. Permanent Installation:

1. After verification of fit and finish, clean substrate; remove loose and foreign matter which may interfere with adhesion. Clean quartz surface backside & joints with denatured alcohol.
2. Horizontal surface: Apply continuous bead of mounting adhesive around perimeter of structural substrate and supports.
3. Vertical surface: Apply continuous bead of mounting adhesive around perimeter. In addition, apply 1/4 inch mounting adhesive bead every 8 inches on vertical center.
4. Fasteners, Grout and Hardware.
5. Install quartz surfacing plumb, level, square and flat to within 1/8 inch in ten Feet, non-cumulative.
6. Align adjacent pieces in same plane.

D. Joints:

1. Joints Between Adjacent Pieces of Quartz Surfacing:
 - a. Joints shall be flush, tight fitting, level and neat.
 - b. Securely join adjacent pieces with Cambria Two Part Acrylic Adhesive.
 - c. Fill joints level to polished surface.
 - d. Secure adjacent quartz surfaces with vacuum clamps until adhesive hardens.
2. Joints Between Quartz Surface and back splash & wall
 - a. Seal joints with '50' year silicone sealant.

3.3 CLEANING

- A. Remove masking, excessive adhesive and sealants. Clean exposed surfaces according to manufacturer's published maintenance instructions.

3.4 PROTECTION

- A. Protect installed fabrications from damage during remainder of construction period.

3.5 REPAIR

- A. If permissible to Architect, minor surface marring for quartz surfacing components may be repaired according to manufacturer's published installation instructions.
- B. Remove and replace quartz surfacing components that are damaged and cannot be satisfactorily repaired.

END OF SECTION

SECTION 07 10 00

WATERPROOFING AND DAMPPROOFING

PART 1 GENERAL

1.1 SUMMARY

- A. Furnish labor and materials to complete waterproofing and dampproofing shown and specified.
- B. Section Includes:
 - 1. Horizontal joint waterproofing
 - 2. Expansion joint fillers
 - 3. Cavity wall flashing system
 - 4. Below-slab vapor barrier

1.2 RELATED SECTIONS

- A. Section 03 30 00 – Cast-In-Place Concrete
- B. Section 04 22 00 – Concrete Unit Masonry
- C. Section 04 72 00 – Custom Cast Stone
- D. Section 06 10 00 – Plywood Sheathing
- E. Section 07 62 00 – Flashing and Sheet Metal
- F. Section 09 29 00 – Drywall-Sheathing

1.3 SUBMITTALS

- A. Comply with Section 01 33 00.

1.4 WARRANTY

- A. The Contractor must guarantee all materials and workmanship for a minimum period of two (2) years from the date of Substantial Completion of the building unless longer warranty periods are specified for individual specified products.
- B. The Contractor will, at any time within the two (2) year period, remedy all leaks of any nature in any part of the building due to the use of faulty materials and/or workmanship, without additional cost to the Owner. The Contractor shall further reimburse the Owner for any damage occasioned by such leaks.

07 10 00-1

- C. The Contractor is cautioned to supplement the work, described in this section of the specifications, by any means necessary to permit the above guarantee, which he will be called upon to make as an obligation of the Contract.

1.5 PRE-INSTALLATION MEETING

- A. The Contractor will schedule and conduct a pre-installation meeting for the following items:
 - 1. Cavity wall flashing system
 - 2. Underslab moisture barrier
- B. The following shall be in attendance:
 - 1. Contractor
 - 2. Architect
 - 3. Product supplier and or manufacturer's representative
 - 4. Installer

PART 2 PRODUCTS

2.1 MATERIALS:

- A. Horizontal expansion joint waterproofing of exterior slabs or slabs on grade: Tremco Vulkem #45 SSL Sealant as manufactured by Tremco, W.R. Meadows, Inc., or approved alternate. Color to be coordinated with Architect.
- B. Horizontal expansion Joint Filler: Asphalt impregnated expansion joint material. Provide "Zip Strip" type filler so that top ½" can be removed for sealant installation.
- C. Cavity wall flashing system:
 - 1. Cavity Wall Flashing System:
 - a. Through-Wall Flashing: Flex-Flash flashing polyester scrim reinforced, minimum 40-mils thick, self-adhering, pressure sensitive clear no drool adhesive membrane formulated with Dupont "Evaloy" Kee, manufactured by Holmann & Barnard, Inc.. Provide with all available preformed shapes (i.e. corners, level changes, end dams, stop ends, etc.) as needed to fit job conditions. Apply Primer-SA by HB where installed on exterior sheathing and/or CMU.
 - b. Drainage & Vents: Mortar Net Drainage & Vent System or Mortar Trap & Weep Vent by HB.
 - c. Termination Bar: Provide continuous aluminum or stainless-steel termination bar where membrane terminates on wall sheathing or substrate. Secure to substrate with screws meeting manufacturer detailing.
 - d. Drip Edge: Not required. Terminate membrane flashing at front masonry edge. Flex-flash should be extended beyond the wall face and cut flush with the brick.
 - e. Sealant: Provide sealant at termination bar and where thru wall flashing ends overlap, inside and outside corners and any other type of soft joints. Verify compatibility of sealant with any adjacent materials. HB Sealant, Dow Corning 790 & 791 with 1200 prime coat. Silaflex-1A with #260-205 primer or Sonolastic NPI with #733 primer.

07 10 00-2

2. Alternate manufacturers with equal or better product may submit product data to Architect for approval, following requirements of Section 01 60 00.
 - a. “TotalFlash” system by Mortar Net USA Ltd, is an approved alternate system, Drainage and weep vents must be provided in addition to the built-in drainage mat.

D. Weep and Ventilation Vents:

1. QV- Quadro Vent by HB, or Weepvent by Mortar Net, ½” thick, size as required to match brick or CMU veneer head dimension.
2. Install at 24” o.c. horizontally for brick veneer, 32 o.c. horizontally for CMU veneer.
3. Confirm Color with Architect for each masonry color used.

E. Mortar Collection Material:

1. Mortar Trap by HB, or MortarNet by Mortar Net, or approved alternate.
2. Thickness as required to fill cavity. Install just above thru-wall flashing in cavity at bottom of walls and above window and door openings per manufacturer’s instructions.

F. Underslab Moisture Barrier: 15 mil thick virgin polyethylene, Approved Products and Manufacturers:

- “Stego Wrap Class A”, vapor barrier (15-mil) by Stego Industries, LLC, 877-464-7834, www.stegoindustries.com
 - Vaporguard by Reef Industries, 713-507-4250, www.reefindustries.com
 - Moistop Ultra 15 by Fortifiber, 800-773-4777, www.fortifiber.com
 - Perminator HP 15 mil by WR Meadows, 800-342-5976, www.wrmeadows.com
1. Use High Density Polyethylene Tape with pressure sensitive adhesive. Minimum width 4 inches. Sealing tape shall be coated with a high tack natural rubber adhesive.
 2. Waterproofing adhesive or mastic equal to Stego Mastic shall be a high quality, long lasting, asphalt-based material and shall be applied in accordance with its manufacturer’s specification. Waterproofing adhesive shall be compatible for use with the vapor barrier and shall meet the applicable standards for the intended use. The installation contractor shall submit the product specification for Architect’s review and approval prior to using the product.
 3. References
 - a. ASTM E 1745-09 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
 - b. ASTM E 154-99 (2005) Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.
 - c. ASTM E 96-05 Standard Test Methods for Water Vapor Transmission of Materials.
 - d. ASTM F 1249-06 Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor.
 - e. ASTM E 1643-09 Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
 4. American Concrete Institute (ACI):
 - a. ACI 302.2R-06 Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.
 5. Vapor barrier must have all of the following qualities:
 - a. Permeance of less than 0.01 Perms [grains/(ft² · hr · inHg)] as tested in accordance with ASTM E 1745 Section 7.

07 10 00-3

- b. Other performance criteria:
 - i. Strength: ASTM E 1745 Class A.
 - ii. Thickness: 15 mils minimum
- 6. Quality control/assurance (Submit the following for Architect's approval):
 - a. Summary of test results as per paragraph 8.3 of ASTM E 1745.
 - b. Manufacturer's samples, literature.
 - c. Manufacturer's installation instructions for placement, seaming and penetration repair instructions.

G. Refer to Section 07 19 00 for brick and exposed CMU damp-proofing.

H. Refer to Section 03 30 00 for water-stops.

PART 3 EXECUTION

3.1 WORKMANSHIP:

- A. Horizontal expansion joint waterproofing:
 - 1. All horizontal expansion joints shall be 1/2 inch asphalt impregnated expansion joint material with "zip-strip" feature. Insulation-type material will not be acceptable. Install to provide 1/2" depth below finish surface and apply sealant as called for above.
- B. Expansion joint Filler:
 - 1. All vertical expansion joints shall be 1/2 inch asphalt impregnated expansion joint material. Not Insulation. The top 1/2 inch of material shall be omitted and joint filled with caulking as specified in Section 07 92 00. All caulking shall be installed flush with wall surface.
- C. Expandable Waterproofing:
 - 1. Follow manufacturer's instructions for installation concerning application in which waterproofing is installed.
 - 2. Prepare surfaces or substrate to receive waterproofing per manufacturer's instructions.
- D. Cavity Wall Flashing System:
 - 1. The installer shall be knowledgeable of system installation. Contractor to have product representative on site when installation begins to verify correct installation procedures are being performed.
 - 2. Contractor to inspect each installed section of flashing system and approve before covering with veneer.
 - 3. Install Flashing/Drainage System in accordance with manufacturer's installation instructions.
 - 4. Install cavity wall flashing system at base of exterior masonry cavity walls and above doors and window openings where located in exterior masonry cavity walls and where shown on drawings. Extend flashing flush with outside face of masonry veneer.
 - 5. Prior to installation of wall flashing, prime substrate where wall flashings are to be installed with product approved by manufacturer.

07 10 00-4

6. Where installed at stud walls, secure to sheathing with continuous galvanized metal or stainless steel termination bar and set in adhesive.
7. Where installed at CMU walls, secure with continuous galvanized metal or stainless steel termination bar and set in adhesive.
8. Install preformed shapes at corners, changes in elevation, etc. provide end dams and end stops where required per manufacturer's instruction. Provide preformed transitions where transitioning from grade to top of walk or drive.
9. Replace any damaged membrane prior to installation of masonry veneer.
10. Coordinate installation in veneer with weeps and drainage material.
11. At brick veneer cavity walls, grout solid below grade, turn out at bed joint at least one brick course below finished floor, or 4" (1/2 course) below finished floor for CMU veneer unless shown otherwise on drawings. Install above all window and door openings at masonry cavity walls and where shown on drawings.
12. Just prior to laying of masonry veneer, install mortar collection material.
13. Install weep joints at brick head joints, 24" o.c. (horizontally), at CMU head joints at 32" o.c. (horizontally).
14. If masonry is to receive paint, stain, or special coating, weep vents and drainage vents are not to be coated. Protect as required during coating process.

E. Below-Slab Vapor Barrier (15 mil below-slab):

1. Prepare surfaces in accordance with manufacturers instructions.
2. Installation shall be in accordance with manufacturer's instructions and ASTM E 1643. All lap joints and areas to be sealed shall be free from dirt, dust, and moisture. Sealing tape shall be applied in temperatures ranging from 41°F to 122 °F or according to its manufacturer specification. Where inconsistencies occur between the project plans and specification and ASTM E1643, the project plans and specification shall govern.
3. Unroll vapor barrier with the longest dimension parallel with the direction of the pour.
4. Lap vapor barrier over footings and seal to foundation walls or top of footings with manufacturer approved sealant.
5. Overlap joints 6 inches and seal with manufacturer's tape.
6. Seal all penetrations (including pipes) with manufacturer's pipe boot and sealant.
7. No penetration of the vapor barrier is allowed except for reinforcing steel and permanent utilities.
8. Repair damaged areas by cutting patches of vapor barrier, overlapping damaged area 6 inches and taping all four sides with tape.
9. Pipe/Conduit Boots and Penetration Sealing:
 - a) Cut a piece of vapor barrier. Width: minimum 12 inches Length: one and one-half times the pipe circumference
 - b) With scissors, cut slits half the width of the vapor barrier.
 - c) Wrap boot around pipe and tape onto pipe, completely taping the base to vapor barrier using the polyethylene tape.
 - d) Install mastic around and through groups of conduit, grade stakes or piping, which cannot be sealed by taping. Seal to vapor barrier. As an allowable alternate method of penetration sealing in lieu of taping, mastic may be used to seal around single penetrations such as pipe, conduit, floor drains, etc. Confirm that the material mastic is installed at is compatible with the mastic prior to application.

07 10 00-5

10. Seal vapor barrier to top of footings with mastic where vapor barrier terminates at perimeter or interior footings. When vapor barrier terminates at concrete or CMU walls, seal with mastic. Do not apply mastic above top of finished slab elevation.

F. Vertical Expansion Joint Filler: Protect from adjacent finish application. Prep substrate and install per Emseal instruction for application in which it is being installed.

END OF SECTION

07 10 00-6

SECTION 07 19 00

WATER REPELLENT COATING

PART I GENERAL

1.1 SUMMARY

A. Section Includes:

1. Water repellent coating to exterior concrete and masonry surfaces.

B. Related Sections:

1. Section 04 43 00 - Stone
2. Section 04 22 00 - Concrete Masonry Unit.
3. Section 04 72 00 – Custom Cast Stone

1.2 SUBMITTALS

- A. Comply with requirements of Section 01 33 00.

1.3 QUALITY ASSURANCE

- A. Applicator: Acceptable to coating manufacturer.

- B. Field Sample: Apply coating to field sample described for material water repellent is to be applied to.

1.4 ENVIRONMENTAL REQUIREMENTS

- A. Follow manufacturer's recommendations for temperature range in which coating may be applied.

- B. Comply with National Volatile Organic Compound Emission Standards for Architectural coatings, Rule 40 CFR, Part 59, established by Environmental Protection Agency for VOC limits unless stricter local regulations are required.

1.5 GUARANTEE/WARRANTY:

- A. Provide 10-year warranty for water repellent coating on brick, precast, stone, and 5 year warranty for CMU guaranteeing the installation waterproof and watertight, except for structural cracks or opening caused by settling, expansion or contraction.

- B. Warranty Period: 10 years from date of Substantial Completion. Non-prorated labor and materials.

07 19 00-1

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURER/PRODUCT

- A. Natural Stone application (Limestone, marble, travertine):
 - 1. Natural Stone Treatment WB Plus. Manufacturer ProSoCo
 - 2. Prime-A-Pell Series 663 N.S.

2.2 SUBSTITUTIONS

- A. Refer to Specification Section 01 60 00 for product substitution requests.
- B. No substitution will be accepted 10 days prior to bid date.

PART 3 EXECUTION

3.1 INSPECTION

- A. Verify joint sealants are installed and cured.
- B. Beginning of installation means acceptance of substrate.

3.2 PREPARATION

- A. Remove loose particles and foreign matter.
- B. Remove oil or foreign substance with a cleaning agent which will not affect coating.
- C. Scrub and rinse surfaces with water and let dry.
- D. Protect adjacent surfaces not scheduled to receive coating.
- E. If applied on unscheduled surfaces, remove immediately, by approved method.
- F. Protect landscaping, property, and vehicles from over spray and drift.

3.3 APPLICATION

- A. Delay work until masonry mortar is cured for seven days and weather forecast calls for hot, dry conditions. Follow manufacturer's directions for masonry cure periods before applying water repellent.
- B. Apply coating (**minimum 2 coats**) in accordance with manufacturer's instructions, using appropriate method and coverage rate.

07 19 00-2

C. Application:

1. Surface must be clean and dry.
2. Air temperature must be 50° F or higher during application.
3. Re-pointing shall be allowed to dry for 72 hrs. minimum before application.
4. All caulking and sealant work must be done prior to application and have a minimum of 12 hours of curing time or until set.
5. All alkali or efflorescence to be cleaned and/or treated prior to application.
6. Material to be applied with a 12" rundown.
7. Mask off other finish materials, aluminum storefronts, windows, glass, etc. that are not scheduled to receive water repellent coating.
8. Coverage must meet or exceed normal coverage rates stated by the manufacturer.
9. Application may be low pressure sprayer (less than 200 psi or lower as recommended by manufacturer.,

END OF SECTION

07 19 00-3

SECTION 07 21 00

INSULATION

PART 1 GENERAL

1.1 SUMMARY

- A. Furnish all labor, material, equipment, and services necessary for and reasonably incidental to complete insulation as called for below.

1.2 SUBMITTALS

- A. Comply with requirements of Section 01 33 00.

1.3 QUALITY CONTROL

- A. All packages and containers of foam plastic and foam plastic ingredients shall bear the label of an approved agency showing either the flame spread rating and smoke developed rating of the product at the thickness tested or the use for which the product has been listed.
- B. All foam plastics or foam plastic cores in manufactured assemblies used in building construction shall have a flame spread rating of not more than 75 and shall have a smoke developed rating of not more than 450 when tested in the maximum thickness intended for use in accordance with ASTM E84.
- C. The potential heat of foam plastic in any portion of the wall or panel shall not exceed 6000 BTU/sq.ft. of projected area as described by tests conducted in accordance with NFPA 259.
- D. Foam plastic insulation, exterior coatings and facings tested separately shall have a flame spread rating of 25 or less and a smoke developed rating of 450 or less as determined in accordance with ASTM E 84.
- E. Results of diversified or full-scale fire tests reflecting an end use configuration shall be submitted to the Building Official demonstrating the assembly in its final form does not propagate flame over the surface or through the core when exposed on the exterior face to a fire source.
- F. The edge or face of each piece of foam plastic insulation shall bear the label of an approved agency. The label shall contain the manufacturer's or distributor's identification, model number, serial number of definitive information describing the product or materials performance characteristics and approved agency's identification.
- G. Insulating materials, concealed as installed shall have a flame spread rating of not more than 75 and a smoke developed rating of not more than 450. Insulating materials exposed as installed shall have a flame spread rating of not more than 25 and a smoke developed rating of not more than 450.

07 21 00-1

PART 2 PRODUCTS

2.1 MATERIALS:

- A. Fiberglass batt type as manufactured by Owens Corning, Certaineed, Johns Manville or approved equal of thickness or R-value as shown on drawings, un-faced, meeting smoke and flame spread rating as specified this section. All concealed and exposed insulation to meet minimum flame spread and smoke development ratings per this specification and governing code requirements.
- B. Sound Attenuation Batts: 3 1/2" thick, un-faced fiberglass "Sonobatts", manufactured by Owens Corning, or approved alternate.
 - 1. Provide sound attenuation batts in stud walls surrounding each toilet and walls surrounding breakrooms, offices and conference rooms.
 - 2. Refer to drawings and finish schedule notes for other areas where sound attenuation batts are called for.
 - 3. Refer to 07 21 01 Mineral Wool Insulation

2.2 ACCESSORIES:

- A. Unfaced Batt Insulation Fasteners: Approved Manufacturer- Midwest Fasteners, Inc., 450 Richard St., Miamisburg, OH 45342 PH: (800) 852-8352 Fax: (937) 866-4174
Email: sales@midwestfasteners.com
 - 1. Adhesively attached spindle-type anchors with washers for batt insulation. Plate formed from perforated galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square, welded to projecting steel spindle with a diameter of 0.105 inch and length capable of holding insulation of thickness indicated securely in position with 1-1/2 inch square or diameter self-locking washers complying with the following:
 - 1. Washers formed from 0.016 inch thick galvanized steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place.
 - 2. Where anchors are located in ceiling plenums provide capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap.
 - 3. Provide spindle length as required for insulation thickness.
- B. Anchor Adhesive: Approved Manufacturer/Product: IHA-177 fastener adhesive, Midwest Fasteners, Inc. 450 Richard St., Miamisburg, OH 45342 PH: (800) 852-8352 Fax: (937) 866-4174
Email: sales@midwestfasteners.com
 - 1. Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.
- C. Raft-R-Maye 22 1/2" x 4' attic rafter baffle by Owens Corning or similar. Install per manufacturer's instructions.
- D. Two (2) layers of 6" batt unfaced insulation. Option to apply 12" of blown in fiber glass insulation.

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PART 3 EXECUTION

3.1 WORKMANSHIP

A. Batt Insulation between wood studs

Friction-fit unfaced insulation between studs after cover material has been installed on one side of the cavity. When unfaced insulation is used, and in applications without a cover material, use wire or metal straps to hold insulation in place. When faced insulation is used staple attachment flanges to face or side of stud every 8 to 12 inches to prevent gaps along the edge of the vapor retarding facing.

1. Coordinate to assure electrical conduits and water piping are held to the interior face side of the wall.
2. Unless other types of insulation is called for, install minimum 6" thick batt insulation (additional thickness as called for on drawings) above ceilings where attic space exists, and at roof where no attic space exists. Provide complete thermal seal between exterior and conditioned space.
3. Unless noted otherwise and in addition to locations called for on drawings and in specifications, batt insulation shall be installed in exterior wall studs and interior walls separating conditioned space from non-conditioned spaces (i.e. offices from warehouse). Provide the following minimum R values:
 - a. R-19 at nominal 6" stud walls.
 - b. R-11 at nominal 4" stud walls.

B. Fiberglass wall insulation and sound attenuation batts shall be friction fit, with electrical conduits and water piping held to the interior face side of the wall. When unfaced insulation is used, and in applications without a cover material or where the stud depth is larger than the insulation thickness, use wire or metal straps to hold insulation in place, maximum spacing 2'-0" o.c.

1. Install tight to sides of studs.

END OF SECTION

07 21 00-3

SECTION 07 27 26

FLUID-APPLIED WEATHER BARRIER SYSTEM

PART 1 - GENERAL

1.1 SUMMARY:

- A. Work of this section includes window and door flashing, air and water-resistive barrier membrane system, and accessory materials for application to exterior building envelope substrates unless indicated otherwise on the drawings and specifications.
- B. Related work:
 - 1. 04 22 00 - Concrete Unit Masonry
 - 2. 06 10 00 - Rough Carpentry
 - 3. 07 62 00 - Sheet Metal flashing
 - 4. 07 92 00 - Joint Sealants
 - 5. 08 11 13 - Hollow Metal Doors & Frames
 - 6. 08 43 13 - Alum Storefronts and Fixed Units
 - 7. 08 51 13 - Alum Windows

1.2 PERFORMANCE REQUIREMENTS:

- A. Performance requirements: Comply with the specified performance requirements and characteristics as herein specified.
- B. Performance description:
 - 1. The building envelope shall be constructed with a continuous, air and water-resistive barrier to control water and air leakage into and out of the conditioned space.
 - 2. Joints, penetrations and paths of water and air infiltration shall be made watertight and airtight.
 - 3. System shall be capable of withstanding positive and negative combined wind, stack and HVAC pressures on the envelope without damage or displacement.
 - 4. System shall be installed in an airtight and flexible manner, allowing for the relative movement of systems due to thermal and moisture variations.

1.3 SUBMITTALS:

- A. Product data: Submit manufacturer's product data including membrane and accessory material types, technical and test data, composition, descriptions and properties, installation instructions and substrate preparation requirements.
- B. Shop Drawings: Provide Installation Guideline Illustrations.

1.4 QUALITY ASSURANCE:

- A. Applicable standards, as referenced herein: ASTM International (ASTM).
- B. Manufacturer's qualifications: Air and water-resistive barrier systems shall be manufactured and marketed by a firm with a minimum of five (5) years experience in the production and sales of air and water-resistive barrier system. Manufacturers

07 27 26-1

proposed for use, but not named in these specifications, shall submit evidence of ability to meet all requirements specified, and include a list of projects of similar design and complexity completed within the past five years.

- C. Installer's qualifications: The installer shall demonstrate qualifications to perform the work of this section by submitting the following:
 - 1. Verification that installer has been trained by and is approved to perform work as herein specified by air and water-resistive barrier system manufacturer.
 - 2. A firm experienced in applying similar materials on similar size and scoped projects.
 - 3. Evidence of proper equipment and trained field personnel to successfully complete the project.
- D. Inspection and testing: Cooperate and coordinate with the Owner's inspection and testing agency. Do not cover installed products or assemblies until they have been inspected, tested and approved.
- E. Sole source: Obtain materials from a single manufacturer.
- F. Regulations: Provide products which comply with all state and local regulations controlling use of volatile organic compounds (VOC).
- G. Pre-installation conference: Prior to beginning installation of air and water-resistive barrier system, hold a pre-installation conference to review work to be accomplished.
 - 1. Contractor, Architect, installing subcontractor, membrane system manufacturer's representative, and all subcontractors who have materials penetrating membrane system or finishes covering membrane system shall be present.
 - 2. Contractor shall notify Architect at least seven days prior to time for conference.
 - 3. Contractor shall record minutes of meeting and distribute to attending parties.
 - 4. Agenda: As a minimum discuss:
 - a. Surface preparation.
 - b. Substrate condition and pretreatment.
 - c. Minimum curing period.
 - d. Special details and sheet flashing.
 - e. Sequence of construction, responsibilities, and schedule for subsequent operations.
 - f. Installation procedures.
 - g. Inspection procedures.
 - h. Protection and repair procedures.
 - i. Review and approval of all glazing applications.
 - 5. Applicator to prepare a mockup of system at an opening, showing all aspects of the weather barrier system.
- H. Mock-up:
 - 1 Prior to installation of the weather and air barrier system a field-constructed mock-up shall be applied to verify details and tie-ins, to demonstrate the required installation.
 - a. Construct a typical exterior wall section, 8 feet long and 8 feet wide, incorporating back-up wall, cladding, window, door frame, sill, penetrations, insulation, flashing and any other critical junction.

- b. Allow 72 hours for inspection and testing of mock-up before proceeding with weather and air barrier work.
- c. Coordinate construction of mockups to permit inspection by of air barrier before beginning installation.
- d. Approved, undamaged mock-up must remain as part of the work.

1.5 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver materials and products in labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from damage, weather, excessive temperatures and construction operations. Remove damaged material from site and dispose of in accordance with applicable regulations.
- B. Protect air and water-resistive barrier components from freezing and extreme heat.
- C. Sequence deliveries to avoid delays, and to minimize on-site storage.

1.6 PROJECT CONDITIONS:

- A. Weather conditions: Perform work only when existing and forecasted weather conditions are within the limits established by the manufacturer of the materials used.
 - 1. Apply at surface and ambient temperatures recommended by the manufacturer. See manufacturer's product data sheets for best practices.
 - 2. Proceed with installation only when the substrate construction and preparation work are complete and in condition to receive the membrane system.
 - 3. Exposure limitations: Schedule work to ensure that air and water-resistive barrier system is covered and protected from UV exposure within 180 days of installation. If air and water-resistive barrier membrane system cannot be covered within 180 days after installation, apply temporary UV protection as recommended by membrane manufacturer.

1.7 WARRANTY:

- A. Manufacturer's warranty requirements: Submit manufacturer's written warranty stating that installed air and water-resistive barrier materials are watertight, free from defects in material and workmanship, and agreeing to replace defective materials and components.
- B. Warranty period: Five years from Date of Substantial Completion.

PART 2 – PRODUCTS

2.1 MANUFACTURER:

- A. PROSOCO, Inc, 3741 Greenway Circle, Lawrence, KS 66046. Phone (800) 255-4255; Fax: (800) 877-2700. E-mail: CustomerCare@prosoco.com
- B. Approved Alternate: AirShield LMP, manufactured by W.R. Meadows (800)-342-5976

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C. Substitutions: Comply with Section 01 60 00.

2.2 R-GUARD GYPPRIME WATER BASED PRIMER FOR RAW GYPSUM BOARD EDGES:

A. PROSOCO R-GUARD® PorousPrep or equivalent by W.R. Meadows.

Description: PROSOCO R-Guard® PorousPrep seals the dry, cut edges of gypsum wall boards exposed in rough openings for windows and doors. PorousPrep brushes on easily and efficiently. Its glue-like viscosity reduces rundown and potential for spills. PorousPrep usually dries in less than 30 to 60 minutes when applied to dry surfaces. The sealed edge is a perfect surface for easy application of R-Guard Joint & Seam Filler or FastFlash.

B. Characteristics:

1. Form: light blue viscous liquid, mild odor
2. Specific Gravity: 1.02
3. pH: 9.0
4. Weight per Gallon: 8.49 pounds
5. Active Content: 16 percent
6. Total Solids: 16 percent ASTM-D-2369
7. Volatile Organic Content (VOC): less than 100 grams per Liter
8. Flash point: greater than 212 degrees Fahrenheit (greater than 100 degrees Celsius) ASTM-D-3278
9. Freeze Point: 32 degrees Fahrenheit (0 degrees Celsius)
10. Shelf Life: 2 years in tightly sealed, unopened container
11. VOC: Less than 100 grams per liter.

2.3 R-GUARD JOINT & SEAM FILLER FIBER REINFORCED FILL COAT AND SEAM FILLER:

A. Acceptable product: PROSOCO R-GUARD® Joint & Seam Filler or equivalent by W.R. Meadows.

B. Description: Joint & Seam Filler is a high modulus, gun-grade, crack and joint filler, adhesive and detailing compound that combines the best silicone and polyurethane properties. This single-component, 99% solids, fiber-reinforced, Silyl-Terminated-Poly-Ether (STPE) is easy to gun, spread and tool.

C. Characteristics:

1. Thickness: Apply according to manufacturer's instructions. See product data sheet.
2. Hardness: Shore A, 45-50 when tested in accordance with ASTM C661.
3. Water vapor permeability: Minimum 14 perms when tested in accordance with ASTM E-96.
4. Tensile strength: 225 psi when tested in accordance with ASTM D412.
5. Lap shear strength: 275 psi when tested in accordance with ASTM D1002.
6. Elongation at break: 275% when tested in accordance with ASTM D412.
7. Peel strength: 30 pli when tested in accordance with ASTM D1781.
8. Shrinkage: None.
9. Form: pale red, gun-grade sealant
10. Specific gravity: 1.40 to 1.50

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11. pH: not applicable
12. Weight per gallon: 11.8 pounds
13. Active content: 99 percent
14. Total solids: 99 percent
15. Volatile organic content (VOC): 30 grams per Liter, maximum
16. Flash point: no data
17. Freeze point: no date
18. Shelf life: 1 year in tightly sealed, unopened container

2.4 R-GUARD FASTFLASH® LIQUID-APPLIED FLASHING MEMBRANE

- A. Acceptable product: PROSOCO R-GUARD® FastFlash® or equivalent by W.R. Meadows.
- B. Description: FastFlash® is a gun-grade waterproofing, adhesive and detailing compound that combines the best of silicone and polyurethane properties. This single component, 99% solids, Silyl-Terminated-Poly-Ether (STPE) is easy to gun, spread and tool to produce a highly durable, seamless, elastomeric flashing membrane in rough openings of structural walls.
- C. Characteristics:
 1. Thickness: Apply according to manufacturer's instructions.
 2. Water vapor permeability: Minimum 14 perms when tested in accordance with ASTM E96.
 3. Water penetration (cyclical static air pressure difference): No uncontrolled water penetration when tested in accordance with ASTM E547.
 4. Hardness: Shore A, 40-45 when tested in accordance with ASTM C661.
 5. Tensile strength: 180 psi when tested in accordance with ASTM D412.
 6. Elongation at break: 400% when tested in accordance with ASTM D412.
 7. Peel strength: 25 pli when tested in accordance with ASTM D1781.
 8. Form: Brick Red, Gun Grade Sealant.
 9. Specific gravity: 1.45 to 1.60
 10. pH: not applicable
 11. Weight per gallon: 12.5 pounds
 12. Active content: 99 percent
 13. Total solids: 99 percent
 14. Volatile organic content (VOC): 30 grams per Liter, maximum
 15. Flash point: no data
 16. Freeze point: no data
 17. Shelf life: 1 year in tightly sealed, unopened container

2.5 R-GUARD SPRAY WRAP MVP (MAXIMUM VAPOR PERMEABILITY) AIR AND WATER-RESISTIVE BARRIER

- A. Acceptable product: PROSOCO R-GUARD® MVP or AirShield LMP, manufactured by W.R. Meadows
- B. Description: SPRAY WRAP MVP is a fluid-applied air and water-resistive barrier that stops air and water leakage in cavity wall, masonry veneer construction, as well as in stucco, EIFS and most other building wall assemblies. Once on the substrate, the easily applied liquid quickly dries into a rubberized, highly durable, water-resistant, vapor-permeable membrane.

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C. Characteristics:

1. Thickness: Apply in accordance with manufacturer's instructions. See product data sheet.
2. Air infiltration: Less than 0.004 cfm per square foot (0.02 L/s/sq m) when tested in accordance with ASTM E2178 or ASTM E283.
3. Air Barrier Assembly: pass when tested in accordance with ASTM E2357.
4. Water vapor permeability: Minimum 17 perms when tested in accordance with ASTM E96.
5. Structural performance: Air and water-resistive barrier system shall withstand positive and negative wind pressure loading when tested in accordance with ASTM E330.
6. Water penetration (static pressure): No uncontrolled water penetration when tested in accordance with ASTM E331.
7. Tensile strength: Greater than 15 psi or exceeds strength of substrate when tested in accordance with ASTM C297.
8. Nail Sealability: pass when tested in accordance with ASTM D1970.
9. Flexibility: pass when tested in accordance with ASTM D522.
10. Form: thin, milky batter-like mixture
11. Specific gravity: greater than 1.31
12. pH: 7.5 to 10.0
13. Weight per gallon: 12.2 pounds
14. Active content: no data
15. Total solids: 68 to 72 percent by volume, ASTM-D-2369
16. Volatile organic content (VOC): less than 18 grams per Liter
17. Flash point: not applicable
18. Freeze point: 32 degrees Fahrenheit (0 degrees Celsius)
19. Shelf life: 2 years in tightly sealed, unopened container

2.6 R-GUARD AIRDAM® AIR AND WATERPROOF SEALANT FOR WINDOWS AND DOORS:

A. Acceptable product: PROSOCO R-GUARD® AirDam®

- B. Description: AirDam® is a medium modulus sealant that combines the best silicone and polyurethane properties. This single component, 98% solids Silyl-Terminated-Poly-Ether (STPE) is easy to gun and tool in all weather conditions. AirDam® cures quickly to produce a durable, high performance, high movement elastomeric interior air sealant

C. Characteristics:

1. Hardness: Shore A, 20-25 when tested in accordance with ASTM C661.
2. Tensile strength: 110 psi when tested in accordance with ASTM D412.
3. Elongation at break: 1300% when tested in accordance with ASTM D412.
4. Peel strength: 30 pli when tested in accordance with ASTM D1781.
5. Type: Type S, Grade NS, Class 50 when tested in accordance with ASTM C920.
6. Shrinkage: None.
7. Form: heavy white paste, mild odor
8. Specific gravity: 1.3 to 1.4
9. pH: not applicable
10. Weight per gallon: 11.648 pounds
11. Active content: 98 percent
12. Total solids: 98 percent

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13. Volatile organic content (VOC): 30 grams per Liter, maximum
14. Flash point: greater than 200 degrees Fahrenheit (greater than 93 degrees Celsius)
15. Freeze point: not applicable
16. Shelf life: 1 year in tightly sealed, unopened container

- D. Backer rod: Compressible, closed cell rod stock as recommended by manufacturer for compatibility with sealant. Provide size and shape of rod to control joint depth.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Verify that surfaces and conditions are ready to accept the Work of this section. Notify design professionals in writing of any discrepancies. Commencement of the Work or any parts thereof shall mean acceptance of the prepared substrates.
- B. All surfaces must be sound, clean and free of grease, dirt, excess mortar or other contaminants. Fill or bridge damaged surfaces, voids or gaps larger than one-half (1/2) inch with mortar, wood, metal, sheathing or other suitable material, as necessary. Fill voids and gaps measuring one-half (1/2) inch or less with R-GUARD Joint & Seam Filler as necessary to ensure continuity.
 1. Surfaces to receive R-GUARD MVP, and VB may be dry or damp. Do not apply to surfaces which are sufficiently wet to transfer water to the skin when touched. Surfaces must be protected from rain for 2 hours following application.
 2. Surfaces to receive FastFlash[®], Joint & Seam Filler, and AirDam[®] may be dry, damp or wet to the touch. Brush away any standing water which may be present before application. The products will tolerate rain immediately after application
- C. Where curing materials are used they must be clear resin based without oil, wax or pigments
- D. Condition materials to room temperature prior to application to facilitate extrusion and handling.
- E. Prior to installation of veneer at cavity wall construction or metal wall panels with CMU and/or exterior gypsum board sheathing backup, apply fluid-applied moisture barrier on all walls where concealed behind masonry veneer, metal wall panels, or similar material where a cavity is created unless called out otherwise.

3.2 SURFACE PREPARATION:

- A. Air, water-resistive and waterproofing membrane and accessories may be applied to green concrete 16 hours after removal of forms.
- B. Refer to manufacturer's product data sheets for requirements for condition of and preparation of substrates.
 1. Surfaces shall be sound and free of voids, spalled areas, loose aggregate and sharp protrusions.
 2. Remove contaminants such as grease, oil and wax from exposed surfaces.
 3. Remove dust, dirt, loose stone and debris.
 4. Use repair materials and methods that are acceptable to manufacturer of the air and water-resistive barrier system.

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5. The PROSOCO R-GUARD® product line includes several options for preparing structural walls to receive the primary air and water resistive barrier. Refer to manufacturer's product data sheets and R-GUARD Installation Guidelines for additional information.

C. Exterior sheathing:

1. Ensure that sheathing is properly installed with ends, corners and edges properly fastened.
2. Mechanical fasteners used to secure sheathing boards or penetrate sheathing boards shall be set flush with sheathing, fastened and spotted with R-GUARD Joint & Seam Filler and fastened into solid backing.
3. Consolidate and seal the cut edges of gypsum wall boards exposed in rough openings for windows and doors at corners. The treated edge provides a suitable surface for application of R-GUARD Joint & Seam Filler fiber-reinforced coat and seam treatment.

D. Masonry and concrete substrates:

1. Mortar joints on concealed areas where fluid applied cavity wall weather barrier is to be applied must be fully filled with no voids, holes, or cracks, struck flush with the face of CMU.
2. Mechanically remove loose mortar fins, mortar accumulations and protrusions, and debris.

3.3 INSTALLATION OF JOINT TREATMENT(PREPARE):

- A. Before applying complete weather barrier system, read "Preparation" and "Safety Information" sections in the Manufacturer's Product Data Sheet for PROSOCO R-GUARD® MVP. Refer to the Product Data Sheet for additional information about application.
- B. Apply R-GUARD Joint & Seam Filler for seams, joints, cracks, gaps, primed rough gypsum edges at sheathing, rough openings:
 1. Fill or repair cracks larger than one-half inch.
 2. Fill surface defects and over driven fasteners with R-GUARD Joint & Seam Filler.
 3. Using a dry knife, trowel or spatula, tool and spread the product. Spread one inch beyond seam at each side to manufacturer's recommended thickness. See product data sheet.
 4. Allow to skin before installing other waterproofing or air barrier components.
 5. Apply in accordance with manufacturer's Application Guideline illustrations.

3.4 R-GUARD FASTFLASH® FLASHING AT WINDOWS, DOORS, OPENINGS AND PENETRATIONS (PREPARE):

- A. Apply R-GUARD FastFlash® over surfaces prepared with R-GUARD Joint & Seam Filler to seal and waterproof rough openings:
 1. Apply a thick bead of R-GUARD FastFlash® over any visible gaps in the prepared rough opening.
 2. Immediately press and spread the wet product into gaps.
 3. Allow treated surface to skin.
 4. Starting at the top, apply a thick bead of R-GUARD FastFlash® in a zigzag pattern to the structural wall surrounding the rough opening.

5. Spread the wet product to create an opaque, monolithic flashing membrane which surrounds the rough opening and extends 4 to 6 inches over the face of the structural wall. Apply and spread additional product as needed to create an opaque, monolithic flashing membrane free of voids and pin holes.
6. Apply additional product in a zigzag pattern over a structural framing inside the rough opening.
7. Apply R-GUARD FastFlash® within temperature and weather limitations as required by manufacturer.
8. Apply R-GUARD FastFlash® to perimeters, sills and adjacent sheathing and building face, in accordance with manufacturer's product data sheet and R-GUARD Installation Guidelines illustrations.
9. Extend flashing onto building face 4 to 6 inches.
10. Install preparation products in accordance with manufacturer's Application Guideline illustrations.

3.5 R-GUARD AIR & WATER-RESISTIVE BARRIER INSTALLATION (PROTECT)

- A. Apply appropriate R-GUARD air and water-resistive barrier to a clean, dry substrate within temperature and weather limitations as required by manufacturer.
 1. Apply to recommended thickness. Proper thickness is achieved when coating is opaque.
 2. Allow product to cure and dry.
 3. Inspect membrane before covering. Repair any punctures, translucent or damaged areas by applying additional material.
 4. Specifier Note: If air or surface temperature exceed 95 degrees Fahrenheit (35 degrees Celsius), apply to shaded surfaces and before daytime air and surface temperatures reach their peak.
 5. On CMU wall construction back roll as necessary to ensure there are no pinholes, voids or gaps in the membrane.

3.6 R-GUARD FLASHING TRANSITIONS (TRANSITION)

- A. Apply R-GUARD Joint & Seam Filler and R-GUARD FastFlash® as a liquid flashing membrane to waterproof the transitions in rough opening and between dissimilar materials.
 1. Fill any voids between the top of the flashing leg and the vertical wall with R-GUARD Joint & Seam Filler. Tool to direct water from the vertical wall to the flashing.
 2. Apply a generous bead of FastFlash® to the top edge of the flashing leg.
 3. Spread the wet products to create a monolithic "cap-flash" flashing membrane extending 2 inches up the vertical face of the structural wall and 1 inch over the flashing membrane extending. Apply additional product as needed to achieve a void and pinhole free surface. This "liquid termination bar" helps secure the flashing and ensures positive drainage from the wall surface to the flashing.
 4. Allow treated surfaces to skin before installing other wall assembly, waterproofing or air barrier components.

3.7 R-GUARD AIRDAM® AIR AND WEATHER BARRIER SEALANT FOR WINDOWS AND DOORS INSTALLATION

- A. Install R-GUARD AirDam® with professional grade caulking gun in continuous beads without air gaps or air pockets.
 1. Apply R-GUARD AirDam® to a clean, dry or damp surface

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2. Install Backer rod: Compressible, closed cell rod stock as recommended by manufacturer for compatibility with sealant. Provide size and shape of rod to control joint depth
3. Install AirDam® to provide uniform, continuous ribbons without gaps or air pockets, with complete wetting of the joint bond surfaces.
4. Tool sealant immediately to ensure complete wetting of joint bond surface and to produce a smooth, concave joint profile flush with the edges of the adjacent surfaces. Where horizontal and vertical surfaces meet, tool sealant to create a slight cove so as to not trap moisture or debris.
5. Do not allow materials to overflow onto adjacent surfaces. Prevent staining of adjacent surfaces.
6. Remove excess and misplaced materials as work progresses. Clean the adjoining surfaces to remove misplaced materials, without damage to adjacent surfaces or finishes.

3.7 CURING AND DRYING

- A. Complete drying times vary with temperature, humidity and surface conditions. Protect from rain or freezing until completely dry. At 70°F (21°C) and 50% relative humidity, R-GUARD MVP dries to touch and can be over coated in 2-4 hours.

END OF SECTION

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SECTION 07 46 19

PREFORMED STEEL SIDING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Requirements for the installation of preformed metal siding, soffit, and fascia.

1.2 RELATED SECTIONS

- A. Section 01 11 00: Summary of Work
- B. Section 01 33 00: Submittal Procedures
- C. Section 01 35 00: LEED Requirements
- D. Section 01 61 00: Common Product Requirements
- E. Section 01 78 00: Closeout Submittals
- F. Section 01 74 11: Cleaning
- G. Section 05 41 00: Structural Metal Stud Framing
- H. Section 06 10 00: Rough Carpentry
- I. Section 07 26 00: Air Barriers
- J. Section 07 62 00: Sheet Metal Flashing and Trim
- K. Section 07 92 00: Joint Sealing
- L. Section 09 22 16: Non-Structural Metal Framing

1.3 REFERENCES

- A. American Society of Testing and Materials International
 - 1. ASTM B117-16, Standard Method of Salt Spray (Fog) Testing.
 - 2. ASTM 2244-15a, Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates.
 - 3. ASTM D522/D522M-13, Standard Test Methods for Mandrel Bend Test of Attached Organic Coating.

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4. ASTM D968-15, Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasion.
5. ASTM D1005-95/2013), Standard Test Method for Measurement of Dry-Film Thickness of Organic Coatings Using Micrometer.
6. ASTM D1308-02(2013) Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Finishes.
7. ASTM D7091-13, Standard Test Method for Non-destructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to Ferrous Metals and Nonmagnetic, Nonconductive Coatings Applied to Non-Ferrous Metals.
8. ASTM D523, Standard Test Method for Specular Gloss.
9. ASTM D2247-15, Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.
10. ASTM D2369-10(2015) e1, Test Method for Volatile Content of Coatings.
11. ASTM D2794-93(2010), Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
12. ASTM D2832-92(2016), Standard Guide for Determining Volatile and Non-volatile Content of Paint and Related Coatings.
13. ASTM D3359-09e2, Standard Test Methods for Measuring Adhesion by Tape Test.
14. ASTM D3363-05(2011) e2, Standard Test Method for Hardness by Pencil Test.
15. ASTM D4214-07(2015), Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films.
16. ASTM D5116-10, Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products.

1.5 SUBMITTALS

- A. Product Data: Submit manufacturers printed literature, specifications, and data sheet in accordance with Section 01 33 00.
 1. Submit two copies of WHMIS MSDS - Material Safety Data. Indicate VOCs for caulking materials during application and curing.
- B. Shop Drawings:
 1. Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
 2. indicate dimensions, profiles, attachment methods, schedule of wall elevations, trim and closure pieces, [soffits, fascia, metal furring, and related work].
- C. Samples:
 1. Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
 2. Submit duplicate 300 mm samples of siding material of color and profile specified.
- D. Manufacturer's Instructions:
 1. Submit manufacturer's installation instructions.

E. Certifications:

1. Provide laboratory reports or certifications showing compliance with specified tests and standards.

1.6 CLOSEOUT DOCUMENTS

- A. Operation and Maintenance Data: Submit manufacturer's printed operation and maintenance literature in accordance with Section 01 78 00 – Closeout Submittals. Submit [2] copies for inclusion in the project O&M manual, [4] weeks prior to substantial performance of the work.
- B. Warranty Documentation: Submit manufacturer's warranty documentation in accordance with Section 01 78 00 – Closeout Submittals. Submit [2] copies for inclusion in the project O&M manual, [4] weeks prior to substantial performance of the work.
- C. Record Documentation: Submit recorded documentation in accordance with 01 78 00 – Closeout Submittals. Submit [2] copies for inclusion in the project record documents, [4] weeks prior to substantial performance of the work.
- D. Sustainable Design Closeout Documentation: Submit sustainable design documentation in accordance with 01 78 00 – Closeout Submittals. Submit [2] copies, [4] weeks prior to substantial performance of the work.

1.7 QUALITY ASSURANCE

- A. Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
- B. Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- C. Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.
 1. Convene pre-installation meeting two (2) week prior to beginning on-site installation with install contractor's representative in accordance with Section 01 32 16.06 - Construction Progress.
- D. Schedule - Critical Path Method (CPM))] [Section [01 32 16.07 - Construction Progress Schedule - Bar (GANTT) Chart]] to:
Verify project requirements.
 1. Review installation and substrate conditions.
 2. Co-ordination with other building sub-trades.
 3. Review [manufacturer's] installation instructions and warranty requirements.
- E. Manufacturer: All products and components from same manufacturer/supplier.

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F. Mock-ups: construct in accordance with Section 01 45 00 - Quality Control & to requirements supplemented as follows:

1. Provide mock-up for evaluation of surface finishes and workmanship.
2. Provide initial production units for job-site assembly with other materials for review and approval.
3. Co-ordinate type and location of mock-ups with project requirements.
4. Accepted units will be used as the standard for acceptance of production units.
5. Remove and replace units, which are not accepted.
6. Do not proceed with remaining work until workmanship, color, and finish are reviewed and approved by Architect.
7. Refinish mock-up area as new.
8. Approved mock-up may [not] remain as part of finished work.
9. Remove mock-up and dispose of materials when no longer required and when directed by Architect.

1.8 EXTENDED WARRANTY

- .1 Provide a written guarantee, signed and issued in the name of the owner, covering the metal cladding/cladding material for 40 (fourty) years from the date of Substantial Completion.
- .2 The manufacturer's warranty is limited to replacement of defective material only, rather than installation of the same. Faulty installation shall be corrected by the installing contractor. The warranty required herein is the sole remedy against the manufacturer and there are no other implied warranties. In any event, the manufacturer shall not be liable for incidentals or consequential damages.

PART 2 PRODUCTS

2.1 CLADDING MANUFACTURER

A. LUX Architectural Products, Inc.; 12603 – 123 Street N.W., Edmonton, Alberta T5L 0H9; (800) 540-0589; www.luxarpro.com

B. STEEL CLADDING AND COMPONENTS

Panel Types:

MP-1

1. LUX LuxLap 6" V-groove 24 ga
2. Finish Paint : 3-Coat PVDF 70 percent resin
3. Color : Custom color to match SW 2861 Avocado, Glacier White (closure trim)

MP-2

1. LUX Board + batten, 24 ga
2. Finish Paint: 3-Coat PVDF 70 percent resin
3. Color: Colonial Red, Glacier White (closure trim)

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- C. Accessories: Except as indicated as work of another specification section, provide components required to complete metal wall panel system, including trim and copings, match material/finishes of preformed panels.
- D. Approved alternate metal panels:
 - a. MP-1, Norwood by MBCI, 5-3/8" width, 24GA. Color, Custom color to match SW 2861 Avocado.
 - b. Or approved alternate
- E. Provide mockup. See drawings for mockup design.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- A. Compliance: comply with manufacturers' written data, including product technical bulletins, product installation instructions, and data sheets.
- B. Install Cladding and components in accordance with manufacturer's installation manuals and videos.

3.2 EXAMINATION

- A. Confirm acceptability of wall sheathing of soundness, measurement, and flatness.
- B. Verify that building framing members are ready to receive siding system.

END OF SECTION

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SECTIONS 07 46 21

PREFORMED METAL WALL AND SOFFIT PANEL SYSTEM

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Preformed, pre-finished, metal soffit panels.

1.2 RELATED SECTIONS:

- A. Section 06 10 00 – Rough Carpentry

1.3 SYSTEM DESCRIPTION

- A. Performance Requirements:
 - 1. Wind Load: Refer to Structural Drawings.
 - 2. Deflection: L/180.

1.4 SUBMITTALS

- A. Product Data: Submit per requirements of Section 01 33 00 through Construction Manager to Architect.
 - 1. Include manufacturer's descriptive literature for each system component, including connection and attachment details.
 - 2. Include finish information and color samples.

1.5 FINISH WARRANTY

- A. Provide a 20 year manufacturer's Kynar 500 finish warranty. Submit warranty information with submittals and provide certificate at closeout.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Soffit Panels
 - 1. FW-12 Panel by Berridge. Provide vents where call for on drawings
 - 2. Approved alternate

2.2 MATERIALS AND COMPONENTS

- A. Soffit Panels:
 - 1. Material: 24-gauge galvanized steel, 1.25 oz. coating (G90).
 - 2. Concealed anchorage.

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3. Continuous length across width of soffit.
 4. Type: perforated or solid type panels as called for on drawings.
- B. Accessories: Prefabricated corners, trim, metal closures, and other units necessary to fabricate and install panel system as indicated on drawings.
- C. Miscellaneous Materials: Provide manufacturer's standard fasteners, sealants, adhesives, or other materials required for system installation.
- D. Panel End Closures:
1. Provide metal closures only. Match wall panel profile & finish closures are installed in. No foam closures are to be used. Secure per manufacturer's instructions. Seal completely around perimeter of each closure to provide weathertight fit.

2.3 FABRICATION

- A. Fabricate panels to fit application and provide watertight installation. Include provision for expansion control among system components and between panel system and adjacent dissimilar materials.
- B. Each panel shall be one continuous length. Laps or joints will not be permitted.
- C. Components shall be fabricated to the greatest extent possible in the factory, ready for field assembly.

2.4 FINISH

- A. Two-coat Kynar 500 finish system:
1. One coat epoxy base primer.
 2. One coat 70% Kynar 500 coating; Fluoropon by DeSoto or Duranar by PPG.
- B. Colors:
1. Panel color(s) to be selected from a minimum of eight (8) standard colors.

PART 3 EXECUTION

3.1 DELIVERY AND STORAGE

- A. Material shall be delivered to the site in a dry and undamaged condition and unloaded per the manufacturer's instructions. The installer shall inspect materials for damage and stains upon their arrival at the site. Materials shall be stored out of contact with the ground in weathertight coverings to keep them dry per the manufacturer's recommendations. Storage accommodations shall provide air circulation and protection from surface staining.

3.2 INSPECTION

- A. The installer shall examine the building to verify that the structure is ready for panel installation.
- B. All structural supports shall be in place and all sag rods, diagonal bracing and connections shall be tightened before work proceeds.
- C. Field-check dimensions and check support alignment with a taut string or wire; support misalignment will cause panel "oil-canning".
- D. Do not proceed until unsatisfactory conditions are corrected.

3.3 INSTALLATION AND ERECTION

Install metal panels, fasteners, trim and related items in conformance with approved drawings and performance requirements as set by manufacturer.

- A. Protect installed panels from abuse by other trades. The general (installing) contractor shall be responsible for protecting the panels from wet cement, plaster, painting operations, etc. The installer shall provide walk boards in heavy roofing traffic areas to prevent damage to panels.
- B. Isolate panel system from dissimilar metals or corrosive substrates using bituminous coating, two coats.
- C. Provide and install soffit panels on minimum 20 gauge, 7/8" galvanized metal hat channels, spaced at 24 inches (max.) O.C. fasteners must be concealed. Refer to Section 09 22 16.

3.4 DAMAGED MATERIAL AND CLEANING

- A. Replace damaged panels and other components of work which cannot be repaired by finish touch-up or similar minor repair.
- B. To prevent rust staining, remove immediately from finished surfaces any filings caused by drilling or cutting.
- C. Wipe down each area after erection is complete for final acceptance.

END OF SECTION

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SECTIONS 07 46 23

CEDAR WOOD EXTERIOR SOFFIT

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Tongue and Groove exterior soffit.

1.2 RELATED SECTIONS

- A. Section 06 10 00 - Rough Carpentry

1.3 SUBMITTALS

- A. Comply with requirements of Section 01 33 00.
- B. Product Data: Submit through General Contractor to Architect.
 - 1. Include manufacturer's descriptive literature for preparation instructions, storage and handling requirements, installation methods, and connection and attachment details.
 - 2. Verification Samples: For each finish product specified, three samples representing actual product with finished color and texture.

1.4 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.5 SUPPLEMENTAL MATERIALS

- A. Fasteners provided by Simpson Strong-Tie®. Conform to requirements set forth by this section.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Delta Millworks, which is located at 4701 East 5th St. Austin, Texas 78702. Phone: 512-385-1812. Email: info@deltamillworks.com. Site: <https://deltamillworks.com/>
- B. Substitutions: Not permitted.
- C. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00.

2.2 TONGUE-AND-GROOVE EXTERIOR SOFFIT

A. Wood Species: Western Red Cedar

1. Nominal Size: 1" x 6"
2. Moisture Content: 12-15%
3. Grade: A & BTR VG
4. Finish: Prefinished
5. Flame Spread: Class B

2.3 FASTENERS

A. Simpson Strong-Tie® Siding Nails

1. Metal: 304 Stainless Steel
2. Length: 2-1/2"
3. Installation: Blind-fastened (Refer to Delta Millworks Handling & Installation Guidelines)

PART 3 EXECUTION

3.1 DELIVERY, STORAGE, AND HANDLING

- A. The installer shall inspect materials for damage and stains upon their arrival at the site and assure that specified products have been received.
- B. Materials shall be stored out of contact with the ground in weather-tight coverings to keep them dry per the manufacturer's recommendations. Storage accommodations shall provide air circulation and protection from surface staining and be safely away from construction traffic.
- C. Keep materials clearly separated and identified with grade marks legible. Keep damaged material identified as damaged and stored separately.

3.2 INSPECTION

- A. Coordinate work with related trades. Allow installation of related work to avoid cutting and patching.
- B. The installer shall examine the building to verify that the structure is ready for panel installation. Do not begin installation until substrates have been properly constructed and prepared.
- C. If substrate preparation is the responsibility of another installer, notify Architect in writing of unsatisfactory preparation before proceeding.
- D. Do not proceed until unsatisfactory conditions are corrected.

3.3 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Scribe and cope boards for accurate fit.
- D. Select boards of longest possible lengths. Discard boards that are warped, twisted, bowed, crooked or otherwise defective.

3.4 INSTALLATION AND ERECTION

- A. Install in conformance with approved drawings and performance requirements as set by manufacturer.
- B. Protect installed panels from abuse by other trades. The general contractor shall be responsible for protecting the panels from wet cement, painting operations, etc. The installer shall provide walk boards in heavy roofing traffic areas to prevent damage to panels.

3.5 DAMAGED MATERIAL AND CLEANING

- A. Touch-up, repair or replace damaged products before Substantial Completion.
- B. Clean cedar in accordance with the manufacturer's recommendations.
- A. Wipe down each area after erection is complete for final acceptance.

3.6 MAINTENANCE

- A. Explain proper maintenance procedures to owner or owner's representative at project closeout.
- B. The use of pressure washers is not recommended.

END OF SECTION

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SECTION 07 46 46 – Alternate #2

FIBER CEMENT SIDING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Fiber Cement Siding panels.
- B. Accessories and trim.

1.2 RELATED SECTIONS

- A. Section 07 10 00 – Waterproofing and Damp proofing: Liquid-applied moisture/air barrier
- B. Section 07 27 19 – Weather Resistant Barrier
- C. Section 09 29 00 - Drywall: Framing and Sheathing.
- D. Section 07 62 00 – Metal Flashing & Trim
- E. Section 07 92 00 - Joint Sealers.
- F. Section 09 91 00 - Paints and Coatings: Field painting.

1.3 REFERENCES

- A. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants; 1998.
- B. ASTM C 1185 - Standard Test Methods for Sampling and Testing Non-Asbestos Fiber-Cement Flat Sheet, Roofing and Siding Shingles, and Clapboards; 1999.
- C. ASTM C 1186 - Standard Specification for Flat Non-Asbestos Fiber Cement Sheets; 1999.
- D. ASTM E 72 - Standard Test Methods of Conducting Strength Tests of Panels for Building Construction; 1998.
- E. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 1999.
- F. ASTM E 96 - Standard Test Methods for Water Vapor Transmission of Materials; 1995.

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- G. ASTM E 136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; 1999.
- H. ASTM E 228 - Standard Test Method for Linear Thermal Expansion of Solid Materials With a Vitreous Silica Dilatometer; 1995.
- I. ASTM G 26 - Standard Practice for Operating Light-Exposure Apparatus (Xenon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials; 1996.

1.4 SUBMITTALS

- A. Make submittals under provisions of Section 01 33 00.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods, including nailing patterns.
 - 4. Applicable model code authority evaluation report (ICBO, BOCA, CCMC, etc.)
- C. Siding manufacturer's requirements for vapor retarders, primer, paint, etc., to be installed by others.
- D. Maintenance and periodic inspection recommendations.

1.5 QUALITY ASSURANCE

- A. Installer: Provide installer with not less than three years of experience with products similar to those specified.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store products off the ground, on a flat surface, and under a roof or separate waterproof covering.

1.7 WARRANTY

- A. Provide Manufacturer's 2-year "Sure-Start" program and manufacturer's 50-year product warranty.
- B. Register manufacturer's warranty, made out in Owner's name, with copy to Owner.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. CertainTeed Corporation, Siding Products Group, P.O. Box 860, Valley Forge, Pennsylvania 19482. ASD. Tel: (800) 233-8990
- B. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00.

2.2 PANELS

- A. Fiber Cement Board Panels - General: Cement and cellulose fiber formed under high pressure into boards with integral surface texture; complying with ASTM C 1186 Type A Grade II; machined edges; for nail attachment.
 - 1. Surface Burning Characteristics: Flame spread index of 0, smoke developed index of 6, maximum; when tested in accordance with ASTM E 84 (Class I/A).
 - 2. Flammability: Noncombustible, when tested in accordance with ASTM E 136.
 - 3. Flexural Strength: At least 1450 psi (10 MPa) when in equilibrium condition, and at least 1015 psi (7 MPa) when in wet condition, tested in accordance with ASTM C 1185.
 - 4. Coefficient of Thermal Expansion: Less than 1×10^{-5} /inch/inch/degree F (0.5×10^{-5} /degree C), when tested in accordance with ASTM E 228.
 - 5. Water Vapor Transmission: Less than 7.0 perm-inch (10 ng/(Pa s m), when tested in accordance with ASTM E 96.
 - 6. Freeze Thaw Resistance: At least 80 percent flexural strength retained, when tested in accordance with ASTM C 1185.
 - 7. UV Resistance: No cracking, checking, or erosion, when tested for 2000 hours in accordance with ASTM G 26.
 - 8. Water Tightness: No water droplets on underside, when tested in accordance with ASTM C 1185.
- B. 5" Cedar Lap Siding
CertainTeed WeatherBoards FiberCement Siding Shapes.
 - 1. Thickness: 5/16 inch (8 mm), nominal x 12".
 - 2. Finish: Factory applied solid color as follows:
 - a. To match SW Avocado SW2831 (field color)
 - b. To match Antique White SW 6119 (trim)
- C. 5" Cedar Impressions Sawmill
 - 1. Finish: factory applied solid color as follows:
 - a. To match SW Red Barn 7591
 - b. To match Antique White SW 6119 (trim)

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2.3 ACCESSORIES

- A. Trim: Fiber cement board, cut from siding material; cut edges primed.
- B. Provide the following trim:
 - 1. Starter strip for lap siding.
 - 2. Outside corners, butted to siding.
 - 3. Outside corners, overlapping siding.
 - 4. Miscellaneous trim as needed for complete installation.
- C. Sealant: Paintable, 100 percent acrylic latex caulk complying with ASTM C 920.
- D. Sheet Metal Flashing: Minimum 24 gauge prefinished steel. Refer to Section 07 62 00.
- E. Nails: Length as required to penetrate minimum 1-1/4 inch (32mm) into solid backing; hot-dipped galvanized or stainless steel.
- F. Building Paper: Tyvek Commercial Wrap Weather Barrier or approved alternate.
- G. Field Finish Paint: 100 percent acrylic latex as specified in Section 09 91 00.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Prior to commencing installation, verify governing dimensions of building and condition of substrate.

3.2 PREPARATION

- A. Examine, clean, and repair as necessary any substrate conditions that would be detrimental to proper installation.
- B. Do not begin installation until unacceptable conditions have been corrected.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions and drawing details.
 - 1. Read warranty and comply with all terms necessary to maintain warranty coverage.
 - 2. Install in accordance with conditions stated in model code evaluation report applicable to location of project.
 - 3. Use trim details indicated on drawings.
 - 4. Touch up all field cut edges before installing.
 - 5. Pre-drill nail holes if necessary to prevent breakage.

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6. Provide a mockup of lap siding, shake siding, and trim on stone wainscot for owner approval.

- B. Over Wood and Wood-Composite Sheathing: Fasten siding through sheathing into studs. Install weather resistant barrier.
- C. Over Gypsum Board Sheathing: Read and comply with sheathing manufacturer's recommendations.
 - 1. For sheathing of 1 inch (25 mm) thickness or less, nail through sheathing into studs using correspondingly longer nails. Install weather resistant barrier.
- D. Over Masonry Walls: Apply liquid-applied moisture air barrier onto masonry walls. Install furring strips of adequate thickness to accept full length of nails and spaced at 16 inches (406 mm) on center.
- E. Over Steel Studs: Minimum 20 gauge steel, 3 5/8" (92 mm) C-studs. Use 1-5/8" (41 mm) long, #8-18 x 3/8" HD self-tapping, corrosion-resistant ribbed bugle head screws. Attach siding at each stud insuring that at least 3 screw threads penetrate the studs.
- F. Diagonal Siding: Follow manufacturer's instructions.
- G. Allow space between both ends of siding panels that butt against trim for thermal movement; seal joint between panel and trim with exterior grade sealant.
- H. Joints in Vertical Siding: Install Z-flashing in horizontal joints between successive courses of vertical siding.
- I. Install sheet metal flashing above door and window casings and horizontal trim in field of siding.
- J. Do not install siding less than 6 inches (150 mm) from surface of ground nor closer than 1 inch (25 mm) to roofs, patios, porches, and other surfaces where water may collect.
- K. After installation, seal all joints except lap joints of lap siding. Seal around all penetrations. Paint all exposed cut edges.
- L. Finish Painting: Specified in Section 09 91 00.

3.4 CLEANING

- A. At completion of work, remove debris caused by siding installation from project site.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

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SECTION 07 61 13

PREFORMED METAL ROOFING

PART 1 GENERAL

1.1 SCOPE:

- A. Structural metal roofing panels, downspouts, flashing, accessories, anchors and other miscellaneous hardware required for erection.

1.2 RELATED SECTIONS

- A. Section 07 62 00: Sheet Metal Flashing & Trim
- B. Section 07 62 10: Prefinished Metal Gutters, and Downspouts

1.3 QUALITY ASSURANCE

- A. SMACNA: "Architectural Sheet Metal Manual", Sheet Metal and Air Conditioning Contractors National Association, Inc. LGSI: "Light Gage Structural Institute"
- B. AISC: "Steel Construction Manual", American Institute of Steel Construction.
- C. AISI: "Cold Form Steel Design Manual", American Iron and Steel Institute (1996 Edition).
- D. UL580: "Tests for Uplift Resistance of Roof Assemblies", Underwriters Laboratories, Inc.
- E. UL2218: Class 4 Impact Resistance Rating
- F. ICBO: Evaluation Report No. ER-5409. ICBO Evaluation Service, Inc.
- G. ASTM E 1592-95: "Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference", American Society for Testing and Materials.
- H. ASTM E 1680-95: "Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems, American Society for Testing and Materials.
- I. ASTM E 1646-95: "Standard Test Method for Water Penetration Through Exterior Metal Roof Panel Systems, American Society for Testing and Materials.
- J. ASTM E 1514-93: "Standard Specification for Structural Standing Seam Steel Roof Panel Systems", American Society for Testing and Materials.

1.4 DESIGN:

- A. The roof construction shall carry an Underwriter's laboratories construction (uplift) classification of not less than Class 1-90.
- B. The roof system shall be designed for a live load of not less than 20 psf, 19 psf uplift wind pressure, and allowable deflection of L/240.

1.5 SUBMITTALS:

- A. Comply with requirements of Section 01 33 00.
- B. Product Data: Submit manufacturer's product data describing product. Include data on materials, finishes, accessories, fasteners, and design loading.

1.6 GUARANTEE

- A. Installer to guarantee workmanship, durability, and weather-tightness of metal roofing system, including flashings and other associated items of the metal roofing system for a period of **Five (5) years**. Refer to form at end of this section.
- B. Finish shall be guaranteed for a period of **Twenty (20) years** by the roofing manufacturer.
- C. Associated metal flashings sheet metal work shall be covered under installer's weathertightness and finish warranty period.

1.7 ROOFING MANUFACTURER INSPECTION

- A. Final inspection by roofing manufacturer's representative is mandatory prior to substantial completion. **Architect to be notified a minimum of 24 hours prior to manufacturer's inspection and be performed in his presence.**
- B. Written proof of final inspection by roofing manufacturer's representative is to be included in closeout documents.
- C. **It will be mandatory** that the final roof inspection report containing items to be corrected be sent to Architect for his records.
- D. Upon acceptance through inspection, a weathertightness warranty will be issued and begin for a five (5) year period for the total system. **No exceptions.**

1.10 PRE-ROOFING MEETING AGENDA

- A. Verifying roof type and insulation thickness with roofing sub.
- B. Warranty:
 - 1. Installer to guarantee workmanship, durability, and weather-tightness of metal roof system, including flashings and other associated items of the metal roof system for a period of five (5) years.
- C. Manufacturer's scheduled inspection for warranty-Notification of Architect
 - 1. Warranty period does not start until date of Substantial Completion
 - 2. Distribution of inspection review to Architect

D. Areas of concern:

1. Installation of welded sub-flashing pieces at parapet corners
2. Installation of crickets at equipment curbs
3. Flashing at equipment curbs.
4. Sealing of roof penetrations.
5. Keeping roof clean after roofing is installed (trash, screws, nails, etc.)

PART 2 PRODUCTS

2.1 MANUFACTURER/PRODUCTS

A. Panels: ('Super-Lok' Panel by MBCI as guideline)

1. Metal: Roll-formed, ASTM A653, hot-dip galvanized steel panels, 24 gage, standing seam.
2. Size: Nominal 2" including seam deep x 16" o.c., continuous length eave to ridge or in longest lengths possible.
3. Seam: 2" high seamed together by means of a power closure machine.
4. Panel Attachment: Concealed fastener. Attach to deck or purlin as required to obtain UL Classification of Class 90 uplift rating. Use articulating clips, providing thermal expansion or contraction, correcting for out-of-plane sub-framing alignment to a maximum of 7 degrees (UL-90 rated - Underwriters Laboratories).
5. Metal roof system using "snap-seam" system, which does not require a powered closure machine, shall not be considered.

B. The concealed system shall provide minimal through penetration of the exposed roofing surface and allow the roof covering to move independently of any differential thermal movement by the structural framing system. The standing seams shall have a factory-applied, non-hardening sealant, and the seams shall be continuously locked or crimped together by mechanical means during erection. Roof panels with lap-type side (longitudinal) joints and exposed structural fasteners shall not be considered acceptable. Panels are to be supplied (in longest possible lengths to minimize splice points) in continuous lengths equal to that required for coverage from ridge to eave without splicing or overlaps. Ridge assembly shall be designed to allow roof panels to move with expansion and contraction.

C. Roof panels shall be fastened to the plywood decking with a concealed clip or backing device of steel having a protective metallic coating. Through penetration of the roofing surface by exposed fasteners shall occur only at terminal locations of the roof panels. Such fasteners shall be stainless steel or aluminum screws, bolts or rivets, with weather-seal washers. Carbon steel shank fasteners with vinyl heads shall be acceptable also.

D. If shown on drawings, provide ventilators where shown, complete with hardware, closure, and all structural supporting members necessary.

2.3 PANEL END CLOSURES:

- A. Provide metal closures only. Match roof panel profile & finish closures are installed in. No foam closures are to be used. Secure per manufacturer's instructions. Seal completely around perimeter of each closure to provide weathertight fit.

2.4 ACCESSORIES:

- A. Prefabricated wall flashing, counterflashing, concealed fasteners, and other accessories indicated, or standard manufacturer's items necessary for installation.

2.5 ROOF JACKS AND CURBS:

- A. Openings, 8 inches or smaller, may be flashed and sealed to the roof panel by jacks, provided complete structural support and weathertightness is maintained. Angle or channel members shall be used to head off all flue and other similar penetrations. Flashing material shall be either metal with a protective metallic coating, plastic alloy with an acrylic film laminated to the exterior surface, or other pre-manufactured assembly made especially for the intended use and approved by the Architect.
- B. All jacks shall be an integral component of the roofing system, designed and supplied by the roofing manufacturer whenever possible.
- C. Equipment Curbs
 1. Curbs to coordinate with Division 23, and provided under this Section.
 2. Curbs to fit profile of roof panel and match color as manufactured by Acme Manufacturing Corp, Claremore, OK (918)266-3097 or approved alternate. Curb to be minimum .063 thick aluminum with cricket water diverter. Provide covers for standing seam ends, designed for watertight fit.

2.6 FINISH

- A. Two-coat Kynar 500 finish system:
 1. One coat epoxy base primer over galvalume panel.
 2. One coat 70% Kynar 500 coating; Fluoropon by DeSoto or Duranar by PPG.
 3. Signature 300 PVDF: Color: Tundra

PART 3 EXECUTION

3.1 FABRICATION:

- A. Fabricate panels in sizes and profiles required to fit applications indicated and to remain watertight. Include provisions for controlled expansion of panel components relative to themselves and to adjoining dissimilar materials. Panels to be factory formed or field formed with appropriate flashings and accessories.

3.2 INSTALLATION:

- A. Install in accordance with manufacturer's instructions. Coordinate with installation of other substrates to produce watertight assembly capable of withstanding inward and outward loading pressures and thermal and lateral loads.
- B. Isolate metals from dissimilar metals or corrosive substrates using bituminous coatings or other means of permanent separation to prevent electrolytic corrosion.
- C. Use extra precautions to not mar or damage prefinished panels. Leave protective covering on panels as long as possible.
- D. Provide method of attachment of panels to substrate or structure to allow for thermal movement so that oil canning, disfigurement, warping is avoided. Submit details with submittals.

3.3 GUARANTEE

- A. Installer to guarantee workmanship, durability, and weather-tightness of metal roof system, including flashings and other associated items of the metal roof system for a period of five (5) years.
- B. Finish shall be guaranteed for a period of Twenty (20) years by the roof manufacturer. A specimen of these warranty documents, similar to those found at the end of this section, must be approved by the Architect and be submitted, prior to signing of the contract, clearly stating the conditions under which the guarantee is valid.
- C. Prior to substantial completion date, Contractor will schedule inspection with roof manufacturer to inspect construction and workmanship. Inform Architect and Owner of inspection date. Contractor to send to Architect, written approval or deficiencies from manufacturer.
- D. Roofer will provide a letter stating the roof system meets or exceeds UL 1-90 uplift design requirements.

END OF SECTION

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COMPANY LETTERHEAD
CERTIFICATE OF GUARANTEE FROM METAL ROOF SYSTEM INSTALLER

We, _____ agree to maintain
(Name of Company or Contractor)
the roofing, flashing, and associated items on the below-mentioned building for the period indicated.
This agreement is to render the roof and the flashing waterproof, subject to the conditions outlined
below.

OWNER OF BUILDING _____

Location of Building _____

City _____ Roof Area _____ square feet _____

This Guarantee effective this _____ day of _____, 20____, for the term of Five (5)
years from this date for installer's warranty, provided any defects result from defective material or
workmanship and are not caused by other mechanics, fire, accidents, or by nature over which we
have no control.

It is understood and agreed that we will not be responsible for leaks in the roofing or flashing due to
excessive winds, distortion of the foundation on which the roofing rests, excessive hail storms, or any
other conditions over which we have no control.

Signed _____
Name of Company

By _____

Position _____

Company is a _____
Corp./Partnership/Individual

NOTARY PUBLIC _____

Registered in the State of: _____

My Commission expires: _____

(Seal)

NOTE: Standard twenty (20) year finish warranty from the manufacturer is to be submitted in
addition to other guarantees asked for on this form.

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SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.1 SCOPE:

- A. The work required under this specification includes all labor, materials, equipment and services necessary for and reasonably incidental to the completion of all metal flashing and counterflashings, wall flashings, parapet cap flashing, joint covers, crickets, and other metal work required to complete the job.

1.2 RELATED SECTIONS

- A. Section 07 42 63: Custom Metal Wall Cladding
- B. Section 07 61 13: Preformed Metal Roofing (*Manufactured*)
- C. Section 07 62 10: Gutters and Downspouts
- D. Section 07 92 00: Sealants

1.3 WORKMANSHIP

- A. All workmanship shall be in accordance with plans, with the various sections uniform, and sections accurately fitted and rigidly secured. All exposed edges shall be seamed, and all work shall be neatly fitted to the framework, with necessary ribs or stiffeners and other reinforcements required to make all sections rigid and substantial. This section to comply with SMACNA Standards.
- B. Proper allowance shall be made in all cases for expansion and contraction, with the vertical joints not secured directly but constructed weather and watertight to allow members to slide freely. Joint covers shall be installed over all joints.

PART 2 PRODUCTS

2.1 MATERIALS

- A. All sheet metal shall be pre- finished steel unless noted otherwise, not less than 24 gauge, and shall be compatible to other materials they may be in contact with. No dissimilar metals will be used together.
- B. Fasteners shall be non-rusting materials which are not subject to galvanic action. Fasteners shall be of proper length and spacing to assure secure attachment, fit and alignment. Furnish and install continuous clip at cap flashing. Provide pre-finished fasteners, matching pre-finished flashing color.

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- C. In general, all exposed flashing is pre-finished material, but where exposed galvanized iron flashings occurs, paint grip materials shall be used.
- D. Where flashing shown must be fabricated into watertight multi-sided slopes, use paint grip material with soldered joints.
 - 1. Solder: Half and half solder made from virgin lead and tin shall conform to the Standard Specifications of the ASTM, E-32, latest edition.
 - 2. Flux: All galvanized sheet metal shall have non- corrosive acid used as a flux.
 - 3. All exposed paint grip galvanized material shall be painted color as selected by Architect.
- E. Pre-finished flashing to be shop formed sections out of material supplied by the metal roofing manufacturer with same color selection available.
- F. Flashing and Trim: Cap Flashing and Counterflashing - 24 gauge prefinished steel. Pitchpocket - two (2") inches deep, 24 galvanized iron. All flashing and trim located in areas which are visually exposed shall be prefinished unless noted otherwise.
- G. Provide cap and parapet flashing in minimum lengths of 10 feet or more between joints.

2.2 FINISH:

- A. Pre-finished Trim and Flashing: Finish: Factory applied Kynar 500. Color: To be selected by Architect.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install work watertight, without waves, warps, buckles, fastening stresses or distortion, allowing for expansion or contraction.

3.2 FLASHING:

- A. Flash walls, etc., as detailed. Flashing shall be of material and gauge as specified on plans. All walls flashing, crickets, counterflashings, etc., shall be installed in accordance with SMACNA standards and in conformance with details shown or implied on plans.
- B. Counterflashing generally shall be in 10'-0" lengths. Counterflashing shall be free from longitudinal joints. End joints in counterflashing generally shall not be soldered. Flashing to be installed with masonry, no saw cut installations will be allowed.
- C. On counterflashings, the ends of one (1) length shall fit into a pocket on the adjacent length which has been formed by soldering a skirter lining on the back of the adjoining member. Counterflashings must be bent to the required shape before being placed.
- D. Provide splices for cap flashing as shown on drawings.

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- E. Provide flexible flashing with stainless steel band clamp for pipe roof penetrations.
- F. Secure all cap flashings with continuous cleats on both sides of parapets. Lap cleat sections minimum 2 inches. Secure to wood nailers with screws at minimum 16 inches on center.

3.3 WORKMANSHIP

- A. Fasteners shall be concealed anchors of compatible materials.
- B. Metal surfaces shall be formed and applied in strict accordance with SMACNA sheet metal working standards.
- C. No perforations of metal surfaces shall be made except as shown on details for flashing, closures, trim, etc.
- D. All exposed edges shall be seamed and all work shall be neatly fitted to the framework, with necessary ribs or stiffeners and other reinforcement required to make all sections rigid and substantial.
- E. Install work watertight, without waves, warps, buckles, fastening stresses or distortion, allowing for expansion and contraction.

END OF SECTION

07 62 00-3

SECTION 07 62 10

GUTTERS AND DOWNSPOUTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pre-finished steel gutters and downspouts, with expansion joints.

B. Related Sections:

1. Section 03 30 00 – Cast-in-Place Concrete: Splashblocks
2. Section 07 61 13: Preformed Metal Roofing (*Manufactured*)
3. Section 07 62 00: Sheet Metal Flashing and Trim
5. Section 07 92 000 - Sealants

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM A2244 - Color Change Quality.
2. ASTM D659-80 - Chalking.
3. ASTM A525 - General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
4. ASTM D2794 - Impact Resistance
5. ASTM D968 - Abrasion
6. ASTM D1737 or D522 - Formability
7. ASTM G23 - Weather-Meter Test. No peeling, blistering, cracking, or loss of adhesion

B. Sheet Metal and Air Conditioning Contractor's National Association (SMACNA):

1. SMACNA - Architectural Sheet Metal Manual

1.3 SUBMITTALS

A. Comply with requirements of Section 01 33 00.

B. Submit shop drawings showing fabrication, shapes, and dimensions. Provide material and finish data.

1.4 QUALITY ASSURANCE

A. Conform to Drawings for nominal sizing of components for rainfall intensity determined by a storm occurrence of 1 in 5 years.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack preformed materials to prevent twisting, bending, or abrasion, and to aid ventilation. Slope to drain.

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- B. Prevent contact with materials during storage which may cause discoloration, staining, or damage.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Pre-finished Steel: 24 gage core steel, color as selected. When pre-finished metal fascia is used, the pre-finished material color selection is to be from same selection of metal roof manufacturer.

2.2 COMPONENTS

- A. Gutters and Downspouts: SMACNA Rectangular style profile; detailed as shown on drawings.
- B. Provide end caps, downspout outlets, gutter and downspout straps, screens/strainers and other accessory components in profiles to suit gutters and downspouts.

2.3 ACCESSORIES

- A. Anchorage Devices: Straps to SMACNA requirements.
- B. Gutter and Downspout Supports: Straps.
- C. Protective Back Coating: FF TT-C-494, bituminous.
- D. Screens and Downspouts Strainers: Same basic metal as gutter. Screen - fabricated of 1/4" hardware cloth. Strainers are fabricated of galvanized wire, inserted into outlet tubes and held in place by friction.
- E. Downspout Collectors: CPP, pipe, sizes, dimensions and profiles to suit downspouts and underground storm drainage system.

2.4 FABRICATION

- A. Form gutters and downspouts of size and profile indicated on Drawings.
- B. Field measure site conditions prior to fabricating work.
- C. Fabricate with required connection pieces.
- D. Form sections square, true, and accurate in size, in maximum possible lengths and free of distortion or defects detrimental to appearance or performance. Allow for expansion at joints.
- E. Hem exposed edges of metal.

- F. Place sealant at pre-finished metal joints. Remove all excess material, wipe and wash joints clean.
- F. Fabricate gutter and downspout accessories; construct watertight.

2.5 FINISHING

- A. Two-coat Kynar 500 finish system:
 - 1. One coat epoxy base primer.
 - 2. One coat 70% Kynar 500 coating; Fluoropon by DeSoto or Duranar by PPG.
- B. Colors:
 - 1. Manufacturer's standard, color to be selected.
- C. Warranty: Manufacturer's standard 20 year.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that surfaces are ready to receive work and conditions are as acceptable.
- B. Beginning of installation means acceptance of existing conditions and substrate.

3.2 INSTALLATION

- A. Install gutters, downspouts, and accessories. Install gutter hangers at 2'-0" o.c. and at each expansion and control joint. Install expansion joints at 50'-0" max. Unless noted otherwise.
- B. Joint lengths with formed seams constructed watertight. Flash and seal gutters to downspouts and accessories. Construct expansion joints as detailed on Drawings.
- C. Apply bituminous protective backing on surfaces in contact with dissimilar materials.
- D. Seal metal joints watertight. Install sealant in inside surface of gutters at each joint. After sealing, wash metal clean with solution and rinse with water.
- E. Attach downspouts with straps on 48" centers.
- F. Install screens and strainers on gutters and downspouts. One screen per downspout.
- G. General Contractor to provide splash block at each downspout. No splash block is required where downspout empties onto pavement or concrete surface.

END OF SECTION

07 62 10-3

SECTION 07 65 26

WATER SHIELD MEMBRANE

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Water shield membrane used as roof waterproofing underlayment.
- B. Related Sections
 - 1. Section 06 10 00 - Rough Carpentry
 - 2. Section 07 61 13- Preformed Metal Roofing

1.2 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00.
- B. Product Data: Submit in letter form the manufacturer and model selected.

1.3 GUARANTEE

- A. Water shield membrane system warranted for five (5) years to be weather-tight and free of defects.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Ice and water shield manufactured by W.R. Grace Construction Products or approved alternate.
- B. Water Shield is cold applied self-adhering membrane composed of 0.004" high strength polyethylene film coated on one side with a thick layer of adhesive-consistency rubberized asphalt. Membrane is inter-wound with a disposable silicone coated release sheet.

PART 3 EXECUTION

3.1 PREPARATION

- A. Surface Preparation:

New Roofs:

Remove any dust, dirt, loose nails or other protrusions from deck.

B. Priming:

Priming is not required for clean and dry wood or metal surfaces. Any concrete or masonry surfaces must be primed with Bituthene Primer P-3000 applied at 250 to 350 sq.ft. per gallon.

C. Temperature:

Apply Ice and Water Shield only in fair weather when air and surface temperatures are above 40 degrees F.

3.2 INSTALLATION

A. Install water shield following manufacturer's instructions.

B. Where membrane is installed on dome, install so that membrane surface is free of gaps and folds.

3.3 PROTECTION

A. Do not leave membrane exposed. Install finish roofing material immediately following installation.

END OF SECTION

07 65 26-2

SECTION 07 72 53

ROOF SNOW GUARDS & FLUE / VENT PIPE GUARDS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Roof Snow Retention System and Fastening Devices for prefinished standing seam metal roofs and flue vent pipes

1.2 RELATED SECTIONS

- A. **Section 07 61 13-Preformed Metal Roofing-Structural**
- B. Section 07 62 00 - Sheet Metal Flashing and Trim.

1.3 REFERENCES

- A. ASTM International (ASTM):
 - 1. ASTM B85 - Standard Specification for Aluminum-Alloy Die Castings.
 - 2. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

1.4 DESIGN / PERFORMANCE REQUIREMENTS

- A. Design Requirements for Systems:
 - 1. Provide at locations indicated on the Drawings.
 - 2. System Design: Snow retention system as designed by the manufacturer.
 - 3. Components of the system supplied by the same manufacturer.
 - 4. Accessories and Fasteners: Accessories and fasteners capable of resisting design forces in accordance with local building code.

1.5 SUBMITTALS

- A. Comply and submit under provisions of Section 01 33 00.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Shop Drawings: Prepared specifically for this project; showing dimensions of metal roof snow guards and accessories, fastening details and connections and interface with other products.
- D. Verification Samples: For each product specified, two samples, minimum size for extrusions 6 inches (152 mm) long, representing actual product, color, and patterns.
- E. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

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1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in production of Metal Roof Snow Guard Products of the type specified with a minimum 5 years documented experience.
- B. Installer Qualifications: Company specializing in installation of Metal Roof Snow Guard Products of the type specified with a minimum 3 years documented experience.
- C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 - 1. Finish areas designated by Architect.
 - 2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
 - 3. Refinish mock-up area as required to produce acceptable work.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components to job site properly packaged to provide protection against transportation damage.
- B. Store products in manufacturer's unopened packaging in a clean, dry location until ready for installation.
- C. Stack all materials to prevent damage and to allow for adequate ventilation.

1.8 SEQUENCING

- A. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.9 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Dynamic Fastener Service Incorporated, which is located at: 9911 E. 53rd Street; Kansas City, MO 64133; ASD Toll Free Tel: (800) 821-5448; Tel: (816) 358-9898; Fax: (816) 358-9899; Email: jerodwebber@dynamicfastener.com, stevebutler@dynamicfastener.com; Web: www.dynamicfastener.com.
- B. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

2.2 ROOF SNOW GUARDS

- A. Basis of Design: DYNA-GUARD; Snow Retention System for metal roofs as supplied by Dynamic Fastener Service Incorporated.
 - 1. New construction and retrofitting of existing construction.
 - 2. Material: 6005A-T6 high tensile aluminum.
 - 3. Extrusions: Comply with ASTM B85 and ASTM B221.
 - 4. DYNA-GUARD:
 - a. Lengths: 96 in (2438 mm). T-shaped profile.
 - b. Hole Spacing: None.
 - c. 1.)Field-Drilled Hole Requirements: 7/16 in (11 mm) on appropriate centers.
 - 5. SNO-DAMS: Inhibits ability of snow and ice to slide under the DYNA-GUARD.
 - a. Slides onto the DYNA-GUARD from either end. One SNO-DAM between every seam is required.
 - b. Width: 3 in (76 mm).
 - c. SNO-DAM Profile: As required for standing seam depth.
 - 6. DYNA-CLAMPS: Non-ferrous, non-piercing clamp for attachment to standing seam roofs.
 - a. Set Screws: Round-point stainless steel accommodating different profiles of standing seam metal roofs and won't pierce the panel.
 - b. Bolts: English standard 5/16-18 bolt (No metric bolts available).
 - c. DYNA-CLAMP Profile: DC Series. Type as required for prefinished metal roof panel standing seam profile
 - 7. DYNA-CLIPS: Provide if required for anchoring Dyna-Guard to Dyna-Clamp.
 - 8. DYNA-SPLICE: Provide where splicing Dyna-guard sections together.
 - 9. Aesthetic Sheet Metal Strips: Supplied by others for installation into the DYNA-GUARD T-shaped profile.
 - a. Prefinished strips of same metal material as the roof with same color.
 - b. Width of Strips: 2 in (51 mm).
 - c. One strip per length of DYNA-GUARD Strips insert into DYNA-GUARD extrusion to help conceal the snow retention system.

2.3 ROOF FLUE AND VENT PIPE GUARDS

- A. Provide same product as selected snow guard.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation and the approved shop drawings.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install in accordance with snow retention system manufacturer's instructions and approved shop drawings. Coordinate the installation with the manufacturer of the roof substrate to which it is installed.
- B. Attach using manufacturer's fasteners, spaced in accordance with approved shop drawings.
- C. Install extrusions in such a manner that horizontal lines are true and level and vertical lines are plumb.
- D. Do not allow components to come into contact with dissimilar materials.
- E. Inspect each clamp and component to ensure assembly is intact and secured to the roofing per manufacturer's instructions.
- F. Set guard at 3'-0" up roof from eave.

3.4 INSTALLATION –F LUE ANDVENT PIPE GUARDS

- A. Install flue/vent pipe guards at all flue and vent pipes where they penetrate metal roof. Span at least two seams of roof panels uphill from penetration.
- B. Set guard at 1'-0"-2'-0" above flue or vent pipe.

3.5 PROTECTION AND CLEANING

- A. Protect installed products until completion of project.
- B. Clean any grease, finger marks or stains from the panels per manufacturer's recommendations.
- C. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 07 92 00

JOINT SEALANTS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Preparing sealant substrate surfaces.
 - 2. Concrete slab control joint filler
 - 3. Sealant and backings
 - 4. Acoustical Sealants and Sound Dampening Compounds
 - 5. Control joint fillers
 - 6. Sill Sealer (Sealant between bottom of exterior stud track and substrate.)

1.2 RELATED SECTIONS

- A. Section 03 30 00: Cast-In-Place Concrete
- B. Section 03 48 43: Precast Concrete trim
- C. Section 04 22 00: Concrete Unit Masonry
- D. Section 04 43 00: Stone Masonry
- E. Section 06 41 16: Cabinetwork & Shelving
- F. Section 07 62 10: Gutters & Downspouts
- G. Section 08 11 13: Hollow Metal Doors & Frames
- H. Section 08 43 13: Aluminum Storefront, Doors, and Exterior Fixed Units
- I. Section 08 81 00: Glass & Glazing
- J. Section 09 29 00: Drywall
- K. Section 09 78 00: FRP Panels
- L. Section 32 16 00: Walks and Curbs

1.3 SUBMITTALS

- A. Comply with requirements of Section 01 33 00.

1.4 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM D1056 - Flexible Cellular Materials - Sponge or Expanded Rubber.
 - 2. ASTM C1087 - Sealant Compatibility with Glazing Materials and Accessories.

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3. ASTM D1565 - Flexible Cellular Materials - Vinyl Chloride Polymers and Copolymers (Open Cell Foam).
4. ASTM C920 - Elastomeric Joint Sealants.

B. Sealing and Waterproofer Institute(SWI):

1. SWI - Sealant and Caulking Guide Specifications.

1.5 ENVIRONMENTAL REQUIREMENTS

- A. Do not install solvent curing sealants in enclosed building spaces.
- B. Maintain temperature and humidity recommended by sealant manufacturer during and after installation.

1.6 SEQUENCING AND SCHEDULING

- A. Coordinate work of this Section with all Sections referencing this Section.

1.7 WARRANTY

- A. The Contractor must guarantee weathertightness for a period of two (2) years from the date of Substantial Completion of the building.
- B. The Contractor will, at any time within the two (2) year period, remedy all leaks of any nature in any part of the building due to the use of faulty materials and/or workmanship under this section, without additional cost to the Owner. The Contractor shall further reimburse the Owner for any damage occasioned by such leaks.
- C. The Contractor is cautioned to supplement the work, described in this section of the specifications, by any means necessary to permit the above guarantee, which he will be called upon to make as an obligation of the Contract.
- D. Provide **Silicone sealant #4** manufacturer's twenty (20) year warranty. All other sealants to have manufacturer's minimum ten (10) year warranty provided.
- E. Butyl Rubber Sill Sealer: Provide subcontractor and manufacturers One (1) year warranty from date of substantial completion.

PART 2 PRODUCTS

2.1 SEALANT MATERIALS

- A. Polymer or Polyurethane Sealants:
 1. **Polyurethane Sealant #1**: ASTM C920, Type M, Grade NS, Class 25.
 2. ASTM C719, ASTM D412, ASTM C661, ASTM C679 and ASTM C510
 3. Polyurethane Sealant approved manufacturers:
 - a. MasterSeal NP-150 by BASF.

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F. Sound Dampening Compound

1. Prospec "DECIBEL Drop", manufactured by Pinta-Acoustic, Minneapolis, MN (800)662-0032.
2. Approved alternate.

2.2 ACCESSORIES

- A. Primer: Non-staining, clear type, recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Joint Filler: Polyethylene foam rod, oversized 30% to 50%
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.
- E. Backer Seal: "Greyflex" backer seal, manufactured by Emseal Joint Systems, LTD (800) 526-8365. No substitutions will be accepted.

2.3 CONTROL JOINT FILLERS

- A. 1" wide joints and larger: Provide 'COLORSEAL' joint filler system by Emseal Joint Systems, Ltd, 800-526-8365, or approved alternate. Provide custom color as selected by architect.
- B. 1/2" – 7/8" wide joints: Provide 'BACKERSEAL' secondary joint filler by Emseal Joint Systems, Ltd, 800-526-8365, or approved alternate. This is to be provided in addition to backer rod and sealant.
- C. Install joint fillers per manufacturer's instructions.

2.4 SEALANT COLORS

- A. Colors to be selected from manufacturer's standard color selection for each type of sealant specified with exception of two-part polyurethane sealants and silicone sealants, which are to match finishes as stated in 2.1 A & B. Architect to approve color matches.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that surfaces and joint openings are ready to receive work and field measurements are as shown on Drawings and recommended by the manufacturer.
- B. Beginning of installation means installer accepts existing substrates

07 92 00-4

3.2 PREPARATION

- A. Clean and prime joints in accordance with manufacturer's instructions.
- B. Remove loose materials and foreign matter which might impair adhesion of sealant.
- C. Verify that joint backing and release tapes are compatible with sealant.
- D. Protect elements surrounding work of this Section from damage or disfiguration.

3.3 INSTALLATION

- A. Install sealant in accordance with manufacturer's instructions.
- B. Measure joint dimensions and size materials to achieve required width/depth ratios.
- C. Install joint backing rods to achieve neck dimension no greater than 1/3 the joint width. For joints 1/2" to 7/8", install backer seal prior to installing backer rod material install backer seal and backer rods as required to keep a uniform depth along entire joint. For joints larger than 7/8", provide "Colorseal" joint filler system. Per manufacturer's instruction for joint size being filled.
- D. Install bond breaker where joint backing is not used.
- E. Apply sealant within recommended temperature ranges. Consult manufacturer when sealant cannot be applied within recommended temperature ranges. In no case, allow the depth of sealant be less than 1/2".
- F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- G. Tool joints concave.
- H. Where sound walls are indicated on drawings, install sound sealant around all penetrations, each side, under stud base plate, at intersection of wall, roof deck, and around all windows and hollow metal frames.
- I. Interior sealants are not to be installed until building is tempered by HVAC system and temperature will remain constant. **DO NOT PAINT POLYURETHANE AND SILICONE SEALANTS.** Do not install sealants in walls or floors where paint, stain, etc is scheduled to be applied until after finishes are applied unless sealants are masked off during coating process.
- J. Concrete slab control joint filler:
 - 1. Use only at concrete floors which **do not** receive any floor coverings or polished concrete finish.
 - 2. Prior to final seal coat, install joint filler flush with top of slab. Remove any excess filler.

07 92 00-5

3.4 SCHEDULE

- A. General Exterior Construction (Non-stone or masonry construction):
 - 1. Polyurethane Sealant #1
- B. Horizontal Exterior Locations:
 - 1. Polyurethane Sealant #2
- C. Stone Exterior Locations:
 - 1. Silicone Sealant #4
- D. General Interior Construction:
 - 1. Polyurethane Sealant #1 (All wall control joints.)
- E. Plumbing Fixtures:
 - 1. Silicone Sealant #2.
- F. Horizontal Interior Locations:
 - 1. Polyurethane Sealant #2.
- G. Aluminum Storefront and Curtainwall Systems, Aluminum Windows:
 - 1. Silicone Sealant #3
- H. Concrete Slab Control Joint Filler
 - 1. All control joints for slab-on-grade and elevated slabs where no finish or floor coverings are scheduled.
- I. Butyl Rubber
 - 1. Continuous bead below bottom track of exterior stud walls and below metal thresholds.

END OF SECTION

07 92 00-6

SECTION 08 11 13

HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.1 SUMMARY

- A. Furnish labor and materials to complete Hollow Metal Doors, Hollow metal frames, and related items as shown and specified.

1.2 RELATED SECTIONS

- A. Section 04 22 00 - Concrete Unit Masonry
- B. Section 08 14 16 - Wood Doors.
- C. Section 08 71 00 – Finish Hardware
- D. Section 08 43 13 - Aluminum Storefront, Doors, and Exterior Fixed Units.
- E. Section 08 81 00 – Glass and Glazing
- E. Section 09 29 00 – Drywall
- F. Division 26 - Electrical Requirements.

1.3 SUBMITTALS

- A. Comply with requirements of Section 01 33 00.
- B. Shop Drawings: Submit prior to fabrication for approval of Architect detailed shop drawings, showing all doors, frames, other miscellaneous materials. Shop drawings to show all locations of reinforcement for door hardware in doors and frames.

1.4 REFERENCES

- A. Comply with ADA Accessible Guidelines in regard to accessible or handicapped features.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Hollow Metal Frames -
 - 1. Manufactured by Steelcraft, Ceko, Curries or Amweld, or approved alternate, constructed of cold rolled steel, commercial quality, annealed and temper passed. All frames, interior, exterior: 16 gauge all openings 3'-6" or less, and 14 gauge for all openings over 3'-6".

08 11 13-1

2. Exterior Frames: **Fleming** or approved alternate, special galvanized, paintable. Field paint all doors and frames.
 3. Frames:
 - a. All frames shall be a one piece unit type with head and jambs completely mitered and face joints continuously welded in their entirety and ground smooth. Inside corners to be caulked prior to painting. The use of tenons or bent tabs is not acceptable. Where transoms and sidelights are required, frames: shop assembled for a proper fit, then shipped in largest size units permitted by shipping restriction. Mullions: assembled by sliding two sections together with continuous welded interior guides. Screwed on mullion covers and visible seams, not acceptable. All seams ground smooth. All exposed welding tabs ground smooth.
 - b. No KD type frames shall be permitted.
 4. Provide concealed reinforcements, drilled and tapped, to receive hardware. Hinge reinforcements: 10 gauge with top hinge high frequency usage hinge reinforcement, 10 gauge angle stiffener welded to both sides of the frame and hinge reinforcement. Lock reinforcement: spring type stabilizer to hold lock in place. Lock and surface applied hardware reinforcement 10 gauge. Clip angles: spot welded to bottom of each frame for anchoring to floor. Mortar 14 gauge anchors, one per each 2' of height, per jamb of a type to suit conditions and requirements. All other reinforcement for hardware to be minimum 10 gauge.
 5. Frames where Underwriter Labeled doors are used: carry Underwriter Label frame.
 6. Provide three (3) rubber silencers on strike side of all frames.
 7. All exposed screws to be countersunk using flathead screws, flush with surface.
- B. Hollow Metal Doors:
1. Non-label and label steel doors: to be completely flush design with lights, louvers, etc., as required on schedule doors as manufactured by Ceco, Amweld, Steelcraft, Curries, Mesker, Dittco, Truscon, or approved equal. Provide **type "A" series** doors with flush door light frames where lights are called for on drawings.
 2. Exterior Doors: Fleming or approved alternate, 'D' Series, special galvanized, flush design, paintable. Field paint.
 3. Construction: Doors shall be constructed of 18 gauge sheets for interior applications, and 16 gauge for exterior applications. Leveled steel formed and rigidly connected and reinforced inside with continuous vertical interlocking 24-gauge stiffeners. All doors shall be continuously arc welded vertically where the two outer sheets are joined on edges and dressed smooth.
 4. All exterior doors shall be insulated and sound deadened with super-core expanded foam or approved alternate.
 5. Provide and properly locate required reinforcement in door for all door mounted hardware.
 6. For door leaf 3'-6" to 4'-0" or wider, provide preparation for 2 pairs butt hinges or continuous hinge as specified.
- C. Doors and frames shall be prepared to receive hardware as specified in section 08 71 00 and glass of type, size, and shape as shown on drawings. Use reinforcing plates welded to inner face of frames for all hardware.

- D. All exterior doors to receive aluminum thresholds. Supply with added aluminum spacer on exterior side if required. Threshold to be type and style to match details if shown on plans, but in no case on plans, no more than 1/2" in height with transition slope not to exceed 1:2 to meet Arkansas Architectural Barriers Law and Americans with Disabilities Act Guidelines.
- E. Coordinate frame throat sizes with wall thicknesses where frames are installed in stud and drywall partitions or where frames are installed in cut openings at existing masonry walls.
- F. Provide three (3) rubber door silencers for each single leaf door frame, and two (2) door silencers for each double leaf door frame.

PART 3 EXECUTION

3.1 COORDINATION

- A. Coordinate location and installation of reinforcement for all scheduled door hardware items attached to hollow metal doors and frames.

3.2 FRAME ANCHORING

- A. Provide proper anchors for wall type frames are to be installed in.
- B. Hollow metal door frame jambs and heads are to be slushed full of mortar. Refer to Section 04 22 00 Concrete Masonry Units.

3.3 FINISHES

- A. All surfaces to be job finished shall be thoroughly cleaned, removing all rust, scales, grease, etc.
- B. All exterior hollow metal doors and frames: Given shop coat of rust resistant prime paint oven baked.

3.4 STORAGE AND ERECTION

- A. Carefully store frames in an upright position, not on ground, protected from moisture and weather. Frames and doors that are dented or sprung, before, during, or after installation will not be accepted.

END OF SECTION

08 11 13-3

SECTION 08 14 16

WOOD DOORS

PART 1 GENERAL

1.1 SCOPE:

- A. Furnish and install wood doors as shown and as specified herein. Doors are to be of type, size, and design shown and scheduled on drawings.

1.2 RELATED WORK:

- A. Section 08 71 00 – Hardware
- B. Section 08 81 00 - Glass & Glazing
- C. Section 09 91 00 - Finishes

1.3 QUALITY REQUIREMENT:

- A. All wood doors shall meet N.W.W.D.A. Industry Standard 1-A and Architectural Woodwork Institute Section 1300-G-3, Type FPC-7.

1.4 SUBMITTALS

- A. Comply with requirements of Section 01 33 00.
- B. Submit shop drawings in accordance with General Requirements. Include full size molding section detail for light and louver installation. Show glazing material, louver type and thickness, and face veneer grade and species.

1.5 REFERENCES

- A. Comply with State of Arkansas Adopted ADA Accessible Guidelines in regard to accessible or handicapped features.

1.6 DELIVERY

- A. Package in heavy Kraft paper or polyethylene bags. Deliver and store in areas of Temperature and humidity such as will not adversely affect doors.
- B. Doors shall be packaged in individual cartons.

1.7 PROTECTION

- A. Protect work from damage until final acceptance.

08 14 16-1

1.8 WARRANTY

- A. Manufacturer to provide lifetime warranty for interior duration, and two (2) year warranty for exterior duration.
- B. Door warp tolerance shall not exceed 1/4" in any section of the door.
- C. Stile, rail and core "telegraphing" shall not exceed 1/100" in any 3" span.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Masonite
- B. Oshkosh Architectural Door Company.
- C. VT Industries

2.2 MATERIALS

- A. Doors shall be 1 3/4" thick, 5 or 7 ply, solid core, stain grade, Aspiro Series, White Maple, Plan Slice. Paint grade may be used where called for on finish schedule. Top and bottom rails to be 1 1/8" min. width, stiles 1 3/8" min. Width prior to field fitting. Core shall be wood particle core meeting ANSI A208.1, Grade 1-LD-1, or 1-LD-2 with a 28-32 lb density, and type II adhesive. Veneer shall be provided on side edges and shall match species of face veneer. Where a pair of doors are called for, face veneer shall be book-matched grain. Provide mineral composition core when fire rating is required.
- B. Architect to select custom color. Stain Color: Clear

2.3 FABRICATION

- A. Fabricate premium type doors in accordance with requirements of WDMA Quality Standards (SCLC-5 or 7) unless specifically indicated otherwise.
- B. Fabricate fire rated doors in accordance with requirements of Underwriter's Laboratories (UL).
- C. Provide doors with edge strips, of wood species to match face veneers.
- D. Make cutouts and provide stops for glass.
- E. Pairs of doors shall be products of a manufacturer who can furnish such doors without astragals and meet the UL requirements.

08 14 16-2

- F. Pre-fit doors at factory with 1/8 inch tolerance on each vertical face, 1/8 inch tolerance at top, and 1/2 inch at bottom, except where undercuts are scheduled.
- G. Machine doors for hardware as required by Hardware Schedule listed in Section 08 71 00, which will be supplied together with all necessary templates for hardware requiring door preparation.
- H. Steel frame shop drawings will be furnished showing location and size of hardware preparation.
- I. Bevel strike edge of single acting doors 1/8 inch in 2 inches. Radius strike edge of double acting swing doors, 2-1/8 inches.
- J. All fire rated doors shall be factory prepped to receive hardware and glazing.
- K. Pre-finish doors at factory with clear WDMA System #6 finish.

PART 3 EXECUTION

3.1 INSTALLATION AND WORKMANSHIP:

- A. Install doors plumb and true to operate without bind or drag with 1/8" clearance top and sides. Provide 3/4" undercut at bottom unless indicated otherwise.
- B. Doors damaged before or after hanging will be replaced.
- C. All edge and end surfaces will be sealed with two (2) coats of door manufacturer's standard sealer before final hanging. **This includes top and bottom ends.**
- D. All necessary refitting or adjustment shall be the Contractor's responsibility during the guarantee period.
- E. Provide moldings and glass stops of same species as face veneers.
- F. If called for, wood louvers to be factory installed into properly prepared openings.
- G. Pre-machine bevel on vertical edges of single doors or meeting stiles of pairs of doors.
- H. Coordinate door light location with door hardware to assure no conflicts occur.
- I. For door leaf 3'-6" to 4'-0" or wider, provide preparation for 2 pairs butt hinges or continuous hinge as specified.

3.2 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver: Protect doors at all times. Deliver doors to site after plaster and cement are dry And building has reached average prevailing relative humidity of locality.

08 14 16-3

- B. Storage: Stack flat on 2 x 4 lumber, laid 12" from ends and across center. Under bottom door and over top of stack provide plywood or corrugated cardboard to protect door surface. Store doors in area where there will be no great variation in heat, dryness and humidity.
- C. Handling: Do not drag doors across one another.

3.3 INSPECTION

- A. Verify that door frames are of type required for door and are installed as required for proper installation of doors. Do not install doors in frames which would hinder the operation of the doors.

SPECIAL NOTE:

THERE CAN BE NO GLASS OR GLASS KITS IN DOORS THAT WILL INTERFERE WITH THE MOUNTING OF ANY FINISH HARDWARE. ENOUGH STILE AND RAIL MUST EXIST SO THAT NO SHIMS ARE NEEDED.

END OF SECTION

08 14 16-4

SECTION 08 31 13

CEILING / WALL ACCESS PANELS

PART 1 GENERAL

1.1 SUMMARY

- A. Provide all labor, materials and equipment necessary for the furnishing and installation of access panels as required in gypsum board ceilings and walls and in masonry walls for mechanical or electrical equipment access. Provide proper model for panels installed in materials other than gypsum board.

1.2 SUBMITTALS

- A. Comply with Section 01 11 00.

PART 2 PRODUCTS

2.1 MANUFACTURER/MODEL

- A. Nystrom Model NT (masonry), Model RW (Stud and gypsum board), Model NP (E.I.F.S. and Plaster)
- B. Substitutions: Subject to compliance with requirements, one of the following may be substituted for that specified.
 - 1. Karp
 - 2. J.L. Industries
 - 3. Approved alternate.
- C. Provide fire rated models of type required where installed in fire rated ceilings and walls, or where called for on drawings.
- D. Panel size as needed for application, unless called out on drawings. Panel size and locations are to be approved by Architect prior to installation.

2.2 CONSTRUCTION

- A. Galvanized bonderized 16 ga. steel door and 16 ga. frame.
- B. Continuous piano hinge.
- C. Key operated cylinder lock by access panel manufacturer, unless otherwise noted.
- D. Panel finish: White powder coat

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PART 3 EXECUTION

3.1 PREPARATION

- A. Verify that rough openings are correctly installed to receive panels.
- B. Make necessary preparation of surrounding materials to accept panel installation.
- C. Coordinate locations and sizes of required access panels with Architect for approval.

3.2 INSTALLATION

- A. Install panels in accordance with manufacturer's instructions and provide concealed framing as required to properly install access panel.
- B. Adjust panel operation and locking mechanism to ensure all features of access panel operate smoothly.

3.3 FINISH

- A. Paint panel per Section 09 91 00.
- B. Recessed perimeter grooves of panels installed in gypsum board walls or ceilings to be clean and free of drywall mud prior to painting. Gypsum board infill and perimeter of panel to be flush with gypsum board finish surrounding panel.

END OF SECTION

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SECTION 08 41 26

ALL-GLASS ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Interior swinging all-glass entrance doors.
 - 2. All-glass sidelights.
 - 3. Interior all-glass storefronts.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for all-glass system.
- B. Sustainable Design Submittals:
 - 1. Product Data: For sealants, indicating VOC content.
 - 2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.
 - 3. Product Certificates: For regional materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project and cost for each regional material.
 - 4. Product Certificates: For materials manufactured within 100 miles (160 km) of Project, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project and cost for each raw material.
 - 5. Product Certificates: For regional materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material.

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- 6 Include distance to Project, means of transportation, and cost for each regional material.
 - 7 Environmental Product Declaration: For each product.
 - 8 Health Product Declaration: For each product.
 - 9 Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.
 - 10 Third-Party Certifications: For each product.
 - 11 Third-Party Certified Life-Cycle Assessment: For each product.
- C. Shop Drawings: For all-glass entrances and storefronts.
 - 1. Include plans, elevations, and sections.
 - 2. Include details of fittings and glazing, including isometric drawings of patch fittings and rail fittings.
 - 3. Door hardware locations, mounting heights, and installation requirements.
- D. Samples for Initial Selection: For each type of exposed finish indicated.
- E. Samples for Verification: For each type of exposed finish indicated, prepared on Samples of size indicated below.
 - 1. Metal Finishes: 6-inch- (150-mm-) long sections of patch fittings and rail fittings, accessory fittings, and other items.
 - 2. Glass: 6 inches (150 mm) square, showing exposed-edge finish.
 - 3. Door Hardware: For exposed door hardware of each type, in specified finish, full size.
- F. Entrance Door Hardware Schedule: Prepared by or under supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors sidelights, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Sample Warranty: For warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For all-glass systems to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer/Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

- B. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
 - 1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

1.8 WARRANTY

- A. Warranty: Manufacture & Installer agrees to repair or replace components of all-glass systems that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.
 - a. Concealed Floor Closers: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design all-glass entrances and storefronts.
- B. General Performance: Comply with performance requirements specified, as determined by testing of all-glass entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
- C. Deflection Limits: Deflection normal to glazing plane is limited to [1 inch (25 mm)] [1/175 of clear span or 3/4 inch (19 mm), whichever is smaller.
- D. Seismic Performance: All-glass entrances and storefronts shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

2.2 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Avanti Systems, Inc.; SolareTM acoustic, single-glazed partition system or comparable product by one of the following:
 - 1. DORMA USA, Inc.
 - 2. Nana Wall Systems, Inc.
 - 3. CR Laurence

2.3 METAL COMPONENTS

- A. Fitting Configuration:
 - 1. Manual-Swinging, All-Glass Entrance Doors Sidelights. Continuous rail fitting at top and bottom.
 - 2. All Glass Storefronts: Continuous rail fitting at top and bottom.
- B. Patch Fittings: Stainless-steel-clad aluminum.
- C. Rail Fittings:
 - 1. Material: Match patch-fitting metal and finish.
 - 2. Height:
 - a. Top Rail: 3-1/2 inches (89 mm).
 - b. Bottom Rail: 3-1/2 inches (89 mm).
 - 3. Profile: Square.
 - 4. End Caps: Manufacturer's standard precision-fit end caps for rail fittings.
- D. Accessory Fittings: Match patch- and rail-fitting metal and finish for the following:
 - 1. Overhead doorstop.
 - 2. Center-housing lock.
 - 3. Recessed, floor closer.
 - 4. Glass-support-fin brackets.
- E. Anchors and Fastenings: Concealed.
- F. Materials:
 - 1. Aluminum: ASTM B 221 (ASTM B 221M), with strength and durability characteristics of not less than Alloy 6063-T5.
 - a. Color and Finish: polyester powder-coat finish, Match Architect's sample.
 - 2. Stainless-Steel Cladding: ASTM A 666, Type 304.
 - a. Finish: No. 4 directional satin finish.

2.4 GLASS

- A. Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated surfaces), Type I (transparent), tested for surface and edge compression per ASTM C 1048 and for impact strength per 16 CFR 1201 for Category II materials.
 - 1. Class 1: Clear monolithic.
 - a. Thickness: 1/2 inch (13 mm).
 - b. Locations: As indicated, refer to drawings
 - 2. Exposed Edges: Machine ground and flat polished.
 - 3. Butt Edges: Flat ground.
 - 4. Corner Edges: Lap-joint corners with exposed edges polished.

2.5 ENTRANCE DOOR HARDWARE

- A. General: Entrance door hardware units in sizes, quantities, and types recommended by manufacturer for all-glass entrance systems indicated. For exposed parts, match metal and finish of patch fittings and rail fittings.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Avanti Systems, Inc.; Pivot.
- B. Free-Swing Hinge: ASTM A 276/A 276M, Type 304, including accessories required for complete installation.
- C. Frame to Glass Door Hydraulic Hinge: ASTM A 276/A 276M, Type 304, including accessories required for complete installation.
- D. Concealed Floor Closers and Top Pivots: Center hung; BHMA A156.4, Grade 1; including cases, bottom arms, top walking beam pivots, plates, and accessories required for complete installation.
 - 1. Swing: Single acting.
 - 2. Opening-Force Requirements:
 - a. Egress Doors: Not more than 15 lbf (67 N) to release the latch and not more than 30 lbf (133 N) to set the door in motion[and not more than 15 lbf (67 N) to open the door to its minimum required width].
 - b. Accessible Interior Swinging Doors: Not more than 5 lbf (22.2 N) to fully open door.
- E. Concealed Overhead Holder: BHMA A156.8, Grade 1, with dead-stop setting coordinated with concealed floor closer.
- F. Single-Door and Active-Leaf Locksets: Center-housing combination deadbolt and latch bolt with lever handles.
- G. Cylinders: Six-pin cylinder, BHMA A156.5, Grade 1.
- H. Doors: 100A & 100B are to have locksets and cylinders to function with card readers and maglocks.

2.6 BUTT-GLAZING SEALANTS

- A. Single-Component, Nonsag, Acid-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Uses NT, G, and A.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Bostik, Inc.
 - b. Dow Corning Corporation.
 - c. GE Construction Sealants; Momentive Performance Materials Inc.
 - d. May National Associates, Inc.; a subsidiary of Sika Corporation.
 - e. Pecora Corporation.
 - f. Polymeric Systems, Inc.

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- g. Schnee-Morehead, Inc., an ITW company.
 - h. Tremco Incorporated.
- 2. Sealant shall have a VOC content of 250 g/L or less.
- 3. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- 4. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- 5. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." Formaldehyde emissions shall not exceed 9 mcg/cu. m or 7 ppb, whichever is less.
- 6. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- 7. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." The building concentration of formaldehyde shall not exceed half of the indoor recommended exposure limit, or 33 mcg/cu. m, and that of acetaldehyde shall not exceed 9 mcg/cu. m.

2.7 FABRICATION

- A. Provide holes and cutouts in glass to receive hardware, fittings, and accessory fittings before tempering glass. Do not cut, drill, or make other alterations to glass after tempering.
 - 1. Fully temper glass using horizontal (roller-hearth) process, and fabricate so that when glass is installed, roll-wave distortion is parallel with bottom edge of door or lite.
- B. Factory assemble components and factory install hardware and fittings to greatest extent possible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

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- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install all-glass systems and associated components according to manufacturer's written instructions.
- B. Set units level, plumb, and true to line, with uniform joints.
- C. Maintain uniform clearances between adjacent components.
- D. Lubricate hardware and other moving parts according to manufacturer's written instructions.
- E. Set, seal, and grout floor closer cases as required to suit hardware and substrate indicated.
- F. Install butt-joint sealants according to manufacturer's written instructions.

3.3 ADJUSTING AND CLEANING

- A. Adjust all-glass entrance doors and hardware to produce smooth operation and tight fit at contact points.
- B. Remove excess sealant and glazing compounds and dirt from surfaces.

END OF SECTION

SECTION 08 43 13

ALUMINUM STOREFRONT, DOORS, AND EXTERIOR FIXED UNITS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Aluminum Storefront System, aluminum doors, accessories.
- B. Anchors, brackets, brake metal, and attachments.
- C. Door hardware.

1.2 RELATED SECTIONS

- A. Section 07 92 00 - Joint Sealers: Perimeter sealant.
- B. Section 08 71 00 - Finish Hardware: Cylinders.
- C. Section 08 81 00 - Glazing.
- D. Division 26 - Electrical Requirements

1.3 REFERENCES

- A. ANSI/ASTM E283 - Rate of Air Leakage through Exterior Windows, Curtain Walls and Doors.
- B. ANSI/ASTM E330 - Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
- C. FS TT-P-31-Paint, Oil: Iron Oxide, Ready Mixed, Red and Brown.
- D. FS-TT-P-641 - Primer Coating; Zinc Dust-Zinc Oxide (for Galvanized Surfaces).
- E. Comply with ADA Accessible Guidelines in regard to accessible or handicapped features.

1.4 SUBMITTALS

- A. Submit through Construction Manager to Architect.
- B. Product Data: Submit manufacturer's installation instructions.
- C. Shop Drawings: Include system and component dimensions; components within assembly; framed opening requirements and tolerances; anchorage and fasteners; glass; door hardware requirements; and affected related work.

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1.5 PERFORMANCE

- A. Each type of window system shall be designed and engineered by the manufacturer to meet or exceed the wind load criteria for the applicable building code with jurisdiction, based on the size, shape, performance and location of each window unit. Manufacturer shall provide all internal stiffeners, blocking, attachments, etc., as may be required to provide a complete system.
- B. Design Wind Loads:
 - 1. Ultimate Design Wind Speed: 106 MPH
 - 2. Nominal Design Wind Speed: 82.1 MPH
 - 3. Exposure Category: B
 - 4. Internal Pressure Coefficient: +/- 0.18

1.6 QUALITY ASSURANCE

- A. Manufacturer of aluminum storefront system shall have minimum of Ten (10) years experience in the manufacturing and installation of the system. Any substitutions shall follow requirements of Specification Section 01 60 00.
- B. Installer Qualifications: The installer shall have successful experience with installation of the same or similar units required for this project and other projects of similar size and scope for a minimum of ten (10) years.
- C. Source Limitations: Obtain aluminum framed storefront systems through one source from a single manufacturer, as well as other framing systems involved in complete building framing package.

1.7 WARRANTY

- A. Aluminum storefront system: manufacturer's two (2) year warranty.
- B. Aluminum entrances: Manufacturer's two (2) year warranty from date of substantial completion. In addition, welded door corner construction shall be supported with a Limited Lifetime Construction Warranty for the life of the door.
- C. Aluminum Storefront Installer's Warranty: Installer shall provide a five (5) year warranty covering air and water leakage, system failure. Installer will provide signed copy of installer's warranty found at the end of this specification section.

1.8 DOOR HARDWARE/KEYING MEETING

- A. Prior to ordering of hardware items, Contractor shall arrange meeting between, hardware supplier, Owner, and Architect to review and verify door hardware submittals and keying suggestions. This review meeting shall be considered as the submittal review. Any changes

shall be incorporated in the hardware submittals and then resubmitted to Contractor and Architect as **record copy**. Contractor to notify all parties one (1) week prior to meeting date.

1.9 PRE-INSTALLATION CONFERENCE

- A. Prior to aluminum storefront installation, Contractor will schedule pre-installation conference to review aluminum storefront system(s) and installation procedures. Required attendance shall include Contractor, aluminum storefront supplier and installer, Installer's foreman, aluminum storefront manufacturer's representative, and Architect. Owner may also attend if he desires. Contractor shall conduct conference in collaboration with manufacturer's representative.
- B. An actual mockup of a typical aluminum storefront installation shall be performed on site by installer immediately following the conference to assure proper installation methods and procedures are followed.

1.10 MANUFACTURER SITE VISITS

- A. Contractor will schedule periodic site visits with to aluminum storefront manufacturer's representative during installation to assure correct installation procedures are being followed.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Kawneer Company, Inc.
- B. Tubelite
- C. YKK
- D. OldCastle Building Envelope

2.2 EXTERIOR ALUMINUM STOREFRONT SYSTEM

- A. Framing: Shall be extruded aluminum flush glazed framing system Tri-Fab 451T451 "Center-Plane" with Kawneer "IsoLock" thermal break with a 1/4" separation consisting of a two-part chemically curing, high density polyurethane, which is mechanically and adhesively joined to aluminum storefront sections or similar systems by other named manufacturers.
 - 1. Thermal break shall be designed in accordance with AAMA TIR-A8 and tested in accordance with AAMA 505.
- B. Doors: Shall be medium stile in sizes as indicated on drawings. Model 350 as manufactured by Kawneer or similar by other named manufacturers.
 - 1. Top Rail: 3-1/2"
 - 2. Mid Rail: None
 - 3. Bottom Rail: 10"

4. Vertical Stiles: 3 1/2"
 5. Provide manufacturer's standard 1 3/4" thick glazed doors with 0.0125 Inch thick extruded tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deep penetration and fillet welded at all 4 corners of door with lifetime warranty.
- C. Finishes: Frame #1 shall be class I Powder coated (color to be selected by Architect). Color: Bone White
- D. Provide water deflector and high performance thermally broken "high performance" sill supplied by manufacturer. Provide bellows-type flexible expansion joint material at all sill flashing expansion joints.
- E. Provide water deflectors at each end of intermediate horizontal members, installed per framing manufacturer's installation instructions. Provide "L" profile end dams at each end of extruded sill flashing. Extruded sill flashing should be an integral part of the storefront framing system. Set in manufacturer approved sealant, seal all penetrations accordingly per manufacturer's instructions.
- F. Brake Metal: .125, .090 and .062 thick extruded aluminum, sizes as required for details and conditions as called for on drawings. Manufacturer to provide detailing at mullions for integral appearance. Match finish and color of storefront system.
- G. Provide 1" insulated glass. Refer to Section 08 81 00.
- H. Storefront to receive a mail slot. CRL NDMS13A 3" x 1 1/2" no draft mail slot or approved alternate. Color is to match storefront.

2.3 HARDWARE

Product Quality: Hardware items are to be ANSI Grade 1 Certification and are to be supplied by aluminum door supplier unless noted otherwise.

A. Closers:

1. Heavy duty surface closer, independently hung, with adjustable back check and 100 degree hold-open at exterior doors; slim line half covers, Finish to be selected by the Architect.
 - a. LCN 4040XP Spring Cush
 - b. Dorma 8916.
 - c. Norton J8300 Series.
 - d. Russwin 2810 Series.
 - e. Yale 3300 Series.
2. Cover to be screw-attached to closer body in at least two locations on top and bottom of closer.

B. Continuous Hinges:

1. 780-224HD continuous aluminum hinge, manufactured by Roton, Markar, or approved alternate.
2. Warranty: Manufacturer's lifetime warranty.

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- C. Door Exit Device:
1. Panic Device:
Manufacturer and Product: (All exit devices are cylinder doggable)
 - a. Von Duprin 33 Series
 - b. Dorma 9000 Series
 - c. Approved alternate.
 2. Provide panic device rear cover for N. mid rail doors.
 3. Provide keyed lever trim where called for on schedule.
- D. Locksets: (Note: Manufacturer and style to match lockset from selection specified in Section 08 71 00.)
1. *Schlage ('L' Series – Mortise lockset with Rhodes style lever handle)
OR
 2. Approved alternate
- E. Push/Pulls: Shall be Style CO-9/CPII as manufactured by Kawneer or approved alternate. Match storefront finish.
- F. Weather-stripping, for exterior doors only:
1. Head and Jamb: Replaceable wool, or polypropylene, or nylon wool pile with aluminum strip backing, recessed in frame; AAMA 701.2.
 2. At exterior door applications, provide weather-stripping as required at door perimeters and where double doors meet in center to provide watertight seal.
 3. Sill: Semi-rigid polymeric material on aluminum anodized to match door; EPDM sweep strip; 38-560 by Kawneer or similar by other named manufacturers.
- G. Mullion Seal:
1. Model 5100S, gray color, manufactured by National Guard Products or approved alternate.
 2. Install at all removable mullions.
- H. Threshold:
- (Threshold height not to exceed ½" to meet ADAAG guidelines.)
1. Model 896N, 5" deep, manufactured by National Guard Products, or approved alternate, ADA compliant panic threshold.
 2. Extruded aluminum, mill finish, neoprene seal, for exterior doors only.
 3. Where "square back" type threshold is called for, provide ADA compliant panic with square back. These types are to be used where backing up to terrazzo, ceramic tile, or other similar floor materials.
- I. Overhead Stop (frame mounted)
1. Glynn-Johnson Series 90, surface mount
 2. Dorma Series 900
 3. Approved alternate
- J. Removable mull (type as required for each door application)
1. Corbin Russwin (keyed)

- 2. Von Duprin (keyed)
- K. Door Shoe (with Rain Drip & Brush Sweep)
 - 1. 95WH Series by National Guard Products or approved alternate.
 - a. Color to match door finish.
 - b. Provide Door Shoe assembly at each exterior door leaf.
- L. Astragal Set
 - 1. 125N Series by National Guard Products or approved alternate.
 - a. One set astragals, aluminum with neoprene seals. Match door finish.
 - b. Install on each pair of exterior doors, extending from head to threshold.
- M. Drip Cap
 - 1. 1 ½" tall x 2 ½" deep, anodized aluminum
 - 2. National Guard Series 16 or approved alternate.
 - 2. Approved alternate
- N. Drip Strip
 - 1. ¾" wide x 1 ½" deep, aluminum.
 - 2. Model 17, manufactured by National Guard Products or approved alternate.
- O. Floor Stop:
 - 1. Rockwood Model 463. Drill 1" dia. X 2 ¾" deep hole. Replaceable rubber bumper with torx-type screw. Epoxy grout stem into place.
 - 2. Approved alternate.
- P. Latch/Lock Guard
 - 1. Nominal 10 inches long, 13 gauge stainless steel manufactured by Ives or approved alternate.
 - 2. Secure to door and frame per manufacturer's instruction for vandal-proof installation.
 - 3. Provide stainless steel, US32D finish.
 - 4. Provide type as required for door and latch type.
 - 5. For vertical rod exit devices, provide latch guard (type as required) at top and bottom of door.
- Q. Security Access System for security controlled doors
Security Access System (Type 1):
 - 1. Panic Device: Provide Von Duprin 33 series for medium or narrow style doors) with cylinder dogging capability.
 - 2. Electric strike with associated power supply in concealed location, manufactured by Locknetics or approved alternate. Access control device is provided by owner.
 - 3. Provide strike type as required to coordinate with latch and frame. Provide latch guard.
 - 4. Provide all low voltage control wiring as required from access control device junction box to power supply and to electric strike. Conceal all wiring in walls, ceilings, doorframes, etc. Refer to electrical drawings for locations.
 - 5. Reader Control by Owner

Security Access System (Type 2): (Rim panic device)

1. Panic Device: Provide Von Duprin XP-EL electric with retractable latch, “Request to Exit” low current function, and cylinder dogging capability where security access doors are scheduled. Provide latch guard.
2. Power Supply: Von Duprin PS914-2RS power supply with battery backup, installed in accessible, concealed location. Power supply to be capable of powering two latches, located no more than 200 feet from the power supply.
3. Power Transfer: Von Duprin Model EPT-10 power transfer door-to-frame transfer device or approved alternate.
4. Reader Control Device: By owner
5. Provide all low voltage control wiring as required from access control device junction box to power supply and to panic device. Conceal all wiring in walls, ceilings, doorframes, etc. Refer to electrical drawings and door/hardware schedule for locations.

2.4 HARDWARE FINISHES

- A. Aluminum hardware color to be clear anodized.
- B. Painted Hardware items to match storefront finish color.

PART 3 EXECUTION

3.1 PREPARATION

- A. Prep all doors and aluminum storefront members to accept and support specified and scheduled hardware items.

3.2 FABRICATION

- A. Fabricate doors and frames allowing for minimum clearances and shim spacing around perimeter of assembly, yet enabling installation.
- B. Rigidly fit and secure joints and corners. Make joints and connections flush, hairline, and weatherproof.
- C. Develop drainage holes with moisture pattern to exterior.
- D. Prepare components to receive anchor devices. Fabricate anchorage items.
- E. Arrange fasteners, attachments, and jointing to ensure concealment from view.
- F. Prepare components with internal reinforcement for door hardware.
- G. All exposed screws to be countersunk using flathead screws, flush with surface.

3.3 EXECUTION

- A. Verify wall openings are ready to receive work of this Section.
- B. Beginning of installation means acceptance of existing conditions.

3.4 INSTALLATION

- A. Install doors, frames, glazing, and hardware called for in accordance with manufacturer's instructions.
- B. Use anchorage devices to securely attach frame assembly to structure.
- C. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- D. Install sill flashings and end dams.
- E. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- F. Install hardware using templates provided. Refer to Section 08 71 00 for cylinders and installation requirements.
- G. Install perimeter flashings for storefront fabrications PRIOR TO storefront installation.
- H. Install perimeter sealant, backing materials, and installation requirements in accordance with Section 07 92 00. Provide sealant DO NOT INSTALL SEALANT AT SILL DRAINAGE HOLES AND SLOTS.
- I. Adjust operating hardware and touch panels.
- J. Closers to have through-bolt connections at door and frame.
- K. Wiring for devices requiring electrical power shall be concealed within aluminum frame and doors.
- L. Cut thresholds at door jamb around stops or jamb trim.

3.5 LATCH/LOCK GUARDS

- A. Latch and lock guards are to be installed on each exterior door.

3.6 TOLERANCES

- A. Variation from Plane: 0.03 inches per foot maximum or 0.25 inches per 30 feet whichever is less.

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B. Misalignment of Two Adjoining Members Abutting in Plane: 0.015 inches.

3.7 DOOR HARDWARE SCHEDULE

A. Locksets, exit devices, and other hardware items are referenced in the following hardware sets for series, type, and function. Refer to the above specifications for special features, options, cylinders/keying, and other requirements.

B. Note the following:

1. All aluminum door hinges are to be continuous hinges.
2. Panic devices are to be “doggable”.
3. Provide heavy-duty floor stops at all exterior doors unless noted otherwise on schedule.
4. All exterior doors to have weatherstripping set capable of keeping blowing rain out of building.
5. All exterior doors to have ADA closers, ADA threshold, door shoes, astragal set (if pair of doors), and drip caps.
6. Mullion seal (where removable mullions are scheduled)
7. All exterior single-leaf doors to have latch guard.
8. Set exterior thresholds in full bed of butyl caulk.
9. At the following doors, provide the security access control door hardware, low voltage wire and conduit, junction box for security access device and items as specified in this section:
 - a. Security Access System - Type 1
 - i. 109, 118A, 118B
 - b. Security Access System – Type 2
 - i. 100

C. Hardware sets:

#1: 100, 109, 118A, 118B

HARDWARE CALLOUT FOR EA. SINGLE OR DOUBLE DOOR
FOR USE ON DOOR #(S):

A101

- PANIC DEVICE W/ ELECTRIC RETRACTABLE LATCH (RIGHT LEAF), STANDARD PANIC DEVICE LEFT LEAF
- CONTINUOUS HINGE
- (2) CLOSERS W/ CUSH STOP
- (2) PULLS
- THRESHOLD
- (2) DOOR SHOE
- WEATHER STRIPPING
- CARD READER
- ASTRAGAL
- KEYED PANIC DEVICE (ELECTRIC PANIC)
- REMOVABLE KEY MULLION

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- MULL GASKET
- OVERHEAD FRAME MOUNTED STOP

109

- PANIC DEVICE W/ ELECTRIC RETRACTABLE LATCH
- CLOSER W/ CUSH STOP
- DOOR SHOE
- THRESHOLD
- CONTINUOUS HINGE
- WEATHER STRIPPING
- CARD READER
- PULL

118A, 118B

- PANIC DEVICE W/ ELECTRIC RETRACTABLE LATCH
- CLOSER
- DOOR SHOE
- THRESHOLD
- CONTINUOUS HINGE
- WEATHER STRIPPING
- DOOR BUMPER
- CARD READER
- PULL

END OF SECTION

COMPANY LETTERHEAD

CERTIFICATE OF GUARANTEE FROM INSTALLER

We, _____
(Name of Company or Contractor) agree to warranty aluminum storefront system on the below mentioned building for the period indicated. This agreement is to render the aluminum storefront system subject to the conditions outlined below.

OWNER OF BUILDING _____

Location of Building _____

City _____ Roof Area _____ square feet _____

This Guarantee effective this _____ day of _____, 20_____, for the term of FIVE (5) years from this date, provided any air and water leakage and system defects result from defective material or workmanship and are not caused by other mechanics, fire, accidents, or by nature over which we have no control.

It is understood and agreed that the Contractor will not be responsible for leaks or failure of the aluminum storefront system due to sustained winds in excess of speeds stated in manufacturer's warranty, or any other conditions over which we have no control as stated in manufacturer's exclusions.

Signed _____
Name of Company

By _____

Position _____

Company is a _____
Corp./Partnership/Individual

NOTARY PUBLIC

Registered in the State of _____

SEAL

NOTE: Aluminum storefront system manufacturer's Two (2) year system warranty and Two (2) year door construction warranty from the manufacturer is to be submitted in addition to the guarantee from the installer found on this form. Manufacturer's Warranty is mandatory - **NO EXCEPTIONS.**

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SECTION 08 71 00

FINISH DOOR HARDWARE

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Door hardware.
 - 2. Miscellaneous finish hardware.
 - 3. Latch & lock guards
- B. Related Sections:
 - 1. Section 08 11 13 - Hollow Metal Doors and Frames.
 - 2. Section 08 14 16 - Wood Doors.
 - 3. Section 08 43 13 - Aluminum Storefront, Doors, and Exterior Fixed Units

1.2 SUBMITTALS

- A. Comply with Section 01 33 00.
- B. Submit through Contractor to Architect. Prior to submitting, contact Architect to discuss door hardware/keying meeting per 1.3.A. If Architect chooses, submittal will be reviewed at time of meeting. Supplier will make corrections as determined through the course of this meeting, and distribute record copies to Architect and Contractor.
- C. Hardware Schedule: Submit final hardware schedule organized by "sets", to indicate specific product to be furnished for each item required in each set.
- D. Templates: Furnish templates to each fabricator of doors and frames, as required for preparation to receive hardware.

1.3 DOOR HARDWARE/KEYING MEETING

- A. Prior to ordering of hardware items, Contractor shall arrange meeting between, hardware supplier, Owner, and Architect to review and verify door hardware submittals and keying suggestions. This review meeting shall be considered as the submittal review. Any changes shall be incorporated in the hardware submittals and then resubmitted to Contractor and Architect as **record copy**. Contractor to notify all parties one (1) week prior to meeting date.

1.4 PRE-INSTALLATION MEETING

- A. Prior to installation of hardware items, Contractor shall arrange meeting between hardware installer, hardware supplier, and factory representatives of locks, locksets, exit devices, closers and specialty hardware items in order to review the installation requirements and procedures.

1.5 REFERENCES

- A. Comply with ADA Accessible Guidelines in regard to accessible or handicapped features for all door hardware items used on this project.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Product Quality: Hardware items are to be ANSI Grade 1 Certification.

2.2 HINGES

- A. Manufacturers:
 - 1. Stanley
 - 2. Hagar
 - 3. McKinney
 - 3. Approved alternate
- B. Material:
 - 1. Provide full mortise-type hinges with stainless steel pins, except steel pins with steel hinges; non-removable for exterior and public interior exposure, non-rising for non-security exposure, flat button with matching plugs. Provide stainless steel hinges on exterior applications.
 - 2. Ball-bearing Function: Swaged, inner leaf beveled, square corners.
- C. CONTINUOUS HINGES
 - 1. Roton, model 780-224 HD series. (No substitutions accepted)
 - 2. Pemko, FM-HD1 Series
 - 3. Warranty: Manufacturer's lifetime warranty.

2.3 LOCKS, LATCHES, AND BOLTS

- A. Manufacturers:
 - 1. Schlage ("LV" Vandlgard Series – Mortise lockset with Rhodes style lever handle)
 - 2. Approved Alternate Manufacturers:
 - a. Corbin Russwin, CLX3300 Series – NZD Lever
 - b. Sargent, 10X Series, LL lever
 - c. Best Locks, 9K Series – 15 lever
 - d. Approved alternate. Refer to Section 01 60 00.

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3. Special operation:
 - a. Provide mortise type privacy "OCCUPIED" indicator where called for.
4. Note: Locksets and lock cylinders for aluminum doors are provided under this section.
5. Warranty: L Series Mortise (3-year),
Electro-mechanical (1-year)

B. Materials:

1. Strikes: Wrought box strikes, with extended lip for latch bolts, except open strike plates may be used in wood frames. Provide dustproof strikes for foot bolts.
2. Locks: Cylindrical locksets equipped with 6-pin tumbler; with interchangeable cores and keyed per keying schedule. Provide 2-3/4" backset. Provide three keys for each lock.
 - a. All interior locks to have standard interchangeable cores.
 - b. **All exterior doors, and where called for on drawings, locks to have cores with additional security measures.**

Acceptable Manufacturers:

- 1) Schlage "Primus" locks
- 2) Sargent "Signature" Series
- 3) Corbin Russwin "Access 3" Series

2.4 DOOR CONTROL DEVICES

A. Closers:

1. Interior Doors:
 - a. LCN 1460 Series (with extra duty arm where called for on hardware schedule)
 - b. Norton Rixson 8501 Series
 - c. Sargent 1430 Series
 - d. Corbin Russwin DC6200
 - e. Approved alternate
 - f. Warranty: Provide minimum 30 year warranty for closer operation.
 - g. Install per 3.2.E
2. Exterior Doors:
 - a. LCN 4040XP-Spring Cush Series.
 - b. Dorma 8900 Series with spring stop
 - c. Norton Rixson 9500 Series
 - d. Sargent 281 Series
 - e. Corbin Russwin DC8000 Series
 - f. Approved alternate.
 - g. Warranty: Provide minimum 30 year warranty for closer operation.
 - h. Install per 3.2.E
3. Provide all brackets and spacers necessary for all door and frame conditions.

C. Security Access Controlled Doors

Security Access System (Type 1):

1. Use where access control is required

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2. Electric strike with associated power supply in concealed location, manufactured by Locknetics or approved equal. Access control device is provided by owner.
 - a. Provide strike type as required to coordinate with latch and frame.
 - b. Provide all low voltage control wiring as required from access control device junction box to power supply and to electric strike. Conceal all wiring in walls, ceilings, doorframes, etc. Refer to electrical drawings for locations.
3. At the following doors, provide security access control door hardware, low voltage wire and conduit junction box for security access device and items as specified in this section.
 - a. Security Access System – Type 1
 - 1) 112

D. Electromagnetic Lock:

1. Provide Model #M450/452, 12/24 VDC surface-mounted electromagnetic lock manufactured by Schlage, Securitron M62/M82 or approved alternate. Finish is anodized aluminum. Holding force to be minimum 1000 lbs.
2. Furnish with required power supply with battery backup, designed to operate 4 Mag Locks. Provide AC power to power supply.
3. Configure operation so that activation of lock is activated and deactivated by owner's central computer. Refer to electrical drawings.
4. Electromagnetic lock system to be tied into fire alarm system. If fire alarm is in alarm mode, power to the electromagnetic locks will be cut off, allowing the doors to be opened. Coordinate installation with fire alarm installer.
5. At each mag lock installation, provide a passive infrared motion sensor 12/24VDC, 26mA, Scan II manufactured by Schlage, Securitron XMS2, or approved alternate.
6. At each mag lock installation, provide a release button, 709GR EX ILL-2" green square Illuminated "PUSH TO EXIT", manufactured by Schlage, Securitron EEB3, or approved alternate.
7. The motion sensor and the release button, once activated, will release the electromagnetic lock and allow passage through the door.
8. Install electromagnetic lock and accessories per manufacturer's instruction. Provide all components for a complete installation.
9. Doors with electromagnetic lock for all glass doors: 100A, 100B

E. Materials:

1. Provide grey rubber exposed resilient parts.
2. Any floor stop other than that specified will not be accepted.
3. All closer cylinders to be cast iron.

2.5 MISCELLANEOUS HARDWARE

- A. Silencers: Provide in metal door frames, unless not permitted for fire rating, or unless bumper-type weather-stripping is provided; three for each single door frame, two for double-door frame.
1. 3M
 2. Hager
 3. Glynn Johnson

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4. Pemko
 5. Approved alternate.
- B. Wall Bumper:
1. Rockwood 400 Series, Concave Style
 2. Glynn-Johnson 60 Series, Concave Style
 4. Approved alternate.
- C. Cabinet-Mounted Bumper:
1. Rockwood 430, “Duraflex” bumper with solid brass trim, concealed mounting, finish color to match door lockset, mounted on countertop edge or window sill edge.
 2. Approved alternate.
- D. Manual Flush Bolt:
1. Rockwood #555 12”
 2. H.B. Ives #458
 3. Glynn-Johnson FB6
 3. Approved alternate.
- E. Automatic Flush Bolt
1. Rockwood model 2840
 2. H.B. Ives model FB61T series (*wood doors*), model FB 31T series (*hollow metal doors*)
 3. Approved alternate.
- D. Pull and Push Manufacturers:
1. Rockwood model 111 x 70C pull plate (.125” thick x 4” x 16” plate with 10” pull); model 73C push (.125” thick x 4” x 16”)
 2. Approved alternate.
- E. Threshold:
- (Threshold height not to exceed ½” to meet ADAAG guidelines.)
1. 5” deep, ADA compliant panic threshold
 - a. NGP - Model 896HDN
 - b. Pemko 2005 Series
 2. Extruded aluminum, mill finish, neoprene seal, for exterior doors only.
 3. Provide saddle-type threshold where threshold is called for at interior locations.
- F. Weatherstripping:
1. Model 135N series, aluminum with neoprene seal, manufactured by National Guard , Pemko 303-PK, or approved alternate.
 2. Provide with dark bronze finish.
 3. Provide other models as required to coordinate with special door hardware items.
- G. Mullion Seal:
1. Model 5100N, gray color, manufactured by National Guard Products, or approved alternate.

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- a. Pemko 5110BL
- 2. Install at all removable mullions.
- H. Door Coordinator:
 - 1. Hager, #297D Coordinator. See drawings for size.
 - 2. Ives CO series
 - 3. Rockwood 2600 Series
 - 4. Approved alternate.
- I. Frame-mounted Door Hold-open & stop:
 - 1. Glynn-Johnson Series 90, surface mounted
 - 2. Dormakaba Series 900
 - 3. Norton Rixson 9 Series
 - 3. Approved alternate.
- J. Floor Stop:
 - 1. Rockwood Model 463. Drill 1" dia. X 2 3/4" deep hole. Replaceable rubber bumper with torx-type screw. Epoxy grout stem into place.
 - 2. Approved alternate.
- K. Sweep
 - 1. 198 Series by National Guard Products
 - 2. Pemko 315-N
 - 3. Approved alternate.
 - a. Neoprene sweep with natural anodized aluminum trim. Size as required to cover door undercut.
- L. Door Shoe (with Rain Drip & Brush Sweep)
 - 1. 95WH Series by National Guard Products, Pemko 223NB or approved alternate.
 - a. Provide with dark bronze finish.
 - b. Provide Door Shoe assembly at each exterior door leaf.
- N. Astragal Set
 - 1. 125N Series by National Guard Products, Pemko 305-N, or approved alternate.
 - a. One set aluminum with neoprene astragal seals with dark bronze finish.
 - b. Install on each pair of exterior doors, extending from head to threshold.
- O. Keyed Removable Mullion (Model as required to coordinate with each installation)
 - 1. Von Duprin
 - 2. Corbin Russwin CR900
 - 3. Sargent 980
 - 3. Approved alternate. (Keyed)
- P. Wall Stop
 - 1. Trimco #1205
 - 2. Ives #WS443
 - 3. Glynn-Johnson #WB35

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4. Rockwood 406/409
5. Approved alternate.

Q. Door Viewer

1. Model Del-55221026, manufactured by Deltana, Brainerd, or approved equal.
2. 200 degree viewing angle, polished chrome finish.

R. Latch/Lock Guard

1. Nominal 10 inches long, 13 gauge stainless steel manufactured by Ives or approved alternate.
2. Secure to door and frame per manufacturer's instruction for vandal-proof installation.
3. Provide stainless steel, US32D finish.
4. Provide type as required for door and lockset type.

S. Drip Cap

1. 2 ½" wide x 1 ½" deep, color to be selected by the Architect
2. NGP Model 16A, Pemko 346, or approved alternate.

T. Drip Strip

1. ¾" wide x 1 ½" deep, aluminum.
2. NGP Model 17, Pemko 345, or approved alternate.

2.6 FINISH

- A. All exposed interior hardware and door control devices to be furnished with US19 Matte Black Finish. Exterior hardware finish to be US30D.
- B. Painted hardware items to match color of door control devices.

2.7 FABRICATION

- A. Finish and Base Material Designations: Number indicate BHMA Code or nearest traditional U. S. commercial finish. US32D or equivalent.

PART 3 EXECUTION

3.1 COORDINATION

- A. Hardware supplier to verify and coordinate door and frame preparation, including required reinforcement in hollow metal doors and frames for hardware attachment.

3.2 INSTALLATION

- A. Hardware Mounting Heights: Door and Hardware Institute Recommended Locations for Builders Hardware for Standard Steel Doors and Frames, except as otherwise indicated.

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- B. Install each hardware item to comply with manufacturer's instructions and recommendations.
- C. Door closers, door coordinators, and frame-mounted overhead stops shall be installed to frames, using machine thread type screws. Holes shall be tapped in hollow metal frames to accept threaded screws. Screws shall be of a size as recommended by hardware manufacturer.
- D. All other hardware items mounted to door shall be required to be mounted to door with appropriate through bolts for wood doors and machine thread type screws for hollow metal doors. Holes shall be tapped in hollow metal door reinforcement to accept threaded screws. Screws shall be of a size as recommended by hardware manufacturer.
- E. Door closers, door coordinators, and frame-mounted overhead stops at all **exterior and interior doors** shall have through-bolt connections at door. Exposed head of bolt shall be of a flush, smooth type.
- F. **'TEK' TYPE SCREWS ARE NOT TO BE USED.** Use fasteners provided by hardware supplier for each corresponding hardware device for door and frame type and as specified in this specification.
- G. Install each hardware item per manufacturer's instructions. If any item fails to operate properly because of improper installation, it shall be the installer's responsibility to correct. If item continues to malfunction or if Contractor or Architect suspects any hardware item to be defective, hardware supplier shall examine item in question. If Supplier determines item is defective, he shall replace item at no extra cost to owner.
- H. Thresholds to be cut around jamb stops for snug fit to door jambs.

3.3 ADJUSTING

- A. Hardware Adjustment: Return to project one month after Owner's occupancy, and adjust hardware for proper operation and function.

3.4 KEYING

- A. Locksets and cylinders are to be master keyed to present schedule. Prepare and submit a detailed list of complete keying recommendations to the Architect, which will be discussed during keying meeting. Coordinate desired keying schedule with owner prior to submitting of keying recommendation. Furnish three (3) keys for each individual lock in addition to three (3) master keys.
- B. Each key for entire project to be stamped for identification.
- C. Provide a key cabinet 1200 Series, surface mounted, 2-1/2" deep cabinet, two-tag system, manufactured by Lund or approved equal. Size to be determined by key quantity. See Drawings for location.

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- D. Provide construction keying for exterior locks. When project is substantially complete, disable all construction keying.

3.5 LATCH/LOCK GUARDS

- A. Latch and lock guards are to be installed on each single leaf exterior door.

3.6 HARDWARE ALLOWANCE:

REFER TO CONSTRUCTION MANAGER PACKAGE FOR ALLOWANCE

- A. Provide an allowance per Construction Manager Package for any changes or additions to door hardware. The hardware sets listed below are to be included in contract price.
- B. Items not included in above allowance.
 - 1. Rough Hardware
 - 2. Toilet Partition Hardware
 - 3. Hardware for doors specified elsewhere
 - 4. Millwork hardware

3.7 TYPICAL DOOR HARDWARE FOR EXTERIOR AND INTERIOR DOORS

- A. Each leaf of all exterior hollow metal doors, unless noted otherwise, is to receive the following hardware items:
 - 1. ADA Accessible closer.
 - 2. Continuous hinges
 - 3. Weatherstripping set
 - 4. ADA Threshold (Set in butyl rubber sealant)
 - 5. Astragal set (for pair of doors)
 - 6. Door shoe
 - 7. Mullion seal (for removable mullions)
 - 8. Drip cap
- B. Each leaf of all interior doors, unless noted otherwise, is to receive the following hardware items:
 - 1. For door leaves up to 3' 4" in width, provide three butt hinges
 - a. For leaves 3'-5" to 3'-10", provide four butt hinges.
 - b. For leaves 4'-0" or wider, provide continuous hinge as specified.
 - 2. Provide three silencers for single leafs, two silencers for double leafs.
- C. Refer to drawings for hardware sets schedule.

END OF SECTION

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SECTION 08 81 00

GLASS AND GLAZING

PART 1 GENERAL

1.1 SUMMARY

- A. Furnish all labor, materials, tools, equipment, services, operations and incidentals necessary to install, complete in every respect, all glass, glazing, and related work as indicated on Drawings and specified.

1.2 RELATED WORK DESCRIBED ELSEWHERE

- A. Glass and glazing, as required under various Sections of these Specifications including, but not limited to:
 - 1. Hollow Metal Work: Section 08 11 13.
 - 2. Wood Doors: Section 08 14 16.
 - 3. Aluminum Storefront: Section 08 43 13
 - 4. Aluminum Windows: Section 08 51 13
- B. Installation materials specified in Sealants and Caulking: Section 07 92 00.

1.3 REFERENCES

- A. ASTM C1048 "Standard Specification for Heat Treated Flat Glass – Kind HS, Kind FT Coated and Uncoated Glass."
- B. ASTM C1279 "Standard Test Method for Non-Destructive Photoelastic Measurement of Edge and Surface Stresses in Annealed, Heat-Strengthened, and Fully Tempered Glass" Requirements.

1.4 SUBMITTALS

- A. General: Comply with the provision of Section 01 33 00.
- B. Product Data: Within 30 calendar days after award of the Contract, submit:
 - 1. Complete materials list showing all items proposed to be furnished and installed under this Section.
 - 2. Sufficient data to demonstrate that all such materials meet or exceed the specified requirements.
- C. Shop Drawings:
 - 1. Submit detailed shop and installation drawings of all work under this Section to Architect for approval prior to ordering materials.
 - 2. Indicate glass sizes, thickness, glazing details and where mirrors are to be installed in the building.

08 81 00-1

3. Shop Drawings shall include engineering data on the Aluminum Entry/Storefront and other glazing systems, including the size and spacing of setting blocks under the glass and wind load.

1.5 FIELD MEASUREMENTS

- A. Accurately field measure all openings to receive glass and cut glass to correspond to each measured opening. The General Contractor and Glazing Contractor shall be responsible for overall coordination and accuracy of the Field Measurements.

1.6 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this Section before, during, and after installation and to protect the work and materials of all other trades.
- B. Replacement: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

1.7 GUARANTEE

- A. Contractor shall furnish a written guarantee covering all mirror silvering from defects in material and workmanship for a period of five years from date of final acceptance of the building.
- B. All glazing work performed under this Section shall be guaranteed against defects in materials and workmanship for a period of one year from date of final acceptance of the building. This guarantee, however, shall not cover accidental breakage of glass subsequent to acceptance except where breakage is due directly to defective materials and/or inferior workmanship.
- C. All sealed insulating glass shall be warranted against failure of the air seal for a period of ten (10) years from the date of substantial completion.

PART 2 PRODUCTS

2.1 GLASS

- A. General: Glass is called for by "type" (i.e. Insulated, wire, etc.) on Details and Schedules in the Drawings. The "types" are defined herein.
- B. Tempered Glass: Provide Tempered Glass where called for on the Drawings or in these Specifications, and where such tempering would be required under provisions of the International Building Code, latest edition, or other applicable laws and regulations.
- C. Heat Strengthened Glass: Unless Tempered glass is required by code, glass at exterior walls shall be heat treated to have a surface compression between 3,500 and 7,500 psi to increase its strength to resist impact, mechanical loads and thermal stress breakage.

08 81 00-2

- D. All glass shall conform to the requirements of Federal Specification DD-G-451c, or as indicated with individual glass types.
- E. Unless noted otherwise, Glass will be manufactured by Vitro (formerly PPG), Guardian Glass or approved alternate. Each light shall bear the manufacturer's label designating the type and thickness of glass. "AFPC V2 2701.1 "Each unit of tempered glass shall be permanently identified by the manufacturer. The identification shall be etched or ceramic fired on the glass and be visible when the unit is glazed. Tempered spandrel glass is exempted from permanent labeling. This type of glass shall be identified with a removable paper label by the manufacturer.
- F. Individual glazed areas in hazardous locations shall meet requirements CPSC 16, CFR Part 1201.
- G. Size: Sizes of glass indicated on Drawings are approximate, actual sizes of glass shall be taken from actual frames. Labels shall remain on glass until after inspection by the Architect.
 - 1. Actual design sizing shall be the responsibility of the glass manufacturer. Sizes indicated herein and on the Drawings are approximate only. Where required, the manufacturer's recommended changes shall be made. Note all such changes or revisions on the Shop Drawings submitted for approval.

2.2 GLASS TYPES

- A. Single Thickness Plate Glass: Shall be 1/4" thick clear glazing quality float glass.
- B. Tempered/Safety Glazing: Shall be 1/4" thick clear Tuf-flex Tempered Safety Glass to meet the requirements of Federal Specifications DD-G-1403B, ANSI Z97, 1-1984 and the Federal Standard 15 CFR 1201.
- C. Laminated (shatter resistant) Glass: Shall be 7/16" thick clear composed of 3/16"(5mm) clear float glass, 0.06" clear PVB and 3/16"(5mm) clear float glass. Cat II (CPSC 16 CFR 1201, ANSI Z97.1) and UL972
- D. Wire Glass: Clear, square mesh of woven stainless steel wire of 1/2 inch grid size; 1/4 inch thickness, installed in fire rated assembly. Glass is to be labeled. Provide glazing equal to TGP "Wirelite NT"
- E. Insulated Glazing: Shall be 1" thick Thermopane Insulating Glass as follows, refer to drawings for locations:
 - 1. Low-E Glass:
 - a. Solarban 60 (2) gray 1/4"(6mm), 1/2" Air Space, Clear 1/4"(6mm). Manuf. By Vitro
 - b. Sunguard SN 68 (2) gray 1/4"(6mm), 1/2" Air Space, Clear 1/4"(6mm). Manuf. By Guardian.
 - c. SHGC= 0.30 - 0.32
 - d. U value= 0.29

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- F. Frosted Insulated Glass: 1" thick Thermopane insulating glass with frosted finish on #3 surface.

2.3 GLAZING COMPOUNDS AND SEALANTS

- A. General: Use glazing compounds and preformed glazing sealant approved for the particular application as described herein and shown on the Drawings or specified in the Related Work referenced in Paragraph 1 b) of the Section, unless otherwise noted.
- B. Glazing Compound shall be GE SILGLAZE, clear or neutral color, unless approved otherwise by the Architect.
- C. Setting Blocks and Gaskets shall be extruded hard neoprene, clear or neutral color unless noted otherwise.
- D. Tape shall be polyisobutylene base elastic compound with gauze reinforcement, equal to Presstite 162 Elastic Compound Tape, clear or neutral color unless noted otherwise.
- E. Sealants used for glazing shall be G.E. Silicone, Dow-Corning Silicone Structural Sealant, or as approved by the Architect. Silicone shall be clear or neutral color as approved by Architect.

2.4 GLAZING ACCESSORIES

- A. Provide all glazing accessories required to supplement those accessories which accompany the items to be glazed, and as needed to provide a complete installation, including glazing points, clips, shims, angles, beads, settling blocks, and spacer strips. Use ferrous metal, which will be exposed in the finished work, which has a finish that will not corrode or stain while in service.

2.5 INSPECTION

- A. Examine the areas and conditions under which work of this Section will be installed. Correct conditions detrimental to the proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.
- B. Verify all field dimension openings prior to glass fabrication and cutting. Cut pieces to fit actual opening sizes.

PART 3 EXECUTION

3.1 INSTALLATION

- A. General:
 - 1. All glass shall be accurately cut or sized to fit openings and locations and shall be set by skilled glazers. Extreme care shall be exercised in sizing the insulating glass to allow recommended clearances around glass.

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2. Cut and install glass with any visible lines or waves running in horizontal direction.
3. Fix movable and operating items securely, or in a closed, locked position until glazing compound has thoroughly set.
4. Use insulating units which do not have corners or edges ground, nipped, cut, or fitted after leaving the factory. Do not subject units to springing, forcing, or twisting during setting. Handle so as not to strike the setting frames or other objects.
5. Use beads or stops furnished with the items to be glazed to secure the glass in place.
6. Items to be glazed shall be shop-glazed or field-glazed with glass of the quality and thickness specified.

3.2 GLASS SETTING

- A. Wood Doors and Wood Frames: Field glaze all wood doors and wood frames with glazing sealant and flush solid wood stops as indicated on Drawings. (Metal stops where required for fire rating)
 1. Use sufficient glazing sealant to insure a complete seal between glass and stop.
 2. After stops have been installed and pulled up tight, trim bead of sealant resulting from setting operations away from face of glass. Retouch damaged compound after glazing.
- B. Aluminum Doors, Frames, Storefront and Windows:
 1. All openings shall be field-glazed in strict conformance with aluminum door frame and window manufacturer's written instructions.
 2. Install glass types as indicated on Drawings and described in this Section.
 3. Extruded EPDM elastomeric glazing gaskets shall be supplied with each aluminum door, frame or window by the manufacturer.
 4. All installations shall be completely watertight when finished.

3.3 REPLACEMENT AND CLEANING

- A. Replacement: Glass broken or glass damaged before completion of the building operations shall be replaced with glass of the like kind and quality at no cost to the Owner.
- B. Cleaning: Upon completion of all construction work and approval of all glazing installations, remove from the glass surfaces, surrounding framing materials and mirrors all labels, sealant and caulking compound smears, spots, etc. Do not use cleaning materials or agents which will damage glass or surrounding surfaces. After cleaning, wash all glass and mirrors completely.

END OF SECTION

08 81 00-5

SECTION 09 29 00

DRYWALL

PART 1 GENERAL

1.1 SUMMARY

- A. Furnish materials and labor to complete installation of all interior drywall and miscellaneous metal trim items as indicated on plans and specified herein.
- B. Gypsum board surface texturing
- C. Reveal Moldings
- D. Wood Blocking

1.2 SUBMITTALS

- A. Comply with requirements of Section 01 33 00.

1.3 RELATED SECTIONS

- A. Section 05 40 00 - Cold Formed Framing
- B. Section 07 27 26 – Fluid-Applied Weather Barrier System
- C. Section 09 22 16 – Non-Load Bearing Metal Stud Wall Framing
- D. Section 09 91 00 - Painting.

1.4 REFERENCES

- A. ASTM C1396-Standard specification for gypsum board
- B. ASTM E90- Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements (ISO 140, Part 3)

1.5 ACOUSTICAL PERFORMANCE

- A. Gypsum board wall assemblies for academic and office areas to have a minimum sound transmission class (STC) of 41.

09 29 00-1

PART 2 PRODUCTS

2.1 MATERIALS:

- A. All gypsum board shall be type "X" fire code, manufactured by Gold Bond, USG, or CertainTeed. Thickness as indicated on drawings. Provide water-resistant in damp areas and where called for. All gyp board shall be installed in accordance with manufacturer's printed instructions and as specified herein. Use water resistant materials in shower areas.
- B. Cementitious Fiber-Mat Reinforced Sheathing (Cement Board): ASTM C 1325, ANSI A118.9, cementitious backer.
 - 1. Product: DUROCK Brand Cement Board by United States Gypsum Company, "Fiberock Aqua Tough" by USG, or approved alternate.
 - 2. Type and Thickness 5/8 inch thick.
 - 3. Size: Supplier's choice.
- C. Gypsum board thickness
 - 1. Unless noted otherwise in this specification or on drawings, gypsum board thickness to be 5/8".
- D. Reveal moldings (Fry Reglet or approved alternate.)
 - 1. Where new gypsum board terminates at CMU, provide series "DRMZ", 1/2" wide reveal. Depth to be gypsum board thickness.
 - 2. Finish to be chemical finish, capable of receiving paint.

PART 3 EXECUTION

3.1 INSTALLATION:

- A. Painted Gypsum Board:
 - 1. In areas calling for painted gypsum wallboard 5/8 thick, apply with length parallel to the studs in lengths sufficient to extend from floor to ceiling with no horizontal joints.
 - 2. Attachment to be by screws 12 inch o.c. in the field and 8 inch o.c. along vertical abutting edges, and 7 inch o.c. on ceiling areas. Type 'X' shall be attached 7 inch o.c. edges, ends, and field.
 - 3. All taping and texture shall be done in accordance to printed instructions as supplied by Gold Bond and approved by the Architect. All texture shall be approved by the Architect before proceeding with the work.
 - 4. At metal stud sound walls with multiple layers of gypsum board on one or both sides, each layer is to be taped and floated to deck. Outer layer to be finished as well. At deck, cut gypsum board to fit profile of deck. Seal joint at deck with continuous bead of polyurethane sealant.
 - 5. Provide metal "J" mold where edge of gypsum board abuts a different material or edge of gypsum board is to remain exposed.
 - 6. All painted gypsum board will be textured per this specification unless noted otherwise.

09 29 00-2

7. Suspended drywall framing shall be attached to structure with No. 12 gauge hanger wires spaced not more than 2'-0" on center in one direction and 2'-0" on center in the other.

B. Cement Board

1. Install cement board backer in areas where wall tile is scheduled to be installed. Attach with screws, complying with Manufacturer's recommendation and instruction.
2. Prep for ceramic tile installation in accordance with applicable requirements of The Tile Council of North America.

3.2 GYPSUM BOARD SURFACE TEXTURING:

- A. Where exposed to view, provide light to medium "orange peel" gypsum compound texture on gypsum board surfaces and where called for on drawings unless noted otherwise.
 1. Provide two 2' x 2' mockup boards with both light and medium orange peel finish for Architect's and Owner's review and approval.
- B. Wall to have level 4 finish or better.
- C. **Do not** texture on surfaces scheduled to receive vinyl wall covering or Dry Erase Coating.
- D. Texture to be uniform on walls throughout building.
- E. Contractor to apply orange peel texturing to sample mockup panel and be approved by Architect prior to any further application

3.3 CONTROL JOINTS

- A. Galvanized metal control joint, Model 093 by USG or approved alternate.
- B. Control joints are to be provided at approximately 30'-0" o.c. horizontally and vertically at wall, ceiling, light coves and furrdown installations. Joints should be located at corner of door or window heads if spacing allows and where shown or called for on drawings. These shall be considered minimum requirements.
- C. Drywall contractor will repair any cracks in drywall for the one-year warranty period.

1.4 WOOD BLOCKING

- A. Install 2 x wood blocking in walls where concealed behind drywall for anchoring of wall-mounted items such as (but not limited to) wall mounted door hardware, markerboards, tackboards, projector screens, TV brackets, etc. **Metal plate backing will not be accepted for anchoring of wall-mounted items.**
- B. Provide blocking treated for fire resistance where required by code and as specified or called for.

09 29 00-3

3.5 CLEAN-UP

- A. The Contractor shall be responsible for complete clean up on his contract at completion of same.

END OF SECTION

09 29 00-4

SECTION 09 31 13

CERAMIC TILE/PORCELAIN TILE

PART 1 GENERAL

1.1 SUMMARY

- A. Section 03 30 00 - Cast-In Place Concrete: Concrete slab moisture mitigation
- B. Furnish all materials, labor, tools, equipment, services, operations and incidentals necessary to complete all ceramic tile work as indicated in the drawings and specified.
- C. Pre-Install meeting

1.2 RELATED SECTIONS:

- A. Gypsum Drywall Systems: Section 09 29 00.
- B. Wall Tile Backer Board: Section 09 29 00
- C. Performed Expansion Joints: Section 07 95 13
- D. Sealing of Joints: Section 07 92 00

1.3 QUALITY ASSURANCE:

- A. Standards: Comply with standards specified in this section.
- B. Subcontractor / supplier providing work under this section will install work specified in this section with their company's own installers, employed by the company. **Subcontracting of installation will not be allowed unless approved by Architect prior to bid.**
- C. Qualifications of Manufacturer: Products used in the work of this section shall be produced by manufacturer regularly engaged in manufacture of similar items and with a history of successful production.
- D. Qualifications of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this section.

1.4 SUBMITTALS:

- A. Submit through Contractor to Architect, comply with Section 01 33 00.

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- B. Manufacturers' Data: As soon as possible after award of the Contract, submit:
 - 1. Complete materials list of all items proposed to be furnished and installed under this section, including manufacturer's recommended installation procedures.
 - 2. Manufacturers' specifications and other data required to demonstrate compliance with the specified requirements.

1.5 SAMPLES:

- A. Contractor shall submit samples of all ceramic and porcelain tile to be used on this work.

1.6 GUARANTEE:

- A. All work under this section shall be guaranteed free from defects in material and workmanship for a period of one (1) year from date of final acceptance.

1.7 PRE-INSTALL MEETING:

- A. Prior to tile installation, Contractor will schedule a meeting with the tile installer, Owner and Architect.
- B. Items for discussion will be topics such as expectations, tile patterns, verification of tile and grout colors, special conditions, and other items as deemed necessary.

PART 2 PRODUCTS

2.1 MATERIALS:

- A. Tile: Tile shall be Standard Grade in accordance with applicable requirements of the tile Council of North America (TCNA) 137.1-(current edition). Furnish a properly executed certificate of grade in the standard form of Master Grade Certificate. Tile shall be delivered to the work in the manufacturer's unopened package sealed with standard grade certificates, and shall be branded with or have sealed within the shipping marks and other designations corresponding to the information given on the executed certificate of grade.
- B. Unless specifically called for, tile shall be equal to those described below as manufactured by: Dal Tile, The American Olean Tile Company, Trinity Tile Company, or approved alternate.

2.2 TILE TYPES:

The following tiles as manufactured by the Company listed, shall be the standard of equality design and color. Other manufacturers must meet or exceed the tile NOTED in each case and be approved by Architect. Appearance will be a definite factor in selection.

- A Wall Tile:
 - 1. Provide 12" x 24" porcelain wall tile, Crossville "Gotham" Porcelain Stone, color AV321 Lamp Post.

2. Base: Provide 6" x 12" porcelain tile cove base floor tile. Base tile to have surface type cove angle for thin set installation. Daltile "Consulate", color Premier Grey Antique CS05, matte finish
- C. Edge Trim: Provide "Schiene" series or "Reno-U" series metal edge and transition strips manufactured by Schluter or approved alternate. Install "Schiene" series at all locations where tile transitions to a different flooring material or "Reno-U" series where tile transitions to concrete floor.

2.3 MORTAR

- A. Mortar/Adhesive: Tile wall-installation (interior non-wet areas):
 1. Manufacturer/Product:
 - a. Mapei KB/KL or Ultraflex LFT
 - b. Laticrete #272 Premium Floor-N-Wall thin-set mortar with #333 super flexible additive, or Laticrete 4XLT, meeting ANSI A108.1A, A108.1B, A108.1C, A118.4, A118.11, and A118.15.
 - c. Approved alternate
- B. Mortar/Adhesive: Tile wall and floor installation (Interior wet areas):
 1. Manufacturer/Product:
 - a. Mapei
 - b. Laticrete Latapoxy SP-100 (700 series), meeting ANSI A108.6 and A118.3.
 - c. Approved alternate
 2. Provide where installing tile in shower enclosures, toilets or similar areas with a potential of water intrusion.

2.4 GROUT

- A. Following setting and curing of installed floor and wall tile, grout joints with epoxy grout for tile installation on interior walls and floors:
 1. Manufacturer/Product:
 - a. Mapei Kerapoxy CQ, meeting ANSI A118.3.
 - b. Laticrete Spectralock Pro Premium, meeting ANSI A118.3.
 - c. Approved alternate.
- B. Cure installed tile as per manufacturer's written instructions prior to installation of grout.
- C. Water shall be fresh, clean and free from deleterious amounts of acid, alkali, or any organic matter.
- D. Grout color as selected by Architect from Mapei or Laticrete standard color selection. In room where more than one grout type is used, color grout shall be consistent throughout.
- E. Sealants for Tile:
 1. 100 percent silicone sealant, Mapei "Mapesil T" silicone sealant, Laticrete "Latisil" silicone sealant, or approved alternate.

2. Provide sealant in place of grout where wall tile butts hollow metal or aluminum door and window frames.

2.4 GROUT SEALER

- A. Water-based grout sealer, "Ultracare" manufactured by Mapei, (800)426-2734, Aqua Mix Grout Sealer manufactured by Custom Building Products, 800-272-8786, or approved alternate.

PART 3 EXECUTION

3.1. INSPECTION:

- A. Examine the areas and conditions under which work of this section will be installed. Correct conditions detrimental to the proper and timely completion of the work.
- B. Calcium Chloride Moisture and pH Testing is required to be performed to the floor prior to tile installation. Perform test following industry standards. Architect to be notified of results as soon as results are ready.
- C. Do not begin work until surfaces scheduled to receive tile are acceptable. Surfaces shall be true with maximum variation not exceeding 1/8" in eight feet.
- D. Coordinate wall tile layout with ceiling installer to assure there will be no gaps between finished ceiling and wall tile.

3.2 INSTALLATION:

- A. General:
 1. Thoroughly mix all materials and install mortar, tile and grout as per the manufacturer's written instructions.
 2. All tile shall be set, grouted and cleaned in accordance with Tile Council of North America Specifications for Installation of Ceramic Tile for adhesive and grout specified and ANSI A108.1 A-C, A108.4-.13, A118.1-.10 and A136.1 (current addition).
 3. At stud walls, thin-set wall tile will be installed over cement board. Refer to Section 09 29 00.
 4. At CMU walls, thin-set wall tile will be installed to cement board, attached to CMU to provide smooth, uniform substrate for flush tile installation.
- B. Tile shall be neatly cut for proper fitting around all fixtures, pipe, accessories, etc. Rub cut edges with an abrasive stone to bring edge of glaze slightly back from body of tile. Where pipes pass through tile occurring on walls thoroughly caulk with sealant to completely seal around opening. Sealant shall be clear or match color of tile.

- C. Floor levelness uniformity at wall perimeter where floor tile is to be installed shall be verified prior to floor and wall tile being installed. Where floor is not uniform at perimeter walls, install floor leveling product compatible with tile and concrete so that perimeter is uniform about the perimeter of the room or area.
- D. When grout has thoroughly cured, apply minimum 2 coats grout sealer per manufacturer's instructions. Clean sealer from tile.
- E. If wall mirrors are specified, coordinate tile pattern and layout to accommodate mirrors. Mirror to be installed on single plane.
- F. Where tile is installed over cement board substrate, align with control joints and fill tile joints where control joints occur with polyurethane sealant, custom colored to match grout color.

3.3 CLEANING AND PROTECTION:

- A. All work shall be thoroughly cleaned when completed.
- B. Contractor shall protect the work of other trades and shall be held responsible for any damage thereto.
- B. Protect tile surfaces for a minimum of 48 hours until tile is firmly set.
- C. Seal grout with clear approved sealer.

END OF SECTION

SECTION 09 65 13

RUBBER BASE

PART 1 PRODUCTS

1.1 SUMMARY:

- A. Section includes:
 - 1. Resilient Base

1.2 RELATED SECTIONS:

- A. Section 06 41 16 – Cabinet Work & Shelving

1.3 SUBMITTALS:

- A. Comply with Section 01 33 00.
- B. Submit through Contractor to Architect:
 - 1. Samples: Provide properly identified, actual samples of each material for approval and color selection prior to installation.
 - 2. Operation and Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.

1.4 QUALITY ASSURANCE:

- A. Regulatory Requirements: Conform to applicable code for flame/fuel/smoke rating requirements in accordance with ASTM E84.

1.5 ENVIRONMENTAL REQUIREMENTS:

- A. Store materials for three days prior to installation in area of installation to achieve temperature stability.
- B. Maintain ambient temperature required by adhesive manufacturer three days prior to, during and 24 hours after installation of materials.

1.6 WARRANTY:

- A. Provide manufacturer's one year warranty for material and Installer's one-year warranty.

PART 2 PRODUCTS

2.1 MATERIAL

A. Coved Rubber Base

1. Tarkett "Traditional Duracove", or approved alternate Thermoplastic Rubber 1/8" coved wall base,
2. ASTM E84/NFPA 255, Type TP or better, group 1 (solid); 4" high, 1/8" thickness; class C fire resistance, with matching pre-molded corner units; top-set coved base; color as selected from 70 color options by Architect. Pre-molded corner units to match exactly, rubber base color selected.
3. Provide base material in continuous rolls. **"Preformed" or "Field-Made" outside corners will not be allowed. Factory made Pre-molded outside corner units must be used.**
4. Adhesive: Porous surfaces: Tarkett #960 Acrylic Cove base Adhesive; Non-porous surfaces: Tarkett #946 Contact Bond Adhesive. Provide adhesives for approved alternate products as approved by manufacturer for each substrate application.

- B. Substitutions: Alternate products may be submitted for Architect's review and approval, but must comply with Section 01 60 00.

PART 3 EXECUTION

3.1 EXAMINATION:

- A. Beginning of installation means acceptance of existing substrate and site conditions.

3.2 PREPARATION:

- A. Cleaning: Immediately prior to installation of the work of this section, vacuum clean substrate. Thoroughly clean substrate and remove all wax, oil, grease, paint, varnish hardeners, and other items which would adversely affect the bond of the adhesive.
- B. Remove edges and bumps.

3.3 INSTALLATION

A. BASE MATERIAL:

1. Areas to receive base will be clean, fully enclosed, weather-tight and temperature maintained at 65 degrees F for a minimum of 24 hours prior to and after installation. This also includes adhesives, which will be conditioned in same manner.
2. Coiled wall base will be uncoiled and laid out flat for at least 24 hours at 65 degrees.
3. Installer to verify substrate rubber base is to be adhered to and coordinate with other trades. Do not install epoxy paint where rubber base is to be installed.
4. Fit joints tight and vertical. Maintain minimum measurement of 18 inches between joints. Install continuous rolls with as few joints as possible. Use pre-molded corner units.
5. Install base on solid backing. Bond tight to wall and floor surfaces.

6. Apply adhesive with 1/8" square notched trowel to cover 80% of the back surface. Hold adhesive down 1/4" from top of base.
7. Scribe to fit door frames and other interruptions.
8. Install pre-molded corner units on all outside corners before installing wall base. Do not extend continuous base around outside corners unless approved by Architect.
9. Base will be mitered at all inside corners.
10. Pieces of base less than 8" not allowed.
11. Install at toe space at base of all cabinets unless otherwise shown.

3.4 CLEANING AND FINISHING:

- A. Allow adhesive to dry prior to mopping. Follow base manufacturer's instruction for drying time.
- B. Remove excess adhesive from base, and wall surfaces without damage.

END OF SECTION

SECTION 09 68 00

CARPETING

PART 1 GENERAL

1.1 DESCRIPTION:

- A. Provide all carpeting and accessories complete, in place, as shown on the drawings, specified herein, and needed for a proper and complete installation.

1.2 RELATED SECTIONS

- A. Section 03 30 00 - Cast-In Place Concrete: Concrete slab moisture mitigation

1.3 QUALITY ASSURANCE:

- A. Qualifications of manufacturer: Products used in the work of this section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production.
- B. Qualifications of installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this section.
- C. Subcontractor / supplier providing work under this section will install work specified in this section with their company's own installers, employed by the company.
Subcontracting of installation will not be allowed unless approved by Architect prior to bid.

1.4 REFERENCES

- A. ASTM D2859 - Standard Test Method for Flammability of Finished Textile Floor Covering Materials.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- C. CRI 104 - Standard for Installation of Commercial Textile Floor-covering Materials; Carpet and Rug Institute.

1.5 SUBMITTALS:

- A. General: Comply with the provisions of Section 01 33 00.

09 68 00-1

- B. Product data: As soon as possible after award of the Contract, submit:
1. Complete materials list of all items proposed to be furnished and installed under this section.
 2. Manufacturer's specifications and other data required to demonstrate compliance with specified requirements.
 3. Shop drawings showing location of all seams and location and types of all carpet material and accessories.
 4. Samples of the following carpet products and of exposed edge accessories available from the proposed manufacturer within the specified allowance qualities.
 5. Manufacturer's recommended installation procedures.
- C. The manufacturer's recommended installation procedures, will become the basis for inspection and accepting or rejecting actual installation procedures used on the work.
1. Dealers/Installers must follow manufacturer's procedures for installation, using the recommended glues, seam sealers, and floor sealers (if needed).

PART 2 PRODUCTS

2.1 MANUFACTURERS:

CPT 1

- A. Shaw Contract 'Above Tile' 5T3932, color 'Path' 88555

- B. Installation Method: Ashlar

CPT 2

- A. Shaw Contract 'Respond Color Tile' 5T310, color 'Radiant Nature' 05326

- B. Installation Method: Ashlar

2.2 MATERIALS

- A. All materials shall be new.
- B. All carpet shall be of first quality, of American manufacture and permanently mothproofed by manufacturer. Carpet must also have static controlled capabilities.
- C. Colors to be selected from manufacturer's standard range.
- D. All modular carpet to have high performance reinforced vinyl composite closed cell polymer backing as a minimum requirement. Modular secondary backing for the useful life of the original installation against product failure from:
1. Tuft Bind (edge ravel, yarn pulls, zippering)
 2. Delamination
 3. Moisture Penetration
 4. Dimensional Stability

- E. Edge Trim: Provide anodized metal edge and transition strips manufactured by Powerhold or approved alternate. "LVT125, LVT 130, LVT150, LVT160" where carpet transitions to VCT or LVT; "LVT160, LVT425, 406, 404, 405, 407" where carpet transitions to concrete or resin epoxy flooring. NOTE: Product number to be selected for specific thickness of flooring specified.

2.3. ADHESIVES:

- A. Modular Carpet: Provide self adhering or manufacturer-approved adhesive, recommended by carpet manufacturer, compatible with carpet specified and provided, for releasable installation.
- B. Provide letter with carpet submittal, stating that adhesive for each type of carpet provided is approved by manufacturer for substrate in which it is applied.

PART 3 EXECUTION

3.1 INSPECTION:

- A. Examine the areas and conditions under which work of this section will be performed. Correct conditions detrimental to the proper and timely completion of the work. Do not proceed until satisfactory conditions have been achieved.
- B. Calcium Chloride Moisture and pH Testing is required to be performed to the floor prior to carpet installation. Perform test following industry standards.
 - 1. Maximum acceptable moisture emission rate for concrete sub floors (unless carpet manufacturer requires more stringent rate):
 - a. Carpet – 3 lbs/1,000 sq. ft. per 24 hours or lessDo not proceed until satisfactory conditions have been achieved.

3.2 SURFACE PREPARATION:

- A. Cleaning: Immediately prior to installation of the work of this section, thoroughly clean all substrate and remove all wax, oil, grease, paint, varnish hardeners, and other items which would adversely affect the bond of the adhesive.
- B. Slabs must be thoroughly cured, and free of curing agents, hydrostatic pressure, excessive alkali as determined by manufacturer, and moisture.
- C. Smoothing: Make all substrate level and free from irregularities. Assure one constant floor height after carpet is installed, grinding high spots and filling in low spots as required.
- D. For areas where carpet is to be installed outdoors, surface must be kept dry for at least 96 hours prior to installation.

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3.3 PRODUCT HANDLING:

- A. Protection: Use all means necessary to protect the materials of this section before, during and after installation and to protect the work and materials of all other trades.
- B. Replacement: In the event of damage, immediately make all repairs and replacements needed at no additional cost to the Owner.

3.4 INSTALLATION:

- A. General:
 - 1. Install carpeting and accessories in strict accordance with the manufacturer's recommendations. CPT-1 and CPT-2, install Ashlar
- B. Seams:
 - 1. Locate seams to the maximum practicable out of traffic.
 - 2. Unless noted otherwise, locate carpet seams between rooms under bottom end of door where butting carpet of alike or different types, pattern, or color.
 - 3. Fabricate seams by the compression method, using a butt joint, and properly bed and seal all carpet edges and seams. Do not stretch seams. Provide seam adhesive at all seams at least 6" wide.
 - 4. Apply carpet adhesive as recommended by carpet manufacturer for the specified backing type. Lay carpet into adhesive as soon as possible and remove any trapped air bubbles. Do not use heavy roller. Use 35# to 70# linoleum roller. Be sure to roll width wise. Apply succeeding widths with firmly butted side joints to eliminate visible seams. Cross seams shall be held to absolute minimum. Apply Rubber Seam Adhesive to seams before they are butted together.
- C. Cleaning up: In addition to the requirements of Section 01 77 00, thoroughly clean all carpet surfaces prior to final acceptance of the carpeted areas by the Owner.

3.5 PROTECTION:

- A. Provide a heavy non-staining paper or plastic walkway as required over carpeting in direction of foot traffic, maintaining intact until carpeted space is accepted by the Owner.

3.6 ATTIC STOCK:

- A. Provide one additional box of carpet tile of each color and type for attic stock.

END OF SECTION

09 68 00-4

SECTION 09 72 16

VINYL AND OTHER FABRIC WALL COVERINGS

PART 1 GENERAL

1.1 SUMMARY

- A. Provide vinyl wall covering as shown and specified and in accordance with the Contract Documents.

1.2 RELATED SECTIONS

- A. Section 01 21 13 - Cash Allowances
- B. Section 07 21 00 - Insulation
- C. Section 09 29 00 - Drywall

1.3 QUALITY ASSURANCE:

- A. Qualifications of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Fire Performance Characteristics; Provide wall coverings with flame spread of 25 or less and smoke developed of 450 or less (Class A. in compliance with ASTM E 84 or UL or other testing and inspecting organizations acceptable to authorities having jurisdiction. Identify wall coverings with appropriate markings of applicable testing and inspecting organization.

1.4 SUBMITTALS:

- A. Comply with requirements of Section 01 33 00.
- B. Samples: Submit 8" x 10" sample of each type and color to be installed, for the Architect's approval.
- C. The manufacturer's recommended installation procedures, approved samples, and Acceptance/Performance Criteria described herein will become the basis for inspecting and accepting or rejecting actual installation procedures used on the Work.

PART 2 PRODUCTS

2.1 PRODUCT HANDLING:

- A. Deliver all materials in manufacturer's cartons, properly labeled and identified.
- B. Store wall covering in undamaged condition as packaged by manufacturer.
- C. Take care to prevent damage during delivery, handling and storage.
- D. Store all materials flat in a clean, dry storage area where temperature shall be maintained above 40 degrees F. with normal humidity. Do not store materials in an upright position.

2.2 CUSTOM GRAPHIC VINYL WALLCOVERING

- A. Wall covering shall be Mystical, Class A Fire Rated, as manufactured by Takeform, 1.800.528.1398, www.takeform.net or Architect approved equal.
 - 1. Adhesive: As recommended by manufacturer with mildew inhibitors
 - 2. Primer: As recommended by manufacturer.
 - 3. Allowance: Refer to section 01 21 13 for allowance per square foot (including taxes, freight & delivery) for the purchase of vinyl wall covering material; installation costs shall be in addition to this allowance.
 - 4. Any difference in actual cost of vinyl wall covering shall be reflected in a change to the contract price.
 - 5. In no case shall the cost exceed the allowance without prior written approval of Architect.
- B. Refer to drawings for locations.
- C. Provide manufacturer's warranty against defects in material or workmanship for five (5) years from the date of shipment.

PART 3 EXECUTION

3.1 INSPECTION:

- A. Install wall coverings on areas indicated on the Drawings and Finish Schedule.
- B. Areas to receive wall covering shall have a constant temperature of at least 55 degrees F. for three days before, and all during application period.
- C. Examine all surfaces to receive wall coverings before beginning work to determine that they are sound, dry, clean, and ready to receive final finish. Correct defects that could affect quality of finished work.

3.2 SURFACE PREPARATION:

- A. Remove all foreign matter and correct any defects.
- B. For drywall construction with field applied fabric, a coat of Drywall Primer may be applied to the surface before application of wall covering, for ease of subsequent removal.
- C. Gypsum wallboard to receive field applied fabrics, shall have all nails and screws recessed, with all joint and nail depressions taped and spackled, sanded and primed with one coat of primer.
- D. Substrate moisture shall not exceed 4%.

3.3 INSTALLATION:

- A. Follow manufacturer's directions for mixing and applying adhesive and primer.
- B. Before cutting, examine pattern and color and determine that they match approved samples. Examine patterned material for repeat in design.
- C. Install panels on the hanging surface, reversing every other panel of non-match patterns unless otherwise instructed by the manufacturer.
- D. Vertical joints shall not occur less than 6" from outside or inside corners.
- E. Where applicable, install wall covering before installation of plumbing, casing, bases, cabinets, etc.

3.4 CLEAN-UP:

- A. Upon completion of the work, remove surplus materials, rubbish and debris resulting from the operations under this Section including equipment and implements of service, and leave the entire structure and site insofar as the work of this Section is concerned in a neat, clean and acceptable condition.

END OF SECTION

09 72 16-3

SECTION 09 78 00

FIBER REINFORCED PLASTIC COATED PANELS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Glass fiber reinforced plastic (FRP) coated panels as wall finish.

1.2 SUBMITTALS:

A. Comply with Requirements of Section 01 33 00.

B. Submit through Contractor to Architect:

1. Samples: Provide properly identified, actual samples of material for approval and color selection, accompanying submittal.

1.3 WARRANTY:

A. One-year from date of substantial completion.

PART 2 PRODUCTS

2.1 FRP PANELS

A. Product Type: 3/32" Glasbord FRP Paneling system by Crane Composites, 23525 W Eames Street, Channahon, IL 60410 sales@cranecomposites.com Ph: 800.435.0080|Fax: 815.467.8666

B. Substitutions: Comply with Section 01 60 00

1. Panels: Embossed FRP, Class A.
 - a. Flame spread 0-25
 - b. Smoke Development < 450
2. Color: Color to be selected from minimum seven standard colors.

B. Trim: Standard trim pieces by Crane Composites.

Profile



Division
Bar

Inside
Corner

Outside
Corner

Cap
CP

09 78 00-1

DB

IC

OC

1. Battens: DB
2. Inside Corners: IC.
3. Outside Corners: OC
4. Top, Bottom & Edge Cap: CP

C. Attachments Materials:

1. Mechanical Fasteners: Countersunk screws or Nylon drive rivets.
2. Adhesive: Crane Titebond GreenChoice Advanced Polymer Adhesive.
3. Sealant: Crane Composites ColorRite Silicone Caulk, color matched to panel color

PART 3 EXECUTION

3.1 INSTALLATION

A. FRP Panels: Coordinate scheduling with Section 09 91 00.

1. Install FRP panel vertically, resting 1/4" minimum above finished base.
 - a. Apply adhesive beads to face of substrate and back of panels.
 - b. Mechanically attach panel edges with countersunk screws.
 - c. Apply 'J' mold trim to top of panel before placing panel. Use bead of sealant to hold trim piece.
 - d. Leave 1/8 to 1/4 inch space at panel edges joint; fill with sealant.
 - e. Adhesive apply flat batten strips and inside and outside corners.
 - f. Install FRP panels behind hollow metal door and window frames so that frame wraps over panel.

3.2 CLEANING

- A. Remove all excess adhesive from panels and trim immediately.
- B. Replace all damaged or discolored components.
- C. Clean all completed walls as per manufacturer's instructions.

3.3 SCHEDULE

- A. Install minimum 4'x4' panels on gypsum board walls at mop sink location.
- B. Wall Panels: Where shown on drawings 4'-0" wide panels x longest length available in order to cover wall from base to ceiling.

END OF SECTION

09 78 00-2

SECTION 09 91 00

PAINTING AND FINISHING

PART 1 GENERAL

1.1 SUMMARY

- A. The work to be completed under this heading includes all labor, materials, equipment, and services necessary and reasonably incidental for painting throughout the building, both exterior and interior, for all wood, metal, masonry, or other surfaces as specified, to make a thoroughly complete job in every respect.
- B. Term "exposed" used herein refers to surfaces exposed at exterior of building and surfaces visible within building unless specifically called out. Materials in pipe chases, pipe tunnels and concealed above finish ceiling shall not be considered "exposed".
- C. Items included but not limited to - Exposed concrete surfaces (as called for on the interior finish schedule. Exposed concrete masonry units, interior and exterior. Exposed ferrous metals at exterior and interior of building not specified to receive factory applied finish of baked-on enamel. Concealed ferrous metals, except for fasteners and electrical and mechanical items, shall have minimum of one coat of corrosion-resistant paint. Exposed aluminum: galvanized steel roof vents, exhaust fans, grilles and registers shall not be painted unless otherwise designated.
- D. Exposed insulated piping, ductwork and mechanical equipment shall be painted unless supplied from the factory with a finish coat in compliance with building decor and this specification.
- E. All exposed flues, vents, and extensions above prefinished metal roofs to be painted to match metal roof color.
- F. Exposed wood, hardboard and plywood surfaces unless otherwise designated shall be painted or stained. Walls requiring patching or showing defects shall be painted in their entirety.
- G. There shall be no painting of copper, prefinished aluminum, or other finished metal, except iron.
- H. Refer to section 09 29 00 for gypsum board surface texturing.**

1.2 SUBMITTALS

- A. Comply with requirements of Section 01 33 00.

09 91 00-1

1.3 ENVIRONMENTAL REQUIREMENTS

- A. Follow manufacturer's recommendations for temperature range in which coatings may be applied.
- B. Comply with National Volatile Organic Compound Emission Standards for Architectural coatings, Rule 40 CFR, Part 59, established by Environmental Protection Agency for VOC limits unless stricter local regulations are required.

1.4 PAINTING AND FINISHING PRE-INSTALLATION MEETING

- A. Prior to any wall or ceiling preparation, Contractor will schedule a pre-installation meeting. Required attendance will be Contractor or CM, Architect, Painter and drywall finisher, and suspended ceiling installer Contractor to conduct meeting.
- B. Discussion items:
 - 1. Gypsum board texturing and mockups
 - 2. Paint application.
 - 3. Protection of floors and surrounding finished items and finishes.
 - 4. Progression of installation following application of finished coat of paint. (i.e. switch and receptacle covers, millwork light fixtures, etc.)
 - 5. Accent painting clarification.
 - 6. Finishing of hollow metal doors and frames. (spray finish, not brushed.)
 - 7. Transparent finishes for woodwork, wood doors, etc.
 - 8. Other discussion items

PART 2 PRODUCTS

2.1 MATERIALS

- A. All paint and stain shall be manufactured by Benjamin Moore, Pittsburg or Sherwin Williams as specified.
 - 1. Other manufacturers listed below are approved, but must meet or exceed specifications for each type of paint or stain as specified in this specification.
 - a. Glidden
 - b. Kelly-Moore
 - c. Kwal.
 - 2. Substitutions: Comply with Specification Section 01 60 00.
 - 3. All colors shall be as selected by the Architect if not called out on drawings or specifications.
- B. All paint materials shall be delivered to the job in original unbroken manufacturer's packages with the labels intact and be kept in a locked room to which the Architect shall have access at all times.
- C. All materials shall be the best of their respective kinds and thoroughly mixed in the proper proportions to secure the best results.

09 91 00-2

2.2 SAMPLE PANELS

- A. After painters' materials have been approved and before any painting or finishing is done, submit panels as follows:
 - 1. Panels showing color and texture of finish coat.
 - 2. Panels showing clear finishes.
- B. Panels to show color: Composition board, 4 inch by 11 inch by 1/8 inch to show each color selected.
- C. Panel to show transparent finishes: Wood of same species and grain pattern as wood approved for use, 4 inch by 11 inch face by 1/4 inch thick minimum, and where both flat and edge grain will be exposed, 11 inches long by sufficient size (two by two inch minimum or actual wood member) to show complete finish. Panels shall show each type of finish specified.
- D. Attach labels to each panel stating where material is to be used, mfg. of finish material, and color or number of finish.

2.3 PAINTING AND FINISHING SCHEDULE

- A. **Paint Schedule provides for minimum two-coat application in addition to primer or filler coat.** Additional coat may be required for certain items to give complete coverage and uniform appearance. Omit primer for items shop primed.

2.4 EXTERIOR FINISHING SCHEDULE:

- A. Ferrous Metal:
 - 1st Coat: Benjamin Moore HP Acrylic Metal Primer HP1100,
Sherwin Williams B66W00310 – Pro Industrial Pro-Cryl Universal Acrylic Primer
PPG/Pittsburgh Pitt-Tech Plus DTM Primer/Finish 4020-1000
 - 2nd & 3rd Coat: Benjamin Moore HP DTM Acrylic Metal Enamel HP3000, gloss,
Sherwin Williams B66W00311 – Sher-Cryl HPA High Performance Acrylic Gloss Coating
PPG/Pittsburg Pitt-Tech Plus EP DTM Acrylic Gloss 90-1510
- B. Galvanized Metal:
 - 1st Coat: Benjamin Moore HP Acrylic Metal Primer HP1100
Sherwin Williams B66W00310 – Pro Industrial Pro-Cryl Universal Acrylic Primer
PPG/Pittsburgh Pitt-Tech Plus DTM Primer/Finish 4020-1000
 - 2nd & 3rd Coat: Benjamin Moore HP DTM Acrylic Metal Enamel Gloss HP3000
Sherwin Williams B66W00311 – Sher-Cryl HPA High Performance Acrylic Gloss Coating

09 91 00-3

PPG/Pittsburg Pitt-Tech Plus EP DTM Acrylic Gloss 90-1510

1. Paint inside galvanized surfaces of guttering.

C. Wood (Exterior):

- 1st Coat: Benjamin Moore Fresh Start High-Hiding All Purpose Primer
Sherwin Williams B51W00620 - PrepRite® ProBlock® Int/Ext Latex Primer/Sealer
PPG/Pittsburg 76-45XI Sunproof Exterior Satin 100% Acrylic Latex Satin
- 2nd & 3rd Coat: Benjamin Moore W448 Ultra Spec EXT Paint - Satin
Sherwin Williams B51W00620 - PrepRite® ProBlock® Int/Ext Latex Primer/Sealer
PPG/Pittsburg 76-45XI Sunproof Exterior Satin 100% Acrylic Latex Satin

1. Do not apply finish coats on surfaces concealed after installation, top and bottom edges of wood doors and sash, or on edges on wood framed insect screens.

2.5 INTERIOR FINISHING SCHEDULE:

A. Ferrous Metals:

- 1st Coat: Benjamin Moore HP Acrylic Metal Primer HP1100
Sherwin Williams B66W00310 – Pro Industrial Pro-Cryl Universal Acrylic Primer
PPG/Pittsburgh Pitt-Tech Plus DTM Primer/Finish 4020-1000
- 2nd and 3rd Coat: Benjamin Moore Command Waterborne Acrylic Urethane Satin V392
Sherwin Williams B53W01150 – Pro Industrial Waterbased Alkyd Urethane Enamel Semi-Gloss
PPG/Pittsburg HPC Rust Preventative Alkyd 4306-0110

B. Exposed Overhead Steel (dry-fall type):

- Spot Prime: Benjamin Moore HP Acrylic Metal Primer HP1100
Sherwin Williams B66W00310 – Pro Industrial Pro-Cryl Universal Acrylic Primer
PPG/Pittsburgh Pitt-Tech Plus DTM Primer/Finish 4020-1000
- 1st & 2nd Coats: Benjamin Moore N110 “Super Kote 5000” Dry Fall Acrylic Latex Flat Finish.
Sherwin Williams B42W00181 – Pro Industrial Waterborne Acrylic Dryfall Flat
PPG/Pittsburg “Speedhide Super Tech” 6-725XI Water-based Dry-Fog Flat Latex

1. Apply over primed finish.

C. Gypsum Board & Plaster: After application of approved texture.

- 1st Coat: Benjamin Moore 354 “Super Hide” ZERO VOC Interior Latex Primer
Sherwin Williams B28WJ0901 – Wasatch Interior Latex Hi Hide Primer

09 91 00-4

2nd & 3rd Coat: PPG/Pittsburg "Speedhide" 6-2 Interior Latex Sealer
Benjamin Moore 537 Ultra Spec 500 Interior Low Sheen Finish
Sherwin Williams B20W02651 - ProMar® 200 Zero VOC Interior
Latex Eg-Shel
PPG/Pittsburg "Speedhide" Zero Interior Latex Eggshell 6-5310

D. Wood (Painted):

1st Coat: Benjamin Moore INSL-X Prime All AP1000 Multi Surface Latex
Primer Sealer
Sherwin Williams B79W00450 – Multi-Purpose Waterbased Acrylic-
Alkyd Primer
PPG/Pittsburg Seal Grip Primeline Fast Dry Latex Undercoater 17-
9517

2nd & 3rd Coat: Benjamin Moore Command Waterborne Acrylic Urethane Satin
V3921X
Sherwin Williams B53W01151- Pro Industrial Waterbased Alkyd
Urethane Enamel Semi-Gloss
PPG/Pittsburg HPC Rust Preventative Alkyd 4306-0110

E. Existing Wood Doors (Stained):

1st Coat: Sherwin Williams S64T00050-Sher-Wood® BAC Wiping Stain
Old Masters Oil-Based Wood Wiping Stain

1. Fill wood with natural paste wood filler tinted with oil stain before final finish.
2. Match existing stain color or Architect to select stain color.

2nd 3rd & 4th Coats:

Benjamin Moore Stays Clear ® Acrylic Polyurethane Low Lustre W423
Sherwin Williams A68F00090 – Wood Classics® Waterborne
Polyurethane Varnish Satin

1. Top, bottom, and edges of all doors shall be finished as above.

F. Concrete Unit Masonry/Concrete (other than epoxy coating):

1st Coat: Benjamin Moore 571 - Ultra Spec Masonry High-Build Block Filler
Sherwin Williams B25W00025 - PrepRite® Block Filler
PPG/Pittsburg "Speedhide" Interior/Exterior Masonry HI Fill Latex
Block Filler 6-15XI

2nd & 3rd Coat: Benjamin Moore 537 "Ultra Spec 500" Interior Zero VOC Low Sheen
Finish
Sherwin Williams B20W02651 - ProMar® 200 Zero VOC Interior
Latex Eg-Shel
PPG/Pittsburg "Speedhide" Zero Interior Latex Eggshell 6-5310

1. 4th Coat: Will be required on accent colors for adequate coverage, same type as 3rd
coat.
2. Back roll both filler and paint coats to ensure good coverage.

09 91 00-5

G. Epoxy Coatings for CMU and Concrete:

- 1st Coat: Benjamin Moore 571 - Ultra Spec Masonry High-Build Block Filler
Sherwin Williams B25W00025 - PrepRite® Block Filler
PPG/Pittsburg "Speedhide" Interior/Exterior Masonry HI Fill Latex Block Filler 6-15XI
- 2nd& 3rd Coat Benjamin Moore HP3410/ HP3420 HP Pre-Catalyzed Waterborne Epoxy Semi-Gloss/ Eggshell
Sherwin Williams K45W00151 – Pro Industrial PreCatalyzed Waterbased Epoxy Eg-Shel
PPG/Pittsburg "Pitt-Glaze" WB1 Pre-Catalyzed Waterborne Acrylic Epoxy 16-510, Semi-gloss Finish

Acceptable

Alternate: Benjamin Moore Ultra Spec "Scuff-X" Satin N486, Semi-gloss N487.

1. Finish coating shall have a vitreous-hard, tile-like surface with high resistance to impact, abrasion, stain chemical and acid corrosion and with a flame spread rating of not more than 15 when tested in accordance with ASTM Standard Specification E-84-61. Application on all surfaces shall be in solid color to be selected by the Architect or as listed on drawings or specifications.

H. Epoxy Coatings for Gypsum Board:

- 1st Coat: Benjamin Moore 354 "Super Hide" Zero VOC Interior Latex Primer
Sherwin Williams B28WJ0901 – Wasatch Interior Latex Hi Hide Primer
PPG/Pittsburg "Speedhide" 6-2 Interior Latex Sealer
- 2nd& 3rd Coat Benjamin Moore HP3410/ HP3420 HP Pre-Catalyzed Waterborne Epoxy Semi-Gloss/ Eggshell
Sherwin Williams K45W00151 – Pro Industrial PreCatalyzed Waterbased Epoxy Eg-Shel
PPG/Pittsburg "Pitt-Glaze" WB1 Pre-Catalyzed Waterborne Acrylic Epoxy 16-510, Semi-gloss Finish

Acceptable

Alternate: Benjamin Moore Ultra Spec "Scuff-X" Satin N486, Semi-gloss N487.

1. Finish coating shall have a vitreous-hard, tile-like surface with high resistance to impact, abrasion, stain chemical and acid corrosion and with a flame spread rating of not more than 15 when tested in accordance with ASTM Standard Specification E-84-61. Application on all surfaces shall be in solid color to be selected by the Architect or as listed on drawings or specifications.

I. Concrete Floors (Sealer)

1. Clear Sealer
 - a. Two coats –MasterKure CC 250SB by BASF, semi-gloss, or approved alternate.

PART 3 EXECUTION

3.1 MATERIAL AND SPACE CONDITIONS

- A. Do not apply to wet or damp surfaces. Wait a minimum of 30 days or more as required by paint manufacturer before applying to new concrete or masonry. Follow manufacturer's procedures to apply appropriate coatings prior to 30 days to other substrate surfaces. Painter is required to test new concrete or masonry for moisture content prior to beginning of painting with a certified digital PH testing meter approved by Architect. If moisture content is above manufacturer's minimum, surface must be allowed to dry to within levels required by paint manufacturer.
- B. Interior of building must be dried in prior to painter primer application. Do not begin painting of surface when temperature is at or below or temperature is predicted to drop below that required by paint manufacturer before required paint drying period.

3.2 SURFACE PREPARATION

- A. General: Temporarily remove items interfering with surface to be painted for complete painting of such items and adjacent areas.
 - 1. See other sections of the specifications for requirements for surface conditions and prime coat.
 - 2. Surfaces to be finished shall be dry, clean, smooth and prepared as specified.
 - 3. Materials and methods used for cleaning shall be compatible with the substrate and specified finish. Remove any residue remaining from cleaning agents used.
 - 4. Method of surface preparation is optional provided results of finish painting produce solid even color and texture specified.
- B. Wood: Sand to a smooth even surface and then dust off.
 - 1. Where transparent finish is specified, finish sanding shall be with 220 grit sandpaper. Wipe surface with a tack rag prior to applying finish.
 - 2. Surface to be painted with an opaque finish shall have all knots, sap and pitch streaks coated with knot sealer before applying any coat of paint. Apply two coats of knot sealer over large knots.
 - 3. Surfaces showing raised grain shall be sanded smooth between each coat.
 - 4. After application of prime or first coat of stain, fill all cracks, nail and screw holes, depressions and similar defects with patching compound. Sand to make smooth and flush with surrounding surface.
 - 5. Before applying finish coat, reapply patching compound if required, and lightly sand surface to remove surface blemishes.
- C. Steel and Iron:
 - 1. Remove oil, grease, soil, drawing and cutting compounds, flux and other detrimental foreign matter by use of solvents, emulsions, cleaning compounds, or by steam cleaning.

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2. Verify that all factory or field welds where exposed have been grinded to achieve smooth consistent surface and that primer has been applied on bare steel. Apply appropriate filler material where voids occur at welds and finish to achieve smooth consistent surface.
 3. Remove loose mill scale, rust, and paint, by hand or power tool cleaning, except where high temperature aluminum paint is used, the surface shall be prepared in accordance with the manufacturer's instructions.
 4. Fill all dents, holes and similar voids and depressions in flat exposed surfaces of hollow steel doors and frames, access panels, roll-up steel doors and similar items specified to have semi-gloss or gloss finish with patching compound. Finish flush with adjacent surfaces.
 5. Spot prime all abraded and damaged areas in shop prime coat which expose the bare metal, with same type of paint used for prime coat. Feather edge of spot prime as required to produce smooth finish coat. Spot prime all abraded and damaged areas which exposed the bare metal of factory finished items with paint as recommended by the manufacturer.
- D. Zinc-coated (Galvanized, Metal, Terne-Plate, Zinc, Lead, Aluminum, Copper and Copper Alloys): Prep galvanized surfaces specified to be painted per paint manufacturer's instructions. Surfaces specified to be painted shall be cleaned of all grease, oil and other deterrents to paint adhesion, with toluene, xylene or similar solvents.
1. Spot prime all abraded and damaged areas of zinc-coating which expose the bare metal, using zinc rich paint on hot-dip zinc-coated items and zinc dust primer on all others.
 2. Spot prime, with red lead prime, all abraded and damaged areas of terne-plate which exposed the base metal.
- E. Masonry, Concrete, Cement Plaster and Stucco: Remove all dust, dirt, oil, grease efflorescence, form release agents, laitance, and other deterrents to paint adhesion.
1. Use emulsion type cleaning agents to remove oil, grease, paint and similar products. The use of solvents, acid, or steam is not permitted.
 2. Remove all loose mortar in masonry work.
 3. Replace mortar and fill all open joints, holes, cracks and depressions with patching compound, finished flush with adjacent surface, with texture to match texture of adjacent surface.
 4. Concrete floors to be stained or sealed shall be etched and prepped per manufacturer's instructions. Allow required time to dry between applications.
 5. Concrete shall have all broken and spalled edged repaired with patching compound to match adjacent surfaces. Remove projections to level of adjacent surface by grinding or similar methods.
- F. Gypsum Plaster and Drywall: Remove efflorescence, loose and chalking plaster. Remove dust, dirt, and other deterrents to paint adhesion.
1. Fill holes, cracks, and other depressions with patching compound, finished flush with adjacent surface, with texture to match texture of adjacent surface.

3.3 APPLICATIONS

- A. Start of surface preparation or painting will be construed as acceptance of the surface as satisfactory for the application of materials.
- B. Unless otherwise specified, paint shall be applied in three coats, prime, body, and finish.
- C. Before application of body and finish coats, surfaces shall be prepped and primed, except as otherwise specified. For primers to be used for field application, see **PRIMERS** paragraph in this specification.
- D. Additional field applied prime coats over shop or factory applied prime coats are not required, except for exterior steel which shall have a field applied prime coat in addition to the shop prime coat.
- E. Retouch damaged and abraded painted surfaces before applying succeeding coats.
- F. Apply each coat evenly and in full covering body.
- G. Not less than 48 hours shall elapse between application of succeeding coats except as allowed by the manufacturer's printed instructions, and approved by the Architect.
- H. Finish painted surfaces shall have solid even color, free from runs, lumps, brush marks, laps, or other defects.
- I. To prevent items from sticking in the shut position, operable items such as access doors and panels, window sashes rolling doors, and similar items shall not be painted when in the closed position.
- J. Painted or otherwise finished surfaces of wood doors, including top and bottom edges, which are cut for fitting or for other reasons shall be given two coats of primer.
- K. Surfaces of finishing woodwork, except shop fabricated or assembled millwork and surfaces specified to have varnish, stain or natural finish shall be given one coat of primer as soon as delivered to the site.
- L. Back prime and seal ends of exterior woodwork, and edges of exterior plywood specified to be finished. Primer shall be same kind of primer specified for exposed face surface.
- M. Prime rebates for stop and face glazing of wood, and for face glazing of steel.
- N. Paint is to be applied by brush, or roller on all surfaces except metal. **SPRAY PAINTING MUST BE USED ON METAL SURFACES AND IS SUBJECT TO THE FOLLOWING:**
 - 1. Spray painting will be allowed if occupied portion of the building completely sealed off and approved by the Architect.

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2. Painting materials specifically required by the manufacturer to be applied by spraying shall be so applied.
3. In areas, where paint is applied by spray, all items specified in Article, Work Not To Be Painted, motors, controls, telephone, and electrical equipment, and similar items shall be masked, or enclosed with polyethylene, or similar air tight material with all edges and seams continuously sealed.

3.4 PRIMERS:

- A. After surface preparation, apply prime coat to various materials as follows: NOTE: Prime coat is not required for acrylic emulsion and latex emulsion finish.
 1. Steel and iron: Red lead primer
 2. Zinc-Coated Steel and Iron: Zinc dust primer.
 3. Aluminum: Zinc chromate primer.
 4. Lead and Terne Metal: Red lead primer.
 5. Copper and Copper Alloys: Zinc chromate primer
 6. Exterior Wood: Oil base primer.
 7. Interior Wood: (except for transparent finish: Enamel undercoat, thinned as recommended by the manufacturer.
 8. Gypsum Plaster Block Filler: Pigmented sealer, except use latex emulsion for alkyd flat finish.
 9. Cement plaster, Concrete, and Masonry: Latex emulsion except use two coats of latex primer when substrate has aged less than six months.
 10. Drywall: Latex primer, except use pigmented sealer in shower, dressing and locker rooms.

3.5 EXTERIOR FINISHES:

- A. On properly prepared and primed surfaces, apply the following finish coats. Prime coat is not required for acrylic emulsion finish.
 1. Wood: Two coats of specified paint generally on exposed surfaces, except where transparent finish is specified and as follows:
 - a. Two coats of exterior specified paint on plywood, wood siding and similar surfaces.
 - b. Do not apply finish coats on surfaces concealed after installation, top and bottom edges of wood doors and sash, or on edges on wood framed insect screens.
 - c. That portion of the sash runs of double hung wood windows, concealed by the sash when in a closed position, shall receive two coats of boiled linseed oil mixed with not more than 1/4 pint of dryer per gallon.
 2. Metal: Two coats of specified paint.
 - a. **NOTE: All metal surfaces to receive paint shall be spray applied!**
- B. Coating of Exterior Pre-Finish Metals:
 1. Prior to application of specified coating over pre-finished metal, properly clean pre-finished metal by removing all oils, dirt, grease, dust, loose rust, and other foreign materials from surface to ensure adequate adhesion. **Do not use hydrocarbon solvents for cleaning.**

09 91 00-10

2. Apply 48" square test patch to pre-finished metal wall panels. Location to be confirmed with Architect. Allow to dry thoroughly for a minimum of seven (7) days to check adhesion.
3. After approval of adhesion test, apply first and second coats of material at rate indicated by manufacturer for spray application. Roller and brush application not allowed.

3.6 INTERIOR FINISHES

- A. On properly prepared and primed surface, apply the following finish coats. Prime coat is not required on concrete for floor enamel finish.
 1. Metal Work: Apply two coats of specified paint on exposed surfaces, including surfaces of ferrous metal louvers and ferrous metal hardware, except as follows:
 - a. Two coats of high gloss sheen specified paint on specified surfaces, color as selected.
 - b. Omit body and finish coats on surfaces concealed after installation
 - c. **NOTE: All metal surfaces to receive paint shall be spray applied. No exceptions!**
 2. Plaster: One coat of latex sealer plus two coats of latex satin on exposed surfaces.
 3. Drywall: One coat of latex sealer plus two coats of specified paint on exposed surfaces.
 4. Masonry and Concrete Walls: One coat of specified paint over block filler on surfaces where scheduled.
 - a. Third coat will be required on surfaces where accent colors are scheduled for adequate coverage.
 5. Dry-Fall Paint Application: Apply over pre-primed surfaces. If steel surfaces are not primed, apply compatible primer for metal surface for dry-fall paint.

3.7 SPECIAL APPLICATIONS

- A. Unless noted otherwise, all exposed piping, conduit, ductwork, etc., exposed on interior of rooms shall be painted, matching color of walls or ceiling item is attached or adjacent to.
- B. Epoxy Paint
 1. Application of epoxy coating under this heading shall be done by trained applicators who are experienced in the use of the specific materials to be applied. Coating shall be applied in such quantity as will result in a dry film thickness of minimum 4 to 6 mils in uniform solid color or colors as selected. Floors and other adjacent surfaces which are not to be coated shall be protected during application, and special coating applicator shall clean and repair any adjacent surfaces damaged by his work.
 2. Coordinate termination of epoxy paint with installation of rubber base. No epoxy paint is to be applied where rubber base is to be installed.

3.8 TRANSPARENT FINISHES ON WOOD

A. General:

1. Open grained wood such as oak, walnut, ash and mahogany shall be filled with a paste wood filler, colored as required to achieve finish specified. Thin filler accordance with manufacturer's instructions as required for application. Remove excess filler, wipe as clean as possible, allow to dry and sand lightly with 220 grit sandpaper.
2. Stain shall be of type and color required to achieve finish specified. Stains may be used when transparent finishes are specified to change the color of sapwood to match heartwood, and to enhance or even the color of the wood as required to match the finish specified. Varnish or polyurethane type stains will not be allowed.
3. Sealers shall be polyurethane, same as used for top coats, thinned with thinner recommended by the manufacturer at the rate of about one part of thinner to four parts of polyurethane. Sealer may be omitted where pigmented, penetrating, or wiping stains containing resins are used.
4. Sealers and polyurethane shall be sanded between coats. Allow manufacturer's recommended drying time before sanding, but in no case less than 24 hours (36 hours in damp or muggy weather). Sanding shall be done using 220 grit sandpaper. Sand enough to scarify the surface to assure good adhesion of the subsequent coat to level roughly applied sealer and to knock off the "whiskers" of any raised grain as well as dust pinnacles. Sanding blocks shall be used for between coat sanding.
5. Finish application shall be done only in clean areas and in still air. Before finishing, the area shall be vacuumed and dusted. Immediately before applying finish, the surfaces shall be wiped down with a tack rag.

B. Stain Finish: Apply in successive coats as follows:

1. One coat of stain.
2. One coat of sealer.
3. Two coats of satin polyurethane finish.

C. Natural Finish: Apply in successive coats as follows:

1. One coat of sealer.
2. Two coats of satin polyurethane finish.

Note: Individual specification sections or notes on drawings may call for finishes or prefinished items different from what is specified in this section (i.e. factory finished; factory stained, etc.). Unless otherwise called for, abide by those finishes as noted or specified on drawings or specification sections.

3.9 SCAFFOLDS

- #### A.
- This Contractor shall provide all ladders, scaffolds, staging, etc., required for the proper execution of the work.

3.10 PROTECTION:

- A. Protect all work from paint droppings and spattering by use of masking, drop cloths, removal of items or by other approved methods.

3.11 EXTRA STOCK:

- A. Provide minimum one full gallon of each type and each color of paint specified and used on project. Each paint container to be properly labeled, identifying type and color.

3.12 CLEAN UP

- A. Upon completion, clean paint from all hardware, glass and other surfaces and items not required to be painted.
- B. Before final inspection, any work which has become damaged or discolored shall be touched-up or refinished in a manner to produce solid even color and finish texture, free from defects.

END OF SECTION

SECTION 09 97 26

SPECIAL COATINGS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Masonry Weatherproofing System: Cementitious Waterproofing Coat with Decorative Acrylic Finish Coat.
2. Protection of weeps, drainage and ventilation vents during coating application.

B. Related Sections:

1. Section 04 22 00 - Concrete Unit Masonry.

1.2 REFERENCES

A. American Society for Testing & Materials (ASTM):

1. ASTM D968 - Abrasion Resistance of Organic Coatings by the Falling Abrasive Tester.
2. ASTM D822 - Operating Light and Water Exposure Apparatus (Carbon Arc Type) for Testing Paint, Varnish, Lacquer, and Related Products.
3. ASTM G26 - Operating Light-Exposure Apparatus (Carbon Arc Type) With and Without Water for Exposure of Nonmetallic Materials.

1.3 QUALITY ASSURANCE

A. Applicator Qualifications: Properly trained and approved by the weatherproofing system manufacturer and have authorization to offer specified warranty. Submit installer letter of certification, signed by Technical Representative of system manufacturer.

B. Field Sample:

1. Apply masonry weatherproofing system to sample concrete block panel.
2. Reflect proposed color, texture, and workmanship.
3. Obtain acceptance of completed section from Architect before beginning work.

C. Pre-installation Conference:

1. Contractor shall arrange meeting no less than seven days prior to starting work.
2. Attendance:
 - a. Construction Manager
 - b. Coating Contractor
 - c. Architect/Owner's Representative
 - d. Coating Manufacturer Representative/Distributor.
3. Agenda:
 - a. Substrate condition.
 - b. Sequence and method of application of coating system.

09 97 26-1

1.4 SUBMITTALS

- A. Comply with Section 01 33 00.

1.5 PROJECT CONDITIONS

A. Environmental Requirements:

1. Do not apply on frozen or frost-filled surfaces.
2. Do not apply if temperature is below 40 degrees F. or expected to fall below 40 degrees F within 24 hours.
3. Protect material from freezing.
4. Protect surfaces from rapid drying where windy, hot, and dry conditions exist.
5. Protect from precipitation for 24 hours after application.
6. Avoid applying material during rapid and extreme changes in temperature to prevent thermal shock cracks during the curing process.
7. The following conditions may require damping the surface prior to and during application.
 - a. Wind-caused rapid drying of surface.
 - b. Excessive surface temperature
 - c. Excessive air temperature
 - d. Direct sun
 - e. Low humidity.

1.6 WARRANTY

- A. Provide five year material and labor warranty to cover:
 1. Waterproofing above grade.
 2. Bonding.
 3. Weathering.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide coatings of the following manufacturers:
 1. Master Builder Solutions by BASF (formerly Thoro System Products)
- B. Substitutions: Must be submitted to the Architect for review prior to bidding.

2.2 CEMENTITIOUS WATERPROOFING AND ACRYLIC FINISH COATINGS

- A. Master Builder Solutions, by Sika USA
 1. Sika Thoroseal 581 (Cementitious Waterproofing Coating)
 2. Sika Thorocoat C250 (Acrylic Finish Coating)

2.3 MIXING

- A. If premixing is required, stir in strict accordance with printed instructions of manufacturer. Use approved mechanical mixer. Do not use frozen, caked, or lumped materials.

PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Examination:
 - 1. Examine substrate to which finely textured coating is to be applied. Do not proceed if unsatisfactory conditions exist which hamper proper application.
 - 2. Beginning of application means acceptance of substrate condition.
- B. Preparation:
 - 1. Surfaces to receive system shall be free of defects such as honeycombs, form marks, tie holes, concrete dropping, laitance, dirt, dust, grease, form release treatments, efflorescence, curing compounds, paint and any other foreign material.
- C. Patch all cracks and holes with Master Builder Solutions MasterEmaco N424 prior to application of Cementitious Waterproofing Coating.
- D. Beginning of application means acceptance of substrate.

3.2 MASONRY WEEP VENT, DRAINAGE VENT AND VENTILATION VENT PROTECTION

- A. Weep vents, drainage vents and ventilation vents are not to be coated. Protect as required during coating process.

3.3 APPLICATION

- A. General:
 - 1. Waterproof exterior walls with cementitious waterproofing coating. Ensure surface is thoroughly cured before starting finish application (48-72 hours under normal conditions)
 - 2. Acrylic Coating:
 - a. After Cementitious Waterproofing Coating has been applied and cured, apply Acrylic coating. Apply material at a rate recommended by manufacturer, directly as it comes from the can.
 - b. Apply material by brush, roller, plaster type sprayer, or low pressure sprayer.
 - c. Back roll brushed or sprayed material; cross roll roller-applied material.
 - d. Finish material so that brush and roller strokes are on one direction

3.4 FIELD QUALITY CONTROL

- A. Unless noted otherwise, all exterior concrete surfaces shall receive complete and thorough coverage of specified masonry weatherproofing. Color to be selected by Architect.
- B. Maintain schedule of application of system in field office for Owner/Architect's review.

3.5 EXTRA STOCK

- A. Provide minimum one gallon of each color of special coating used on project. Each container to be properly labeled, identifying color.

END OF SECTION

09 97 26-4

SECTION 10 00 00

MISCELLANEOUS SPECIALTIES

PART 1 GENERAL

1.1 SUMMARY

- A. Furnish all items listed and specified below and where shown on drawings. Install per manufacturer's instructions.
- B. Section includes:
 - 1. Aluminum Wall Vents
 - 2. Access Panels
 - 3. Security Key Box (Knox Box)
 - 4. Electrical Power Shutdown (Knox Box)
 - 5. Corner Guards
 - 6. Envelope Depository
 - 7. Roof Gravity Vents
 - 8. Folding Stairway - Steel Insulated Attic Ladder
 - 9. Bird Control Device
 - 10. Roof Cupola
 - 11. Corner Guards

1.2 QUALITY ASSURANCE

- A. Qualifications of Manufacturer: Products used in the work of this Section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production acceptable to the Architect.

1.3 SUBMITTALS

- A. Comply with requirements of Section 01 33 00.
- B. General: Submittals showing all details of script, fabrication, and installation.
- C. The manufacturer's recommended installation procedures, when approved by the Architect, will become the basis for inspecting and accepting or rejecting actual installation procedures used on the Work.

1.4 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect materials of this Section before, during and after installation and to protect installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

10 00 00-1

PART 2 PRODUCTS

2.1 MATERIALS

A. Aluminum Wall Vents:

1. Aluminum, triangular gable vents, see drawings for size. Locate in masonry walls as shown on drawings. Vents to be manufactured by Sunvent Industries, a division of Sylro Sales Corporation, 1 Industrial Drive, No. 26, Pelham, New Hampshire 03076; 800-325-4115; www.sunventindustries.com., or approved alternate. Louver blades to be fixed, horizontal blades 1 inch deep set at 45 degrees at 1 inch on center. Top of blade formed with storm drip. Furnish complete with anchors, insect screens, drip caps, and sleeves as required to provide completed, rain tight assembly. Factory applied baked enamel finish, color as selected.

B. Access Panels

1. Furnish 3'-0" x 2'-0" prime coated 14 ga steel access door as model L-LCP with cylinder lock by Larsen's, 7421 Commerce Lane NE, Minneapolis, MN 55432 (612)571-1181
2. Install within soffit as noted on drawings. Anchor unit to suspended soffit framing system. Provide all necessary items; blocking, screws, etc., as required for proper installation.

C. Security Key Box (Knox Box)

1. Model 3200 series small Key & data storage cabinet with swing door, recessed mount with alarm tamper switch, (surface mount with tamper switch,) manufactured by the Knox Company, 846 Production Place, Newport Beach, CA 92663, 1-800-552-5669. Color to be bronze. Provide with recessed mount kit. Verify and coordinate installation location with local fire department.

D. Electrical Power Shutdown (Knox Box)

1. Model 4544 series small Key & data storage cabinet with swing door and building electrical shutdown switch, recessed mount,) manufactured by the Knox Company, 846 Production Place, Newport Beach, CA 92663, 1-800-552-5669. Color to be red. Provide with recessed mount kit. Verify and coordinate installation location with local fire department.

F. Roof Gravity Vent

1. Cook, GI/GR Series, 12" throat with bird screen, gravity backdraft damper, and aluminum curb. Provide with 5-year warranty.
2. Approved alternate

G. Envelope Depository

1. Model NDMS13A, 3"x11 12" by CRL, manufactured by approved alternate.

H. Folding Stairway

1. Provide Fakro LME Series Steel , 400 lb test load by Dur-Red, Ludahy, CA (323)771-9000; Precision Ladders, LLC, Morristown, TN (800)225-7814; Werner Co., Greenville, PA (724)588-8600; or approved alternate.

10 00 00-2

2. Install per manufacturer's instructions.
- I. Bird Control Device
 1. Model 2001™ 5 inch width, manufactured by Bird-B-Gone, Inc., Mission Viejo, CA, (800)392-6915, or approved alternate.
 2. Install on substrate per manufacturer's instructions where shown on drawings.
 3. Provide with 10 year warranty. Installation warranty for 2 years.
 - J. Aluminum Louver Cupola
 1. Aluminum Jamestown Louver Cupola, manufactured by B&B, (216)292-6555, <https://store.bbwood.com/Jamestownglasscupola.aspx>, email:info@bbwood.com
 2. Color and finish: PVC slight wood grain. Color: to be selected from standard colors. Cupola cap to be copper.
 3. Manufacturer to provide mounting curb, non-venting cupola, and weathervane with mount.
 4. Weathervane to be Rooster:515, Color: Gray to match Roof.
 5. or approved alternate.
 6. Install on substrate per manufacturer's instructions where shown on drawings.
 - K. Corner Guards - Type 1 (Adhering)
 1. Model "VA" Series Acrovyn colored plastic, 1-1/2" wing size, manufactured by Construction Specialties, Inc, Muncy, PA, (520)546-5941, InPro Corporation, Muskego, WI (800) 222-5556, Korogard G815 Vinyl, 1-1/2" wing size, manufactured by Koroseal Interior Products, Fairlawn, OH (855-753-5474), or approved alternate.
 2. Guards to be provided with self adhesive tape.
 3. Extend guards from top of base to ceiling unless noted otherwise.
 4. Color to be selected from manufacturer's standard colors and textures.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Verify that area to receive product is ready for installation.
- B. Install items in strict accordance with manufacturer's instructions.
- C. If required, provide training to owner.

END OF SECTION

10 00 00-3

SECTION 10 14 00

IDENTIFYING DEVICES

PART 1 GENERAL

1.1 SUMMARY

- A. Provide all labor, materials, fabrications and coordination required to install complete, in place interior signage, exterior building signage, and plaque.

1.2 QUALITY ASSURANCE

- A. Qualifications of Manufacturer: Products used in the work of this Section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production acceptable to the Architect.

1.3 SUBMITTALS

- A. Comply with requirements of Section 01 33 00.
- B. Manufacturers must submit 3 references showing products for projects completed within the last 6 years.
- C. Submit manufacturer's technical data and installation for each type of sign required.
- D. Submit shop drawings listing sign size, letterform and letter heights.
- E. Submit one full size sample sign of type, style and color specified, including method of attachment. If approved, the sample will become part of the job.
- F. The manufacturer's recommended installation procedures, when approved by the Architect, will become the basis for inspecting and accepting or rejecting actual installation procedures used on the Work.

1.4 SIGN TYPE DESCRIPTION

- A. Signage shall consist of room number and room function to meet the requirements of the Americans with Disabilities Act (ADA).

1.5 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect materials of this Section before, during and after installation and to protect installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

10 14 00-1

1.6 REFERENCES

- A. Comply with State of Arkansas Adopted ADA Accessible Guidelines in regard to accessible or handicapped features.

PART 2 PRODUCTS

2.1 ROOM IDENTIFICATION:

- A. Provide products from Take Form, phone 1-800-528-1398, Hilary Misiti, Client Advisor, email: hgh@takeform.net, www.takeform.net, or approved alternate substitution.
- B. Substitutions: Other manufacturers must submit their signage products to the Architect 10 days prior to the bid date for approval to be considered for substitution.
- C. Colors: Architect to select colors from manufacturer's standard color selection.

2.2 GRAPHIC PROCESS

- A. All signs shall be manufactured using Graphic Process Series 200A - Sand Carved® using Format D.
 - 1. Tactile characters shall be raised the required 1/32" inches from sign face. Glue-on letters or etched backgrounds are not acceptable.
 - 2. All text shall be accompanied by Grade 2 braille with domed dots. Braille shall be separated 1/2" from the corresponding raised characters or symbols. Grade 2 braille translation to be provided by signage manufacturer.
 - 3. All letters, numbers and/or symbols shall contrast with their background, either light characters on a dark background or dark characters on a light background. Characters and background shall have a non-glare finish.
- B. Plaque material shall be Special Purpose SP125 decorative thermosetting high pressure laminate. Material to be 1/8" thick laminate with a melamine resin surface and a phenolic resin core which provides resistance to abrasion, stains, alcohol, solvents, boiling water, and heat. The material shall be NEMA rated and have flammability and smoke values that meet the standards for flammability of interior materials.
- C. Background color as selected by architect from manufacturer's actual color samples.
- D. Letterform shall be Gill Sans upper case letters and numbers
- E. Size of letters and numbers shall be as follows:
 - 1. Room numbers shall be 1".
 - 2. Lettering for room ID signs shall be 5/8" or as noted.
 - 3. Symbol size shall be 4".
 - 4. Standard Grade 2 braille shall be 1/2" below copy.
 - 5. Corners: 1/2" radius

10 14 00-2

F. Copy position: CC (centered/centered) or As indicated on drawings.

G. Exterior Signs at Storefront Windows

1. 1/16" thick phenolic plastic plaque
2. Mount to exterior at upper right corner
3. Number to identify interior room number
4. 1.5" H x 4" W with 1" Numeral
5. Plaque color to be white, numeral to be black
6. Apply with exterior grade adhesive tape
7. Manufactured by Seton

2.3 SIGN DESIGN

A. Refer to drawings for sign types.

2.4 CAST ALUMINUM PLAQUE

- A. Cast Aluminum individually applied plaque shall be a foundry fabricated, cast aluminum plaque with raised polished letters as manufactured by A.R.K. Ramos, Oklahoma City, OK, OMC Industries, Inc., Gemini Incorporated, or approved alternate.
1. Letter Style: Helvetica Medium
 2. Letter Finish: Polish Aluminum.
 3. Background: Matte painted black.
 4. Border Style: No. 515.
 5. Fastening Method: Type 4, concealed fastener in masonry wall
 6. A message allowance cost shall be quoted based on a layout containing approximately 250 characters. Final message layout shall be determined on shop drawings and pricing adjusted accordingly by change order at that time.
 7. Submit detailed shop drawings of message layouts, capitalization, spacing, border style and mounting methods for Architect's approval prior to fabrication.
 8. Letter size (upper case) shall generally be 1/2"; Main Title or Caption shall be 1"; Plaque size shall be approximately 22-1/4" x 14-1/2".
 9. Location, mounting height and details shall be as indicated on drawings.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas, conditions and surfaces where work of this Section will be performed. Correct conditions detrimental to the proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

- A. Cleaning: Immediately prior to installation of the work of this Section, thoroughly clean all substrata and remove all oil, grease, paint, varnish hardeners, and other items which would adversely affect the bond of adhesive.

10 14 00-3

- B. Smoothing: Make all substrata level and free from irregularities.

3.3 INSTALLATION

- A. Install all graphic materials and identifying devices in strict accordance with the approved shop drawings and the manufacturer's instructions.
- B. Signs shall be mounted using vinyl tape and silastic adhesive. Mechanical for Exterior signage. Unless noted otherwise, all signs shall be mounted 60" from the floor to the top of the sign on the latch side. Center of sign is to be 9" from doorframe or room opening and edge of sign. Installer user assumes responsibility for suitable installation of the signs.

3.4 CLEANING UP

- A. Thoroughly clean all graphics and identifying devices after installation and prior to final acceptance by the Owner. Use only those cleaning materials and methods recommended by the respective manufacturers.

3.5 PROTECTION

- A. Provide any and all necessary protective measures or materials to ensure that graphic materials and identifying devices are not damaged prior to acceptance by Owner. Replacement or repairs caused by such damage shall be corrected immediately at this Contractor's expense.

3.6 COORDINATION

- A. Throughout construction of substrate surfaces, use all means necessary to ensure proper and adequate provision for concealed support devices, and for finished openings, to receive the work of this Section.

END OF SECTION

10 14 00-4

SECTION 10 14 19

ALUMINUM LETTERS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Furnishing and mounting of aluminum letters.
 - 2. Furnishing and mounting of aluminum numerals.

1.2 SUMMARY

- A. Comply with requirements of Section 01 33 00.
- B. Submit letter layout following determination of verbiage through Contractor to Architect in accordance with General Conditions.

1.3 CASH ALLOWANCE

- A. Provide an allowance stated in the Construction Manager's manual for furnishing and installation of aluminum letters

1.4 SIZE AND VERBIAGE

- A. NAME: Upper case letters are to be 8" high x average width of 9".
 - 1. Verbiage: Upper case as follows:
 - a. FARM CREDIT
- B. Provide five (5) numerals 8" high. Numbers will be determined when address is announced.

PART 2 PRODUCT

2.1 MATERIAL

- A. Cast aluminum letters where shown on the drawings shall be as manufactured by A.R.K. Ramos Oklahoma City, OK, The Southwell Co., San Antonio, TX, OMC Industries, Inc., Gemini Incorporated, Cannon Falls, Minnesota, or approved alternate.
- B. Letters and numerals shall be Roman.
- C. Letters and numerals shall be cast from F-214 aluminum alloy, 1" thick, with satin polished faces and matte sides.
- D. Letters and numerals shall be finished in Black.

E. Letter and numeral Finish: Painted baked enamel.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Numerals shall be mounted to wood post where shown on drawings.
- B. Letters to be mounted where shown on drawings.
- C. Letters shall be projected mounting, minimum 1/2" from mounting surface, using extended masonry anchors or threaded screws. Set anchors in epoxy cement. Holes to be thoroughly cleaned prior to setting.

END OF SECTION

10 14 19-2

SECTION 10 14 53

SITE SIGNAGE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Installation of traffic control signs.

1.2 RELATED REQUIREMENTS

- A. Section 03 30 33 – Cast-In-Place Concrete
- B. U. S. Department of Transportation, Federal Highway Administration’s “Manual on Uniform Traffic Control Devices” (MUTCD).
- C. Construction Drawings.

PART 2 PRODUCTS

- 2.1 SIGNS – MUTCD classification is shown in parentheses. Signs manufactured by Seton or approved alternate product. Refer to Civil Drawings for signs to be provided.

- A. “STOP” Signs: 30-in. x 30-in., Octagon, white legend and border on red background (R1-1).
- B. “ACCESSIBLE PARKING” Signs: 12-in. x 18-in., green legend and border, white symbol.
- C. “ONE WAY” Signs: 18” x 24”, black letters and arrow with white background (R6-2).
- D. “NO PARKING FIRE LANE” Signs: 12” x 18”, red letters and border, white background (R8-31).

2.2 SIGN LEGEND

- A. Reflective legend material shall comply with Federal Highway Administration standards regarding color, reflectively and durability.

2.3 SIGN PANELS

- A. Sheet aluminum sign panel material shall be approximately .080” thick aluminum complying with ASTM B209, alloy 6061-T6.

2.4 POSTS

- A. “U” channel galvanized steel posts with galvanized sign-mounting hardware for each sign. Posts shall have a weight of not less than 2-lb per ft. Set steel posts inside 6”, galvanized steel pipe bollard, filled with concrete. Pipe is to extend to within 2” of bottom of sign.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install posts and pipe in 18-in. round x 24-in. deep concrete foundations. Concrete shall comply with Section 03 30 00. Set posts vertical and plumb with bottom of sign at 6’-5” above finish grade. Mount signs in accordance with manufacturer’s instructions.

END OF SECTION

SECTION 10 28 13

TOILET AND BATH ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

- A. The work to be completed under this heading consists of furnishing all labor, materials, equipment and services necessary for and reasonably incidental to the furnishing and application of all miscellaneous items as shown and as specified.
- B. All items shall be delivered in sound condition, properly installed and shall be clean, undamaged, and in proper working order.

1.2 SUBMITTALS

- A. Comply with requirements of Section 01 33 00.

1.3 REFERENCES

- A. Comply with State of Arkansas Adopted ADA Accessible Guidelines in regard to accessible or handicapped features.

PART 2 PRODUCTS

2.1 OWNER FURNISHED TOILET ACCESSORIES:

- A. Owner will furnish soap dispensers, paper towel dispensers, and sanitary napkin disposals.

2.2 TOILET ACCESSORIES:

- A. Mop Racks: (One for each mop or service sink shown on drawings.)
 - 1. Stainless steel, satin finish; anti-slip mop holders with spring loaded, rubber cam w/3 holders.
 - a. Bobrick Washroom Equipment, Inc., Model B-223 x 24
 - b. Bradley Corp. Model 9953.
 - c. Approved alternate.
- B. Pre-manufactured Wall Mounted Mirrors: (One at each wall-hung lavatory.)
 - 1. Standard Stainless Steel Mirrors:
 - a. Surface mounted, center over each lavatory, 304 stainless steel, satin finish frame with No. 1 quality 1/4" glass, mirror warranted against silver spoilage for 15yrs. Galvanized steel back, 18"x36". Secure to concealed wall hanger with theft-resistant mounting. Mounting height as scheduled on Drawings.
 - b. Acceptable Products:
 - Bobrick Washroom Equipment, Inc. - Model B-290-1836

10 28 13-1

Bradley Corporation, Model 780-1836

- C. Grab Bar-Toilet Rooms: (One set at each handicapped water closet.)
 - 1. 18 gage stainless steel; 1 1/2" diameter, safety grip surface; concealed mounting. One at each handicapped water closet.
 - a. Model No. B6806.99 x 42, B6806.99 x 36 & B6806.99 x 18 by Bobrick.
 - b. Model No. 8122-00142, 8122-00136 & 8122-00118 by Bradley.
 - c. Or approved alternate.
- D. Toilet Tissue Dispenser – Type 1 (one for each water closet)
 - 1. Surface mounted type; double roll, vandal and theft resistant locking mechanism for spindle; no key required; tension spring or other means for controlled delivery of roll; cast aluminum, satin finish.
 - 2. Acceptable Product:
Bradley Corporation - Model 5241
Bobrick Washroom Equipment, Inc., Model B-274
Approved alternate.
 - 3. For handicapped toilets, provide Bobrick, Model B-2740 or approved alternate.

PART 3 EXECUTION

3.1 FABRICATION:

- A. Stamped names or labels on exposed faces of toilet accessory units are not permitted. Wherever locks are required for particular type of accessory, provide same keying throughout project. Furnish two keys for each lock, properly identified.
- B. Surface Mounted Accessories: Fabricate units with tight seams and joints, exposed edges rolled. Hang doors or access panels with continuous piano hinge or minimum of two 1 1/2" pin hinges of same metal as unit cabinet. Provide concealed anchorage wherever possible.

3.2 INSTALLATION:

- A. Install toilet accessory units in accordance with manufacturer's instructions, using fasteners appropriate to substrate and recommended by manufacturer of unit.
- B. Install units at location and heights as shown on drawings. Install as to comply with all national, state, and local codes and regulations. Units shall be plumb and level, firmly anchored.
- C. If mirrors are installed on ceramic tile, coordinate tile pattern and layout to accommodate mirrors. Mirror to be installed on single plane.
- D. Molly-type anchors are not acceptable for securing accessories to walls or partitions. Secure to gypsum board partitions with screws anchored in wood blocking. Anchor accessories to masonry walls with screws set in epoxy.

- E. Where mounting grab bars to existing gypsum board walls, anchor with Winglt model 251-4 wall anchor, manufactured by Winglt Innovations, Inc. Install per manufacturer's instructions.
- F. Verify and coordinate location and installation of wood blocking concealed in gypsum board walls for attachment of wall-mounted toilet accessories.

3.3 ADJUSTING AND CLEANING:

- A. Adjust toilet accessories for proper operation and verify that mechanisms function smoothly.
- B. Clean and polish all exposed surfaces after removing protective coatings.

END OF SECTION

SECTION 10 44 00

FIRE EXTINGUISHERS & CABINETS

PART 1 GENERAL

1.1 SUMMARY

- A. Work under this heading consists of furnishing all labor, materials, equipment and services necessary to install fire extinguisher and cabinets as shown or called out on drawings.

1.2 SUBMITTALS

- A. Comply with requirements of Section 01 33 00.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Furnish where called for on drawings, semi-recessed, enameled steel case with "Larsen-Loc" door latching mechanism, solid door, with red fire handle plate, Larsen 2409-6R, J.L. Industries 1017, or approved alternate. Where fire rated cabinets are called for, provide FS-2409-6R by Larsen, J.L. Industries, or approved equal. Verify semi-recessed cabinet will fit in provided wall thickness. Break-glass doors will be acceptable only if approved company has no equal to "Larsen-Loc".
- B. Furnish multi-purpose dry chemical extinguisher, Larsen MP10, J.L. Industries Cosmic 10E, or approved equal in each fire extinguisher cabinet.
- C. Furnish wet chemical extinguisher, bracket mounted, located in kitchen area, Larsen WC-6L, J.L. Industries Saturn 15, or approved alternate.
- D. Provide extinguishers with wall mounted brackets where called for on drawings.

PART 3 EXECUTION

3.1 INSTALLATION:

- A. Accurately locate all items, install level, plumb, and true. See Plans for required locations. Rigidly attach to the supporting surfaces in the manner recommended by the manufacturer. Install cabinet as required to provide 48" from finished floor to extinguisher handle.

END OF SECTION

10 44 00-1

SECTION 12 24 15

WINDOW SHADES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Manually operated, roll-up fabric interior window shades including mounting and operating hardware.

1.2 RELATED SECTIONS

- A. Section 06 10 00 - Rough Carpentry.
- B. Section 07 90 00 - Joint Protection.
- C. Section 09 29 00 – Drywall

1.3 REFERENCES

- A. NFPA 70 - National Electrical Code.
- B. NFPA 701-99 - Fire Tests for Flame-Resistant Textiles and Films.
- C. GREENGUARD Environmental Institute Children & Schools
- D. US Green Building Council

1.4 SUBMITTALS

- A. Submit under provisions of Section 01 33 00
- B. Product Data: Manufacturer's data sheets on each product specified, including:
 - 1. Preparation instructions and recommendations.
 - 2. Installation and maintenance instructions.
 - 3. Styles, material descriptions, dimensions of individual components, profiles, features, finishes and operating instructions.
 - 4. Storage and handling requirements and recommendations.
 - 5. Mounting details and installation methods.
- C. Shop Drawings: Plans, elevations, sections, product details, installation details, operational clearances, wiring diagrams and relationship to adjacent work.
- D. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings, field verified window dimensions, quantities, type of shade, controls, fabric, and color, and include opening sizes and key to typical mounting details.

- E. Selection Samples: For each finish product specified, two complete sets of shade cloth options and aluminum finish color samples representing manufacturer's full range of available colors and patterns.
- F. Verification Samples: For each finish product specified, two complete sets of shade components, unassembled, demonstrating compliance with specified requirements. Shade fabric sample and aluminum finish sample as selected, representing actual product, color, and patterns. Mark face of material to indicate interior faces.
- G. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.
- H. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Obtain roller shades through one source from a single manufacturer with a minimum of twenty years experience in manufacturing products comparable to those specified in this section.
- B. NFPA Flame-Test: Passes NFPA 701. Materials tested shall be identical to products proposed for use.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver window shades until building is enclosed and construction within spaces where shades will be installed is substantially complete.
- B. Deliver products in manufacturer's original, unopened, undamaged containers with labels intact.
- C. Label containers and shades according to Window Shade Schedule.
- D. Store products in manufacturer's unopened packaging until ready for installation.

1.7 SEQUENCING

- A. Ensure that locating templates and other information required for installation of products of this section are furnished to affected trades in time to prevent interruption of construction progress.
- B. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.8 PROJECT CONDITIONS

- A. Install roller shades after finish work and ambient temperature, humidity and ventilation conditions are maintained at levels recommended for project upon completion.

1.9 WARRANTY

- A. Hardware and Shade Fabric: Draper's standard twenty-five year limited warranty.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: Draper, Inc., which is located at: 411 S. Pearl P. O. Box 425 ; Spiceland, IN 47385-0425; Toll Free Tel: 800-238-7999; Tel: 765-987-7999; Email: request info; Web: www.draperinc.com
- B. Acceptable Manufacturers: MechoSystems, Inc., Springs Window Fashions, Inc.
- C. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00

2.2 MANUALLY OPERATED WINDOW SHADES

- A. Manually Operated Window Shades with Independent Control: Manually operated, vertical roll-up, fabric window shade with components necessary for complete installation; Manual FlexShade as manufactured by Draper, Inc.
 - 1. Operation: Bead chain and clutch operating mechanism allowing shade to stop when chain is released. Designed never to need adjustment or lubrication. Provide limit stops to prevent shade from being raised or lowered too far.
 - a. Clutch mechanism: Fabricated from high carbon steel and molded fiberglass reinforced polyester or injected molded nylon. White or Black color as selected by Architect.
 - b. Bead chain loop: Stainless steel bead chain hanging at side of window.
 - c. Idler Assembly: Provide roller idler assembly of molded nylon with adjustable or spring-loaded length idler pin to facilitate easy installation, and removal of shade for service.
 - d. Bead Chain Hold Down: P-Clip (standard).
 - 2. Roller Tube: Fabricated from extruded aluminum, galvanized steel, or enameled steel. Diameter, wall thickness, and material selected by manufacturer to accommodate shade type and size. Fabric connected to the roller tube with LSE (low surface energy) double sided adhesive specifically developed to attach coated textiles to metal. Adhesive attachment to eliminate horizontal impressions in fabric.
 - 3. Shade slat: Slat encased in heat sealed hem.
 - 4. Mounting:
 - a. Mounting brackets.
 - b. Endcaps and fascia.

5. Brackets: Plated stamped steel. Provide size compatible with roller size.
 - a. Mount to jamb
6. Endcaps: Stamped steel with universal design suitable for mounting to ceiling, wall, and jamb. Provide size compatible with roller size.
 - a. Endcap covers: To match fascia color.
7. Fascia: L shaped aluminum extrusion to conceal shade roller and hardware.
 - a. Attachment: Snaps onto endcaps without requiring exposed fasteners of any kind. Fascia can be mounted continuously across two or more shade bands. No notching is required.
 - b. Shape: Square Fascia Panel.
 - c. Color: Architect to select from manufacturer's standard colors palate

2.3 FABRIC

- A. Light-Filtering Fabrics
 1. SheerWeave Series SW2400 by Phifer: VOC Emissions: GREENGUARD Children & Schools -certified as a low emitting fabric. Manufacturer to supply GREENGUARD Children & Schools certificate. 500 denier fiberglass, vinyl coated and woven into a 2 x 2 basket weave. Fire rating: NFPA 701. Bacteria and Fungal Resistance: ASTM G 21 and ASTM G 22. Series SW2400, 3 percent open, .019 inches thick.
- B. Color and pattern: As indicated in Color Schedule on Drawings.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Coordinate requirements for blocking and structural supports to ensure adequate means for installation of window shades.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install roller shades level, plumb, square, and true. Allow proper clearances for window operation hardware. Install the following items to conceal roller and operating mechanism. Do not use exposed fasteners.
 1. Fascias
 2. Closure panels.
 3. Endcaps.

- C. Position shades level, plumb, and at proper height relative to adjacent construction. Secure with fasteners recommended by manufacturer.
- D. Position so that fascia front aligns with plane of interior gypsum wall board finish.

3.4 TESTING AND DEMONSTRATION

- A. Test window shades to verify that interface to other building systems and other operating components are functional. Correct deficiencies.
 - 1. Chain and clutch.
- B. Demonstrate operation of shades to Owner's designated representatives.

3.5 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

3.6 SCHEDULES

- A. Refer to Drawings for shade types and locations.

END OF SECTION

SECTION 22 01 00

GENERAL PLUMBING PROVISIONS

PART 1 GENERAL

1.1 WORK INCLUDED

- A. The work covered by Division 22 sections consist of furnishing all labor, equipment, appliances and material for the heating, air conditioning, piping and plumbing systems in strict accordance with Codes, Specifications and the applicable drawings and subject to the terms and conditions of the contract. Include all appurtenances necessary to the proper operation of the systems and equipment specified.
- B. General Contractor shall install all concrete pads and bases required for installing mechanical equipment. Mechanical Contractor is responsible for the exact sizes required, location of anchor bolts, etc.
- C. Some equipment may be furnished by other divisions. Mechanical Contractor is responsible to check the drawings and specifications for equipment that will be furnished by others. Furnish the supplies (hot and cold water cut-offs), traps, drains, controls, gas piping, pressure reducing valves, etc., on all equipment furnished by other divisions.
- D. General Contractor shall furnish and install all ceiling access panels required to service mechanical equipment, valves and controls above gyp board or hidden spline ceilings.
- E. General Contractor shall provide all site drive, sidewalk and other surfaced areas saw cutting and repairs back to preexisting conditions for the required mechanical piping. Mechanical Contractor shall provide the trenching, bedding and backfill required for the pipe installation.

1.2 RELATED SECTIONS

- A. The General Conditions and Division 1, General Requirements, as bound in the specification preamble, apply to all work under Division 22. Carefully note its contents in performance of the work.
- B. The Architectural, Mechanical, Electrical, and Structural plans and Specifications, including Information to Bidders and other pertinent documents issued by the Engineer are a part of this Specifications and the accompanying mechanical plans. Comply with them in every respect. Examine all the above carefully. Failure to comply does not relieve the Contractor of responsibility nor may it be used as a basis

for additional compensation due to omission of architectural, electrical and structural details from the mechanical drawings.

- C. All electrical power wiring is specified under Division 26 of the Specifications. Mechanical Contractor shall furnish all motor starters required for the control and protection of all motors furnished for the Division 22.
- D. All concrete pads and bases required for installing mechanical equipment are specified in another section of the Specifications. Advise the General Contractor as to the exact sizes required, location of anchor bolts, etc.
- E. Paint all mechanical equipment piping, supports and other exposed material. Do not paint equipment supplied with painted finish, such as the main mechanical equipment unless damaged during handling and installation. In such cases, use touch-up paint of the same type and color as original paint. Conform to requirements in other sections of the Specifications and match wall finish to the room in which installed.

1.3 CODES, FEES AND LATERAL COSTS

- A. Comply with all applicable codes, specifications, local ordinances, industry standards, utility company regulations, and the applicable requirements of the following latest nationally accepted codes and standards:
 - 1. 2021 Ozark, Arkansas City Building Code.
 - 2. 2021 Arkansas State Mechanical Code.
 - 3. 2018 Arkansas State Plumbing Code.
 - 4. 2014 Arkansas Energy Code.
 - 5. IBC - International Building Code; latest accepted edition.
 - 6. IFC - International Fire Code; latest accepted edition.
 - 7. IGC - International Gas Code; latest accepted edition.
 - 8. IPC - International Plumbing Code; latest accepted edition.
 - 9. IMC - International Mechanical Code; latest accepted edition.
 - 10. IECC - International Energy Conservation Code; latest accepted edition.
 - 11. AMCA - Air Moving & Conditioning Association.
 - 12. ASA - American Standards Association.

13. ASHRAE - American Society of Heating, Refrigerating and Air Conditioning Engineers.
 14. ASME - American Society of Mechanical Engineers.
 15. ASTM - American Society of Testing Materials.
 16. AWWA - American Water Works Association.
 17. NBS - National Bureau of Standards.
 18. NEMA - National Electrical Manufacturers Association.
 19. NFPA - National Fire Protection Association.
 20. SMACNA - Sheet Metal & Air Conditioning Contractors' National Association.
 21. UL - Underwriters' Laboratories, Inc.
 22. AGA - American Gas Association.
 23. OSHA - Occupational Safety and Hazard Association.
 24. AABC - Associated Air Balance Councils.
 25. NEBB - National Environmental Balancing Bureau.
- B. Comply with State of Arkansas adopted ADA Accessible Guidelines in regard to accessible or handicapped features.
- C. In case of difference between building codes, Specifications, state Laws, local ordinances, industry standards and utility company regulations and the Contract Documents, the most stringent governs. Promptly notify the Engineer in writing of any such difference.
- D. Remove any work installed that does not comply with the requirements of the applicable building codes, state laws, local ordinances, industry standards, or utility company regulations, correct the deficiencies, and reinstall all work at no cost to the Owner.
- E. The mechanical drawings show the general arrangement of all piping, equipment and appurtenances. Follow as closely as actual building construction and the work of other trades will permit. Final layout will be governed by actual field conditions with all measurements verified at the site. Conform to the requirements shown on all of the drawings. General and structural drawings take precedence over mechanical drawings. Because of the small scale of the mechanical drawings, it is not possible to

indicate all offsets, fittings and accessories which may be required. Investigate the existing and finish conditions affecting the work and arrange the work accordingly, providing such fittings, valves and accessories as may be required to meet such conditions. Contractor shall verify that all equipment, ducts, pipes and all other components will fit in the space provided before fabrication or ordering.

- F. Obtain any and all required permits in connection with this work under the Contract and pay any and all fees in connection therewith. Arrange with the serving utility companies for the connections to all utilities and pay all charges for same including inspection fees and meters if required. Refundable deposits will be paid by the Owner.
- G. Mechanical Contractor shall provide and install, where applicable, seismic restraints for all piping and duct systems per the latest accepted Building Code.

1.4 GUARANTEE

- A. Furnish a written certificate guaranteeing all materials, equipment and labor furnished to be free of all defects for a period of one (1) year from and after the date of final acceptance of the work by the Owner and further guarantee to replace such work without charges if any defects appear within the stipulated guaranty period.

1.5 SOIL CONDITIONS

- A. The Specifications and the drawings in no way imply the conditions of the soil to be encountered. When excavating may be required in execution of the work, this Contractor agrees that he has informed himself regarding conditions affecting the work.

1.6 INSPECTION OF PREMISES

- A. Before submitting a bid, visit the site of the proposed job and determine the conditions relating to this work.

1.7 UTILITIES, LOCATIONS AND ELEVATIONS

- A. Locations and elevations of the various utilities included within the scope of this work have been obtained from substantially reliable sources and are offered as a general guide only, without guarantee as to accuracy. Verify the location and elevation of all utilities and their relation to the work before entering into a contract.
- B. Identify outdoor underground lines with continuous strip of plastic utility marker tape at regular intervals (maximum of 10 feet) "Caution (state utility) pipe below". Install one foot directly above pipe before backfilling to grade.

1.8 EQUIPMENT NOT SPECIFIED UNDER DIVISION 22

- A. Equipment which requires plumbing and other mechanical connections may be specified in another division of this Specification. Under these conditions, provide necessary utilities including waste, water and natural gas.
- B. Rough-in work from approved shop drawings only.

PART 2 PRODUCTS

2.1 EQUIPMENT AND MATERIALS

- A. Provide new materials bearing the manufacturer's name, trade name and the UL label in every case where a standard has been established for the particular material.
Furnish the standard product of a manufacturer regularly engaged in the production of the required type of equipment. Provide the manufacturer's latest approved design.
- B. Deliver equipment and materials to the site and store in original containers, suitably sheltered from the elements, but readily accessible for inspection by the Engineer until installed. Store all items subject to moisture damage (such as controls) in dry, heated spaces.
- C. Provide equipment and materials of the same general type and of the same make throughout the work to provide uniform appearance, operation and maintenance.
- D. Tightly cover equipment and protect against dirt, water and chemical or mechanical injury and theft. At the completion of the work, clean fixtures, equipment and materials and polish thoroughly. Turn over to the Owner in a condition satisfactory to the Engineer. Repair damage or defects developing before acceptance of the work at no expense to the Owner.
- E. Insure that items to be furnished fit the space available. Make necessary field measurements to ascertain space requirements, including those for connections.
Furnish and install such sizes and shapes of equipment that the final installation suits the true intent and meaning of the drawings and Specifications.
- F. Follow manufacturer's directions completely in the delivery, storage, protection and installation of all equipment and materials. Promptly notify the Engineer in writing of any conflicts between any requirements of the Contract Documents and the manufacturers' directions. Obtain the Engineer's written instruction before proceeding with the work. Replace any work that does not comply with the manufacturers' directions or such written instructions from the Engineer, at no cost to the Owner.

- G. Support all products by service organizations with adequate spare parts inventory and personnel located reasonably close to the site.
- H. Where multiple units of the same type or class of products are required, provide all units of the same manufacturer.

2.2 EQUIPMENT ACCESSORIES

- A. Furnish and install all equipment, accessories, connections and incidental items necessary to fully complete all work, ready for use, occupancy and operation by the Owner.
- B. Where equipment requiring different arrangement or connections from those shown is provided, install the equipment to operate properly and in harmony with the intent of the drawings and Specifications.
- C. Support, plumb, rigid and true to line, all work and equipment furnished. Study thoroughly all general, structural, electrical and mechanical drawings, shop drawings and catalog data to determine how equipment, fixtures, piping, ductwork, etc., are to be supported, mounted or suspended and provide extra steel bolts, inserts, pipe stands, brackets and accessories for proper supports whether or not shown on the drawings. When directed, submit drawings showing supports.
- D. If accessories are required to complete the work and meet the intent of the specification, it is the responsibility of the Contractor to provide such accessories.

2.3 MATERIAL AND EQUIPMENT SCHEDULE

- A. Submit to the Engineer as soon as practical, six (6) complete sets of the schedule of materials and equipment proposed for the installation, or electronic submittals as detailed below. Include manufacturers' names, catalog data, diagrams, drawings and other descriptive data and submit under one cover with an index sheet in front.
 - 1. If Electronic files are submitted, a complete set of the schedule of materials and equipment proposed for the installation shall be included. Include manufacturers' names, catalog data, diagrams, drawings and other descriptive data. All information shall be submitted electronically in "pdf" format, and shall be separated into electronic "pdf" files according to the corresponding specification section (i.e. "22 10 06 - Plumbing Specialties.pdf"). Unless incomplete submittals are authorized by the project engineer, all Division 22 submittals shall be electronically sent at one time. Without authorization, incomplete submittals shall be rejected.

- B. Provide written certification that shop drawings are in accordance with the specifications and are dimensionally correct with reference to available space.
- C. All submittals will be reviewed a maximum of two (2) times. The cost of additional submittal reviews beyond those two specified will be charged to the Contractor.
- D. Shop drawings for the Engineer's files are required on the following items:
 - 1. Commercial water heaters.
 - 2. Plumbing fixtures and floor drains.
 - 3. Valves/Circulation pumps/flex connectors and other specialties.
 - 4. Water balance certification.
 - 5. Piping materials including valves.
 - 6. Piping insulation materials.
 - 7. Complete mechanical equipment electrical data and wiring details.

2.4 EQUIPMENT AND MATERIAL SUBSTITUTIONS

- A. It is the responsibility of the Contractor to investigate any desired substitutions for specified equipment prior to submission of his bid. The Mechanical Contractor shall be responsible for any changes required in mechanical, electrical, structural or vibration isolation systems and shall bear all cost for those changes whether the substitute equipment is named by manufacturer in the specifications or is submitted to the Architect for "or equal" consideration. All changes shall be accomplished in a manner acceptable to the Architect per Section 01 60 00 at no additional cost to the Owner.
- B. In order to obtain prior approval on equipment or material not specified in Division 22 Specifications or Equipment Schedules, Mechanical Contractor MUST submit to the Engineer any proposed equipment or material ten (10) working days prior to the bid date.
- C. If ANY substitute equipment is submitted to Engineer for approval, without said equipment having been pre-approved, the entire submittal will be rejected for resubmittal.
- D. Any equipment manufacturers which are a subsidiary to the listed acceptable manufacturers are not considered equal. Therefore, it is the responsibility of the Contractor and equipment supplier to obtain prior approval as described in paragraph 2.4, this Section.

2.5 ELECTRICAL MOTORS

- A. Provide motors of a recognized manufacturer, wound for the voltage specified, and in conformance to latest standards of the manufacturer and performance of the National Electrical Manufacturers Association and the Institute of Electrical and Electronic Engineers. Provide motors as manufactured by General Electric, Westinghouse, Century or Siemens-Allis, Baldor or approved equal.
- B. Provide motors rated for continuous duty at 100% of rated capacity and temperature raise of 40 degrees Centigrade open type; 50 degrees Centigrade drip and splash proof; 55 degrees Centigrade explosion proof and totally enclosed above an ambient of 40 degrees Centigrade.
- C. Unless otherwise required, provide integral horsepower, polyphase motors, Class B, general purpose, squirrel cage, open type induction motors, T-frame.
- D. Provide single phase fractional horsepower motors of the open capacitor type. Generally, motors under 1/2 horsepower may be split phase type unless otherwise specified. Provide motors rated 1/2 horsepower or less with integral overcurrent protection.
- E. Insure the insulation resistance between stator conductor and frames of motors is not less than 1/2 megohm. Provide shop test of motors including temperature rise, insulation resistance, motor terminal voltage, normal operating line current, RPMs, breaker or switch size with fusing and overload relay sizes.

PART 3 EXECUTION

3.1 COORDINATION OF WORK

- A. Compare the mechanical drawings and Specifications with the drawings and Specifications for other trades and report any discrepancies between them to the Engineer and obtain from him written instruction for changes necessary in the mechanical work. Install the mechanical work in cooperation with other trades installing inter-related work. Before installation, make proper provisions to avoid interferences in a manner approved by the Engineer. Make all changes required in the work caused either by neglect or existing field conditions at no cost to the Owner.
- B. It is the responsibility of the General Contractor, Mechanical Contractor, Electrical Contractor and Sprinkler Contractor to coordinate installation of all equipment. Equipment installed prior to proper coordination, which interferes with the harmony and intent of the specifications and drawings, will be removed and reinstalled at the cost of the responsible Contractor.

- C. Furnish anchor bolts, sleeves, inserts and supports required for the mechanical work. Locate anchor bolts, sleeves, inserts and supports as directed by the trade requiring them and insure that they are properly installed.
- D. Adjust locations of pipes, ducts, equipment fixtures, etc., to accommodate the work and for interferences anticipated and encountered. Determine the exact route and location of each pipe and duct prior to fabrication.
 - 1. New work and remodeled areas are to interface with existing facility services. Contractor to familiarize himself with the extent of the work prior to submitting his bid. Failure to gain familiarity will not be grounds for additional compensation.
 - 2. Provide right-of-way to lines that pitch over those that do not pitch. For example, Plumbing drains normally have right-of-way. Lines whose elevations cannot be changed have the right-of-way over lines whose elevations can be changed.
 - 3. Make offsets, transitions and changes in direction in pipes and ducts as required to maintain proper head room and pitch.
- E. Install all mechanical work to permit removal without damage to other parts, to coils, fan shafts and wheels, filters, belt guards, sheaves and drives and all other parts requiring periodic replacement or maintenance. Arrange pipes, ducts and equipment to permit ready access to valves, cocks, traps, starters, motors, control components and to clear the openings of swinging and overhead doors and of access panels.

3.2 CHLORINATION OF DOMESTIC WATER LINES

- A. After the hot and cold water systems are complete, all fixtures connected, the system flushed out completely and the shut-off valve to the water main closed, fill the system with a solution containing 50 parts per million of available chlorine. Allow the solution to stand six (6) hours before flushing and returning to service.
- B. Then fill the system with a solution containing 100 parts per million of available chlorine. Allow this solution to stand two (2) hours before flushing and returning to service.
- C. Notify the Owner twenty-four hours prior to test so his representative can witness test. Obtain chemical analysis of the domestic water lines after chlorination from a Certified Chemist and submit the results of these tests to the Engineer and Owner.

3.3 RECORD DRAWINGS

- A. Maintain record drawings showing exact locations and sizes, as actually installed, of piping, drains, cleanouts, ductwork, controls and equipment as specified herein. Deliver to the Owner/Architect upon completion and acceptance of the work, one (1) complete set of contract drawings marked to indicate all deviations from intended installation.

3.4 CUTTING AND PATCHING

- A. The General Contractor shall be responsible for all required Building cutting, patching, etc., incidental to this work and shall make all required repairs thereafter to the satisfaction of the Engineer. Do not cut into any major structural element, beam or column without the written approval of the Engineer.
- B. The General Contractor shall cut, patch, repair and/or replace pavements, sidewalks, roads and curbs as required to permit the installation of the plumbing work and pay all expenses incurred for this work.
- C. Openings in fire or smoke barriers for air handling ductwork or air movement shall be protected in accordance with NFPA 90A and 90B and the Standard Mechanical Code.
- D. Pipes, conduits, cables, wires, air ducts, pneumatic tubes and ducts and similar handling service equipment that pass through fire or smoke barriers shall be protected in accordance with NFPA 101 by the plumbing contractor.
- E. All fire stopping assemblies must be UL approved assemblies.

3.5 EXCAVATION AND TRENCHING FOR PIPING

- A. Excavate to the depths indicated on the Drawings or as required to provide adequate slope and burial depth. Excavated materials not required or suitable for backfill or fill shall be removed from the site. Do such grading as is necessary to prevent surface water from flowing into trenches or other excavations. Water accumulating therein shall be removed by pumping or by other method. Sheet piling and shoring shall be installed as may be necessary for protection of the work and for safety of personnel. Excavation shall be by open cut except that short sections of a trench may be tunneled if the pipe can be safely and properly installed and backfill can be properly tamped in such tunnel sections.
- B. Trench Excavation: Grade bottom of trenches to provide uniform bearing and support for each section of pipe on undisturbed soil. Where rock is encountered excavate to a minimum overdepth of 4" below trench depths indicated on the Drawings or specified. Overdepth in rock excavation and unauthorized overdepths shall be backfilled.

Whenever wet or otherwise unstable soil incapable of properly supporting the pipe is encountered such soil shall be removed and the trench backfilled to proper grade as hereinafter specified.

- C. Depth of Cover: Trenches shall be of depth that will provide three feet (3') minimum cover for domestic water, fire lines, sanitary and storm sewers from existing grade or from indicated finish grade, whichever is lower, unless otherwise specifically shown.
- D. Utilities Locating: Locate existing utility lines prior to beginning any excavation
- E. Protection of Existing Utilities: Existing utility lines to be retained that are shown on the Drawings or the locations of which are made known to the Contractor prior to excavation, as well as all utility lines uncovered during excavation operations, shall be protected from damage during excavation and backfilling, and if damaged, shall be repaired by the Contractor, at his expense.
- F. Trenches shall not be backfilled until required pressure and other tests have been performed and until the utilities systems as installed conform to requirements of Drawings and Specifications.
- G. Backfill trenches with excavated materials consisting of earth, sandy clay, sand, gravel, soft shale or other approved materials, free from clods of earth or stones 2-1/2" maximum dimension, deposited in 6" layers and compacted to 95% Standard Proctor Compaction Test of the maximum laboratory density determined in accordance with ASTM D698, Moisture-Density Relation of Soils. If fills fail to meet the specified densities, the Contractor shall remove and re-compact the fill until specified densities are achieved. Compaction test shall be performed for each fifty linear feet of trench.
- H. Provide a 4-inch thick (minimum) layer of 3/4-inch No. 4 gravel aggregate bedding beneath all buried piping. Bedding shall be compacted and leveled to provide sloping required.
- I. Tests for displacement of sewers: After the trench has been backfilled to 2 feet or more above the pipe, if the pipe shows poor alignment, displaced pipe, or any other defects, such defects shall be remedied by the Contractor at his expense.

3.6 EQUIPMENT START-UP AND TESTING

- A. Instruct the Owner's operating personnel during start-up and separate operating tests of each major item of equipment. During the operating tests, prove the operation of each item of equipment to the satisfaction of the Engineer. Give at least seven (7) days notice to the Engineer of equipment start-up and operating tests.

3.7 CATALOG DATA FOR OWNER

- A. Provide, in looseleaf binders, two (2) sets of a compilation of catalog data of each manufactured item of equipment used in the mechanical work and present this compilation to the Owner/Architect for transmittal to the Owner before final payment is made. Include descriptive data and printed installation, operating and maintenance instructions for each item of equipment. Provide a complete double index as follows:
 - 1. Listing of products alphabetically by name.
 - 2. Listing the names of manufacturers whose products have been incorporated in the work alphabetically together with their addresses and the names and addresses of the local sales representatives.
 - 3. Certificates of Final Inspections.
 - 4. Complete spare parts data with current prices and supply sources.
 - 5. Extended warranties.
- B. Deliver to the Owner all special tools, lubricants, extra materials and any other products necessary for the proper operation and maintenance of the mechanical and plumbing systems.
- C. Provide project record documents indicating all changes from contract documents made during construction.
- D. Submit all Certificates of Final Inspections from the Administrative Authorities.
- E. Submit TAB reports on approved forms. Final TAB report submittals shall include all required rebalances if any are required.
- F. Submit to the Engineer as soon as practical, electronic closeout documents as detailed below.
 - 1. Include manufacturers' names, catalog data, diagrams, drawings and other descriptive data and submit under one cover with an index sheet in front. All information shall be submitted electronically in "pdf" format, and shall be separated into electronic "pdf" files.

3.8 INSTRUCTION OF OWNER'S REPRESENTATIVE

- A. Instruct the representative of the Owner in the proper operation and maintenance of all elements of the mechanical system.

3.9 PROTECTIVE COATINGS

- A. Paint exterior surfaces of steel piping run in or through concrete floor fill, under tile floors or underground, and aluminum surfaces in contact with masonry, with one coat of acid resisting bituminous base paint.

3.10 TEST AND ACCEPTANCE

- A. Water Piping System: Test with water at 100 psi for one (1) hour or with available city water pressure for twenty-four (24) hours to prove tight and free from leaks.
- B. Plumbing and Drainage System: Test the new system humidity and drain piping with water and prove tight. Test system with 10 feet of water for 24 hour period. Air test is not permitted.
- C. Storm Drainage System: Test storm drainage system with 10 feet of water for a 24-hour period. If approved by the administrative authority and there is proof that no site water is available, an air test of 5 pounds for 24 hours without introduction of additional air may be used. The air test shall be conducted with a three-inch gage with a maximum scale of 100 psig. This test applies to new storm drains connecting to existing storm drain system. Any failures to the existing storm drain system shall be brought to the attention of the administrative authority prior to the completion of the installation.

3.11 NOISE CONTROL

- A. It is intended that the mechanical systems as installed under this contract be free from objectionable noise when the system is operating. The system shall operate at noise levels below criteria recommended for the application by ASHRAE. Provide vibration isolation accessories and isolate equipment, pipeline, ductwork, etc., as required so as to insure an acceptable noise level in all of the mechanical systems.

3.12 CLEANING AND ADJUSTING

- A. Do not allow waste material and rubbish to accumulate in or above the premises. After completion of this work, remove rubbish, tools, scaffolding and surplus materials from and about the building and leave all work clean and ready for use. Clean all equipment, pipes, valves and fittings of grease, metal cuttings and sludge. Repair any stoppage, discoloration or other damage to parts of the building, its finish or furnishings due to failure to properly clean the mechanical systems, without additional cost to the Owner. Adjust all automatic control devices for proper operation.

3.13 SYSTEM OPERATING TESTS

- A. After the successful completion of all equipment start-up and test requirements, perform the following tests on the complete mechanical systems:
1. First Operating Test by Contractor: Prove the operation of the mechanical systems and of each individual item in the systems. Give at least 10 days prior notice to the Engineer of such tests. Adjust and set proper quantities to all items and equipment. Should any item of the systems fail to perform in an approved manner, repeat this test until approved by the Engineer. During this test, balance circulation of heating and cooling water to balancing cocks, valves, thermostats and similar Items to insure that the mechanical systems perform as intended.
 2. Checking by Owner and Engineer: Following the successful completion of first operating tests by the Contractor, the Owner and the Engineer have the privilege of making such tests as they may desire during a period of three weeks to ascertain in detail if any corrections are to be made to the system. At the end of the testing by the Owner and the Engineer, the Engineer may direct the Contractor in writing to make such corrections to the systems as are within the scope of the contract.
 3. Contractor's Corrections to Systems: Make all required corrections to the systems and notify the Engineer in writing that the corrections outlined have been completed. Give at least seven (7) days notice of a final three-day operating test.
 4. Three-Day Operating Test: Perform an operating test to the satisfaction of the Engineer for a period of three (3) days. Should any element of the systems not perform properly, make all required corrections and repeat the test until successfully performed.
 - a. Submit the Form of Record proposed by the Contractor for the recording of all measurements to the Engineer for approval at least two weeks before the approved form will be required by the Contractor.
 - b. Measurements: Make the following measurements at two-hour intervals (5 measurements per 8-hour day) during the three-day operating test.
 - 1) Electrical: Running amperes and voltage of each motor 3/4 horsepower or larger.
 - 2) Air temperatures in each heated or air conditioned space and outdoor temperatures.

- c. Instruments: Provide all instruments, materials and labor to perform the tests and to obtain and record the measurements specified herein, including the furnishing of all required record forms as approved by the Engineer. Submit for the Engineer's approval, complete shop drawings or catalog data for all instruments to be used for the three day operating test and obtain approval at least two weeks before the instruments will be required for test measurements.
- d. Report: Submit four (4) copies of a written report of the three-day operating test on the approved Form of Record to the Engineer for approval and subsequent transmittal to the Owner.

3.14 MOTOR CONTROL

- A. General: Provide each motor 1/8 horsepower or larger with a suitable controller and devices that will perform the functions as specified for the respective motors, together with manual reset thermal overload, protection in each undergrounded conductor. Provide the controller either integral with circuit protective device or mounted in separate enclosure. Starters shall be Allen-Bradley, G.E., Westinghouse, Square D or approved equal.
- B. Control: Automatic control devices such as thermostats, float or pressure switches may control the starting and stopping of motor directly, provided the device used is designated for that purpose and has an adequate horsepower rating. When automatic control device does not have such a rating, use a magnetic starter with the automatic control device actuating the pilot control circuit. When combination manual and automatic control is specified and the control device operates the motor directly, provide a manual motor starter and selector switch. When combination manual and automatic control is specified and the automatic control device actuates the pilot control circuit, a magnetic control device actuates the pilot control provided. Provide all magnetic starters with push buttons or selector switches in the covers. Provide connections to the selector switch such that only the normal automatic regulating control devices will be bypassed when the switch is in the manual position. Connect all safety control devices, such as low or high pressure cutouts, high temperature cutouts and motor overload protective devices in the motor control circuit in both the manual and automatic positions of the selector switch control circuit. Make connections to any selector switch or to more than one (1) automatic regulatory control device in accordance with wiring diagrams recommended by the manufacturer and approved by the Engineer. Where required for manual control, provide push-button stations consisting of two (2) momentary contact operators, 600 volts, 10 amperes installed and wired for three wire control to provide under-voltage relays, auxiliary contacts or other devices required for a complete system.

- C. Location: Where the controller is located within sight of the motor driven equipment (fifty feet or less), the controller and circuit protective device shall be capable of being locked in the open position. Where the controller is located out of sight of the motor driven equipment (more than fifty feet) provide a non-fused safety disconnect, suitable for the service, and which opens all ungrounded conductors simultaneously, at or on the motor driven equipment.
- D. Enclosure: Enclosure to be general purpose, NEMA Type 1 unless noted otherwise (NEMA Type 1 gasketed). The circuit breaker shall be operable by hand from outside the enclosure and shall be so interlocked with the door or doors that it must be returned to the "OFF" position before the door can be opened.
- E. Push-buttons: Provide maintained contact, standard duty type in a general purpose, NEMA Type 1 enclosure for surface mounting rated for 10 amperes continuous at 600 volts or less.

3.15 ACCESS PANELS

- A. Provide access panels as required in all walls, ceilings and ductwork to service and have access to all valves, and other operating parts. For all ceiling and wall access doors that are required in gypsum board and plaster, provide minimum 24" x 24", unless due to structural restraints the access door can be reduced to a minimum of 18" x 18", Milcor type appropriate for the construction involved.

3.16 FINALLY

- A. It is the intention that this specification shall provide a complete installation except as herein before specifically excepted. All accessory construction and apparatus necessary or advantageous in the operation and testing of the work shall be included. The omission of specific reference to any part of the work necessary for such complete installation shall not be interpreted as relieving this Contractor from furnishing and installing such parts.

END OF SECTION

SECTION 22 05 53

IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Stencils.
- D. Pipe Markers.
- E. Underground warning tape.
- F. Ceiling tacks.

1.2 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2023.
- B. ASME A13.1 - Scheme for the Identification of Piping Systems; The American Society of Mechanical Engineers; 2007.
- C. ASTM D709 - Standard Specification for Laminated Thermosetting Materials; 2013.

1.3 SUBMITTALS

- A. See Section 22 01 00 - General Plumbing Provisions for submittal procedures.
- B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number. Valve locations with tag numbers shall also be indicated on "as-built" drawings.
- D. Product Data: Provide manufacturers catalog literature for each product required.
- E. Manufacturer's Installation Instructions: Indicate special procedures, and installation.
- F. Project Record Documents: Record actual locations of tagged valves.

PART 2 PRODUCTS

2.1 PLUMBING COMPONENT IDENTIFICATION GUIDELINE

- A. Pipe Markers: 3/4 inch diameter and higher.

2.2 IDENTIFICATION APPLICATIONS

- A. Instrumentation: Tags.
- B. Piping: Pipe markers.
- C. Pumps: Nameplates.
- D. Small-sized Equipment: Tags.
- E. Tanks: Nameplates.
- F. Valves: Tags and ceiling tacks where located above lay-in ceiling.

2.3 NAMEPLATES

- A. Manufacturers:
 - 1. Kolbi Pipe Marker Co.
 - 2. Seton Identification Products.
 - 3. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Description: Laminated three-layer plastic with engraved letters.
 - 1. Letter Color: White.
 - 2. Letter Height: 1/4 inch.
 - 3. Background Color: Black.
 - 4. Plastic: Conform to ASTM D709.

2.4 TAGS

- A. Manufacturers:
 - 1. Advanced Graphic Engraving.
 - 2. Brady Corporation.
 - 3. Kolbi Pipe Marker Co.

4. Seton Identification Products.

5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

- B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.
- C. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.
- D. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame. Valve tag chart should indicate valve size, valve model and valve location. Valve locations with tag numbers shall also be indicated on "as-built" drawings.

2.5 STENCILS

A. Manufacturers:

- 1. Brady Corporation.
- 2. Kolbi Pipe Marker Co.
- 3. Seton Identification Products.
- 4. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Stencils: With clean cut symbols and letters of following size:

- 1. 3/4 to 1-1/4 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 1/2 inch high letters.
- 2. 1-1/2 to 2 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 3/4 inch high letters.
- 3. 2-1/2 to 6 inch Outside Diameter of Insulation or Pipe: 12 inch long color field, 1-1/4 inch high letters.

C. Stencil Paint: Semi-gloss enamel, colors conforming to ASME A13.1.

2.6 PIPE MARKERS

A. Manufacturers:

- 1. Brady Corporation.
- 2. Kolbi Pipe Marker Co.
- 3. MIFAB, Inc.

4. Seton Identification Products.

5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Comply with ASME A13.1.

C. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

E. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

F. Color code as follows:

1. Potable, Cooling, Boiler, Feed, Other Water: Green with white letters.

2. Fire Quenching Fluids: Red with white letters.

3. Combustible Fluids: Brown with white letters.

2.7 UNDERGROUND WARNING TAPE

A. Materials: Use foil-backed detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.

B. Foil-backed Detectable Type Tape: 3 inches wide, with minimum thickness of 5 mil, 0.005 inch, unless otherwise required for proper detection.

C. Legend: Type of service, continuously repeated over full length of tape.

2.8 CEILING TACKS

A. Manufacturers:

1. Marking Services Incorporated.

2. Seton.

3. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Color code as follows:

1. Plumbing Equipment: Yellow.

2. Plumbing Valves: Green.

PART 3 EXECUTION

3.1 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

3.2 INSTALLATION

- A. Install plastic 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. Apply ASME A13.1 Pipe Marking Rules:
1. Place pipe marker adjacent to changes in direction.
 2. Place pipe marker adjacent each valve port and flange end.
 3. Place pipe marker at both sides of floor and wall penetrations.
 4. Place pipe marker every 25 to 50 feet interval of straight run.
- G. Install metallic detection tape located approximately 12 inches above pipe, where in ground utility lines are buried outside building footprint. Tape shall be continuous and be marked, indicating utility type (ie. water, sewer, gas, electric, etc).
- H. 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.

- I. Locate ceiling tacks to locate valves above lay-in panel ceilings. Locate in corner of panel closest to equipment.
- J. Identify all piping on this project as described, except piping which is concealed and/or not accessible. Identify piping concealed by ceiling tiles, floor tiles and, crawl spaces. Piping outside, on roof, above grade, and within parking structures shall also be identified. Only piping located within walls or inaccessible areas need not be identified. Install pipe markers on long straight runs every 20 feet. Install pipe markers above and below every floor penetration and on either side of every wall penetration and, insure there is at least one marker per pipe in every room. Install pipe markers at every valve, branch and, any change in piping direction. Install pipe markers so they are visible for a normal standing position.

END OF SECTION

SECTION 22 07 19

PIPING INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Flexible elastomeric cellular insulation.
- B. Piping insulation.
- C. Jackets and accessories.

1.2 RELATED REQUIREMENTS

- A. Section 22 10 05 - Plumbing Piping: Placement of hangers and hanger inserts.

1.3 REFERENCE STANDARDS

- A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- B. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2019, with Editorial Revision (2023).
- C. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement; 2007 (Reapproved 2024).
- D. ASTM C449 - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement; 2007 (Reapproved 2024).
- E. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.
- F. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation; 2017 (Reapproved 2023).
- G. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2025.
- H. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2013).
- I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.

- J. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2024a.
- K. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association; 2006.

1.4 SUBMITTALS

- A. See Section 22 01 00 - General Plumbing Provisions, for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- C. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.5 QUALITY ASSURANCE

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

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.
- B. Deliver material to job site in original non-broken factory packaging, labeled with manufacturer's density and thickness.

1.7 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.
- C. Perform work at ambient and equipment temperature as recommended by the adhesive manufacturer.

PART 2 PRODUCTS

2.1 REQUIREMENTS FOR ALL PRODUCTS OF THIS SECTION

- A. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84, NFPA 255, or UL 723.

2.2 GLASS FIBER

A. Manufacturers:

1. Knauf Insulation.
2. Johns Manville Corporation.
3. Owens Corning Corp.
4. CertainTeed Corporation.
5. Armstrong World Industries, Inc.
6. Rubatex Corp.
7. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Insulation: ASTM C547 ; semi-rigid, noncombustible, end grain adhered to jacket.

1. 'K' value: ASTM C177, 0.24 at 75 degrees F.
2. Maximum service temperature: 650 degrees F.
3. Maximum moisture absorption: 0.2 percent by volume.

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

D. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.

E. Vapor Barrier Lap Adhesive:

1. Compatible with insulation.

F. Insulating Cement/Mastic:

1. ASTM C195; hydraulic setting on mineral wool.

G. Fibrous Glass Fabric:

1. Cloth: Untreated; 9 oz/sq yd weight.
2. Blanket: 1.0 lb/cu ft density.
3. Weave: 5x5.

H. Indoor Vapor Barrier Finish:

1. Cloth: Untreated; 9 oz/sq yd weight.
 2. Vinyl emulsion type acrylic, compatible with insulation, white color.
- I. Outdoor Vapor Barrier Mastic:
1. Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.
- J. Outdoor Breather Mastic:
1. Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.
- K. Insulating Cement:
1. ASTM C449/C449M.

2.3 CELLULAR GLASS

- A. Manufacturers:
1. Pittsburgh Corning Corporation.
 2. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Insulation: ASTM C 552.
1. 'K' value: 0.37 at 100 degrees F.
 2. Service Temperature: Up to 900 degrees F.
 3. Water Vapor Permeability: 0.005 perm inch.
 4. Water Absorption: 0.2 percent by volume, maximum.

2.4 HYDROUS CALCIUM SILICATE

- A. Manufacturers:
1. Johns Manville Corporation.
 2. PABCO.
 3. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Insulation: ASTM C533 ; rigid molded, asbestos free, gold color.
1. 'K' value: ASTM C177 and C518; 0.40 at 300 degrees F, when tested in accordance with ASTM C177 or C518.

- C. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.
- D. Insulating Cement:
 - 1. ASTM C449/C449M.

2.5 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A. Manufacturer:
 - 1. Armacell International.
 - 2. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534 Grade 2; use molded tubular material wherever possible.
 - 1. 'K' value: ASTM C 177; 0.27 at 75 degrees F.
 - 2. Maximum Moisture Absorption - Pipe Insulation: 3.5 percent, by weight, when tested in accordance with ASTM D 1056.
 - 3. Maximum Moisture Absorption - Sheets: 6.0 percent, by weight, when tested in accordance with ASTM D 1056.
 - 4. Water Vapor Permeability: 0.20 perm-inches, when tested in accordance with ASTM E 96.
- C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.
 - 1. Air dried, contact adhesive, compatible with insulation.

2.6 JACKETS

- A. PVC Plastic.
 - 1. Manufacturers:
 - a. Johns Manville Corporation.
 - b. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
 - 2. Jacket: One piece molded type fitting covers and sheet material, off-white color.
 - a. Minimum Service Temperature: 0 degrees F.
 - b. Maximum Service Temperature: 150 degrees F.

- c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
 - d. Thickness: 15 mil.
 - e. Connections: Pressure sensitive color matching vinyl tape.
- 3. Covering Adhesive Mastic:
 - a. Compatible with insulation.
- B. Canvas Jacket: UL listed 6 oz/sq yd plain weave cotton fabric treated with dilute fire retardant lagging adhesive.
 - 1. Lagging Adhesive:
 - a. Compatible with insulation.
- C. Aluminum Jacket: ASTM B209 (ASTM B209M) formed aluminum sheet.
 - 1. Thickness: 0.016 inch sheet.
 - 2. Finish: Embossed.
 - 3. Joining: Longitudinal slip joints and 2 inch laps.
 - 4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
 - 5. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.
- C. Repair all insulation that is damaged during construction using the same materials.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NAIMA National Insulation Standards.
- C. Exposed Piping: Locate insulation and cover seams in least visible locations.

- D. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, and expansion joints.
- E. Glass fiber insulated pipes conveying fluids below ambient temperature:
 - 1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
 - 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.
- F. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.
- G. Inserts and Shields:
 - 1. Application: Piping 1 inch diameter or larger.
 - 2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
 - 3. Insert location: Between support shield and piping and under the finish jacket.
 - 4. Insert configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
 - 5. Insert material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.
- H. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions.
- I. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces: Finish with PVC jacket and fitting covers.
- J. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with PVC jacket and fitting covers.
- K. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

- L. Buried Piping: Provide factory fabricated assembly with inner all-purpose service jacket with self-sealing lap, and asphalt impregnated open mesh glass fabric, with one mil thick aluminum foil sandwiched between three layers of bituminous compound; outer surface faced with a polyester film.
- M. 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.

3.3 SCHEDULES

A. Plumbing Systems:

1. Domestic Hot Water Supply:

a. Glass Fiber Insulation:

- 1) Pipe Size Range: 2 inch and under: 1 inch thickness.
- 2) Pipe Size Range: 2-1/2 inch and larger: 1-1/2 inch thickness.
- 3) Thickness: 1/2 inch (in interior walls).

2. Domestic Cold Water Supply:

a. Glass Fiber Insulation:

- 1) Pipe Size Range: 2 inch and under: 1 inch thickness.
- 2) Pipe Size Range: 2-1/2 inch and larger: 1 inch thickness.
- 3) Thickness: 1/2 inch (in interior walls).

3. Domestic Hot Water Recirculation:

a. Glass Fiber Insulation:

- 1) Pipe Size Range: All sizes.
- 2) Thickness: 1 inch.

4. Sanitary Piping Above Ceilings:

a. Glass Fiber Insulation:

- 1) Pipe Size Range: all sizes.

2) Thickness: 1 inch.

B. Cooling Systems:

1. Condensate Drains from Cooling Coils: 1/2 inch thickness; cellular insulation.
2. Refrigerant Suction: 3/4 inch thickness; cellular insulation.
3. Refrigerant Hot Gas: 3/4 inch thickness; cellular insulation.

END OF SECTION

SECTION 22 10 05

PLUMBING PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Pipe, pipe fittings, valves, and connections for piping systems.
 - 1. Sanitary sewer.
 - 2. Domestic water.
 - 3. Storm water.
 - 4. Gas.
 - 5. Flanges, unions, and couplings.
 - 6. Valves.
 - 7. Flow controls.
 - 8. Strainers.

1.2 RELATED REQUIREMENTS

- A. Section 22 01 00 - General Plumbing Provisions.
- B. Section 22 05 53 - Identification for Plumbing Piping and Equipment.
- C. Section 22 07 19 - Piping Insulation.

1.3 REFERENCE STANDARDS

- A. ANSI Z21.22 - American National Standard for Relief Valves for Hot Water Supply Systems; 2015 (Reaffirmed 2020).
- B. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2021.
- C. ASME B16.4 - Gray Iron Threaded Fittings: Classes 125 and 250; 2021.
- D. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2021.
- E. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2021.
- F. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes; 2024.

- G. ASME B31.9 - Building Services Piping; 2025.
- H. ASME BPVC-IV - Boiler and Pressure Vessel Code, Section IV - Rules for Construction of Heating Boilers; 2025, with Errata.
- I. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2024.
- J. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings; 2025.
- K. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2025.
- L. ASTM B32 - Standard Specification for Solder Metal; 2020.
- M. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes; 2025.
- N. ASTM B68/B68M - Standard Specification for Seamless Copper Tube, Bright Annealed; 2025.
- O. ASTM B75/B75M - Standard Specification for Seamless Copper Tube; 2020.
- P. ASTM C4 - Standard Specification for Clay Drain Tile and Perforated Clay Drain Tile; 2004 (Reapproved 2014).
- Q. ASTM C14 - Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe; 2015.
- R. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings; 2020a.
- S. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications; latest accepted edition.
- T. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems; 2020 (Reapproved 2024).
- U. ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings; 2025.
- V. ASTM D2683 - Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing; 2020.
- W. ASTM D2846/D2846M - Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Hot- and Cold-Water Distribution Systems; 2024.

- X. ASTM D2855 - Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets; 2020 (Reapproved 2024).
- Y. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2024, with Editorial Revision (2025).
- Z. ASTM D3517 - Standard Specification for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pressure Pipe; 2024.
- AA. ASTM F437 - Standard Specification for Threaded Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80; 2024.
- BB. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers; 1992 (Reapproved 2008).
- CC. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems; 2018.
- DD. AWWA C110/A21.10 - Ductile-Iron and Gray-Iron Fittings; 2021.
- EE. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast; 2023.
- FF. AWWA C901 - Polyethylene (PE) Pressure Pipe, Tubing, and Fittings, 3/4 In. (19 mm) Through 3 In. (76 mm), for Water Service; 2025.
- GG. AWWA C950 - Fiberglass Pressure Pipe; 2020.
- HH. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2021.
- II. CISPI 310 - Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2020.
- JJ. MSS SP-67 - Butterfly Valves; 2022.
- KK. MSS SP-71 - Gray Iron Swing Check Valves, Flanged and Threaded Ends; 2018.
- LL. MSS SP-78 - Gray Iron Plug Valves, Flanged and Threaded Ends; 2011.
- MM. MSS SP-80 - Bronze Gate, Globe, Angle, and Check Valves; 2019.
- NN. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010, with Errata .
- OO. NFPA 54 - National Fuel Gas Code; National Fire Protection Association; 2012.

1.4 SUBMITTALS

- A. See Section 22 01 00 - General Plumbing Provisions, 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. Shop Drawings: For non-penetrating rooftop supports, submit detailed layout developed for this project, with design calculations for loadings and spacings.
- D. Sustainable Design Documentation: For soldered copper joints, submit installer's certification that the specified installation method and materials were used.
- E. Project Record Documents: Record actual locations of valves.

1.5 QUALITY ASSURANCE

- A. Perform work in accordance with applicable codes.
- B. Perform Work in accordance with State of Arkansas, city of Ozark standards.
- C. Valves: Manufacturer's name and pressure rating marked on valve body.
- D. Welding Materials and Procedures: Conform to ASME (BPV IX) .
- E. Welder Qualifications: Certified in accordance with ASME (BPV IX).
- F. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

1.6 REGULATORY REQUIREMENTS

- A. Perform Work in accordance with State of Arkansas, and city of Ozark plumbing code.
- B. Conform to city of Ozark, Arkansas code for installation of backflow prevention devices.
- C. Provide certificate of compliance from authority having jurisdiction indicating approval of installation of backflow prevention devices.

1.7 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.

1.8 FIELD CONDITIONS

- A. Do not install underground piping when bedding is wet or frozen.

PART 2 PRODUCTS

2.1 SANITARY SEWER PIPING, BURIED BEYOND 5 FEET OF BUILDING

- A. Cast Iron Pipe: ASTM A74 service weight.
 - 1. Fittings: Cast iron.
 - 2. Joint Seals: ASTM C 564 neoprene gaskets.
- B. PVC Pipe: ASTM D2665 or ASTM D3034.
 - 1. Fittings: PVC.
 - 2. Joints: Pipe sizes 4 inches or less: Solvent welded, with ASTM D 2564 solvent cement.
 - 3. Joints: Pipe sizes greater than 4 inch: Push-on, using ASTM F477 elastomeric gaskets.

2.2 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET OF BUILDING

- A. Cast Iron Pipe: ASTM A74 service weight.
 - 1. Fittings: Cast iron.
 - 2. Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C 564 neoprene gaskets.
- B. Cast Iron Pipe: CISPI 301, hubless.
 - 1. Fittings: Cast iron.
 - 2. Joints: CISPI 310, neoprene gasket and stainless steel clamp and shield assemblies.
- C. PVC Pipe: ASTM D2665 or ASTM D3034.

1. Fittings: PVC.
2. Joints: Pipe sizes 4 inch and smaller: Solvent welded, with ASTM D 2564 solvent cement.
3. Joints: Pipe sizes greater than 4 inch: Push-on, using ASTM F477 elastomeric gaskets.

2.3 SANITARY SEWER PIPING, ABOVE GRADE

- A. Cast Iron Pipe: ASTM A74, service weight.
 1. Fittings: Cast iron.
 2. Joint Seals: ASTM C 564 neoprene gaskets.
- B. Cast Iron Pipe: CISPI 301, hubless, service weight.
 1. Fittings: Cast iron.
 2. Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.
- C. PVC Pipe: ASTM D2665.
 1. Fittings: PVC.
 2. Joints: Solvent welded, with ASTM D2564 solvent cement.
- D. In Fire-rated Walls:
 1. Cast iron.
 - a. Fittings: Cast iron.

2.4 WATER PIPING, BURIED BEYOND 5 FEET OF BUILDING

- A. Ductile Iron Pipe: AWWA C151/A21.51.
 1. Fittings: AWWA C110, ductile or gray iron, standard thickness.
 2. Joints: AWWA C111/A21.11, rubber gasket with 3/4 inch diameter rods.
- B. Copper Pipe: ASTM B42, hard drawn.
 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.

- 2. Joints: ASTM B 32, alloy Sn95 solder.
- C. PVC SDR 21: pipe shall be manufactured from a Type I, Grade I Polyvinyl Chloride (PVC) compound with a Cell Classification of 12454 per ASTM D1784.
 - 1. Fittings: PVC.
 - 2. Joints: Solvent welded, with ASTM D 2564 solvent cement.

2.5 WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING

- A. Copper Pipe: ASTM B42, hard drawn Type "K".
 - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.
 - 2. Joints: AWS A5.8M/A5.8, BCuP copper/silver braze.

2.6 WATER PIPING, ABOVE GRADE

- A. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), Drawn (H).
 - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
 - 2. Joints: ASTM B32, alloy Sn95 solder or mechanical press-fit couplings.

2.7 STORM WATER PIPING, BURIED BEYOND 5 FEET OF BUILDING

- A. Cast Iron Pipe: ASTM A74 service weight.
 - 1. Fittings: Cast iron.
 - 2. Joint Seals: ASTM C 564 neoprene gaskets.

- B. PVC Pipe: ASTM D 2729.
 - 1. Fittings: PVC.
 - 2. Joints: Solvent welded, with ASTM D 2564 solvent cement.

2.8 STORM WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING

- A. Cast Iron Pipe: ASTM A74 service weight.
 - 1. Fittings: Cast iron.
 - 2. Joint Seals: ASTM C 564 neoprene gaskets.

- B. Cast Iron Pipe: CISPI 301, hubless, service weight.
 - 1. Fittings: Cast iron.
 - 2. Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies.
- C. PVC Pipe: ASTM D 2729.
 - 1. Fittings: PVC.
 - 2. Joints: Solvent welded, with ASTM D 2564 solvent cement.

2.9 STORM WATER PIPING, ABOVE GRADE

- A. Cast Iron Pipe Where Noted: ASTM A 74 service weight.
 - 1. Fittings: Cast iron.
 - 2. Joint Seals: ASTM C 564 neoprene gaskets.
- B. Cast Iron Pipe Where Noted: CISPI 301, hubless, service weight.
 - 1. Fittings: Cast iron.
 - 2. Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies.
- C. PVC Pipe: ASTM D2665 or ASTM D3034.
 - 1. Fittings: PVC.
 - 2. Joints: Solvent welded, with ASTM D2564 solvent cement.
- D. In Fire-rated Walls:
 - 1. Cast iron.
 - a. Fittings: Cast iron.

2.10 NATURAL GAS PIPING, BURIED BEYOND 5 FEET OF BUILDING

- A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
 - 1. Fittings: ASTM A234/A234M, wrought steel welding type, with AWWA C105/A21.5 polyethylene jacket or double layer, half-lapped 10 mil polyethylene tape.
 - 2. Joints: ASME B31.1, welded.

2.11 NATURAL GAS PIPING, BURIED WITHIN 5 FEET OF BUILDING

- A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
 - 1. Fittings: ASTM A 234/A 234M, forged steel welding type.
 - 2. Joints: ASME B31.1, welded.
 - 3. Jacket: AWWA C105/A21.5 polyethylene jacket or double layer, half-lapped 10 mil polyethylene tape.

2.12 NATURAL GAS PIPING, ABOVE GRADE

- A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
 - 1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, wrought steel welding type.
 - 2. Fittings: ASME B16.3, malleable iron, or ASTM A 234/A 234M, forged steel welding type.
 - 3. Joints: NFPA 54, threaded or welded to ASME B31.1.

2.13 FLANGES, UNIONS, AND COUPLINGS

- A. Unions for Pipe Sizes 3 Inches and Under:
 - 1. Ferrous pipe: Class 150 malleable iron threaded unions.
 - 2. Copper tube and pipe: Class 150 bronze unions with soldered joints.
- B. Flanges for Pipe Size Over 1 Inch:
 - 1. Ferrous pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
 - 2. Copper tube and pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.
- C. Grooved and Shouldered Pipe End Couplings:
 - 1. Housing: Malleable iron clamps to engage and lock, designed to permit some angular deflection, contraction, and expansion; steel bolts, nuts, and washers; galvanized for galvanized pipe.
 - 2. Sealing gasket: "C" shape composition sealing gasket.

- D. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.14 MECHANICALLY FORMED TEE FITTINGS

- A. Mechanically extracted outlets shall have a height not less than three times the thickness of the branch tube wall.
- B. Branch tubes shall not restrict the flow in the main tube. Mechanical Contractor shall insure the branch tube penetration into the collar is of the correct depth.
- C. Mechanically formed tee fittings shall be cleaned and brazed with filler material conforming to AWS A5.8.

2.15 PRESS FITTINGS

- A. Fittings shall comply with NSF 61, CSA, UPC and be approved by the local jurisdiction. Wrot copper press fittings shall be made from commercially pure copper mill products per ASTM B 75 Alloy C12200. Cast copper alloy press fittings shall be made from materials with a minimum of 78% copper and a maximum of 15% zinc. The press fittings connections shall be compatible with seamless K, L or M copper tube made to ASTM B 88. Fittings shall have a maximum non-shock working pressure of 200 PSI between the temperatures of -20°F and +250°F. Elastomeric seals shall be made of EPDM material, and the fittings shall be manufactured with an inboard bead design. All fittings shall be installed in accordance with the manufacturer's installation instructions and according to local plumbing and mechanical codes. The press-to-connect joint shall be made with pressing tools and jaw sets recommended and authorized by press fitting manufacturer.

2.16 PIPE HANGERS AND SUPPORTS

- A. Provide hangers and supports that comply with MSS SP-58.
- B. Plumbing Piping - Drain, Waste, and Vent:
 - 1. Conform to ASME B31.9.
 - 2. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Carbon steel, adjustable swivel, split ring.
 - 3. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
 - 4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
 - 5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.

6. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
 7. Vertical Support: Steel riser clamp.
 8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 9. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- C. Plumbing Piping - Water:
1. Conform to ASME B31.9.
 2. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Carbon steel, adjustable swivel, split ring.
 3. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
 4. Hangers for Hot Pipe Sizes 2 Inches to 4 Inches: Carbon steel, adjustable, clevis.
 5. Hangers for Hot Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron pipe roll, double hanger.
 6. Multiple or Trapeze Hangers: Steel channels with welded supports or spacers and hanger rods.
 7. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches and Over: Steel channels with welded supports or spacers and hanger rods, cast iron roll.
 8. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
 9. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
 10. Vertical Support: Steel riser clamp.
 11. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 12. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, locknut, nipple, floor flange, and concrete pier or steel support.
 13. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

2.17 GATE VALVES

A. Manufacturers:

1. Conbraco Industries.
2. Nibco, Inc.
3. Milwaukee Valve Company.
4. Crane Co.
5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Up To and Including 2 1/2 Inches:

1. MSS SP-80, Class 125, bronze body, bronze trim, rising stem, handwheel, inside screw, solid wedge disc, solder or threaded ends.

C. 3 Inches and Larger:

1. MSS SP-70, Class 125, iron body, bronze trim, outside screw and yoke, handwheel, solid wedge disc, flanged ends. Provide chain wheel operators for valves 6 inches and larger mounted over 8 feet above floor.

2.18 GLOBE VALVES

A. Manufacturers:

1. Conbraco Industries.
2. Nibco, Inc.
3. Milwaukee Valve Company.
4. Crane Co.
5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Up To and Including 2 1/2 Inches:

1. MSS SP-80, Class 125, bronze body, bronze trim, handwheel, bronze disc, solder or threaded ends.

C. 3 Inches and Larger:

1. MSS SP-85, Class 125, iron body, bronze trim, handwheel, outside screw and yoke, renewable bronze plug-type disc, renewable seat, flanged ends. Provide

chain-wheel operators for valves 6 inches and larger mounted over 8 feet above floor.

2.19 BALL VALVES

A. Manufacturers:

1. Conbraco Industries.
2. Nibco, Inc.
3. Milwaukee Valve Company.
4. Crane Co.
5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Construction, 4 Inches and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze, two piece body, chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle, threaded ends with union.

2.20 PLUG VALVES

A. Manufacturers:

1. Conbraco Industries.
2. Nibco, Inc.
3. Milwaukee Valve Company.
4. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Construction 2-1/2 Inches and Larger: MSS SP-78, 250 psi CWP, cast iron body and plug, pressure lubricated, teflon or Buna N packing, flanged or grooved ends. Provide lever operator with set screw.

2.21 BUTTERFLY VALVES

A. Manufacturers:

1. Hammond Valve.
2. Crane Co.
3. Milwaukee Valve Company.
4. Stockham.

- 5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Construction 1-1/2 Inches and Larger: MSS SP-67, 200 psi CWP, cast or ductile iron body, elastomer coated ductile iron disc, resilient replaceable EPDM seat, wafer ends, extended neck, 10 position lever handle.
- C. Provide gear operators for valves 6 inches and larger, and chain-wheel operators for valves mounted over 8 feet above floor.

2.22 FLOW CONTROLS

- A. Manufacturers:
 - 1. ITT Bell & Gossett.
 - 2. Griswold Controls.
 - 3. Taco, Inc.
 - 4. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Construction: Class 125, Brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet , blowdown/backflush drain.
- C. Calibration: Control flow within 5 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, maximum minimum pressure 3.5 psi.

2.23 SWING CHECK VALVES

- A. Manufacturers:
 - 1. Hammond Valve.
 - 2. Nibco, Inc.
 - 3. Milwaukee Valve Company.
 - 4. Crane Co.
 - 5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Up to 2 Inches:
 - 1. MSS SP-80, Class 125, bronze body and cap, bronze swing disc with rubber seat, solder or threaded ends.
- C. Over 2 Inches:

1. MSS SP-71, Class 125, iron body, bronze swing disc, renewable disc seal and seat, flanged or grooved ends.

2.24 SPRING LOADED CHECK VALVES

A. Manufacturers:

1. Hammond Valve.
2. Crane Co.
3. Milwaukee Valve Company.
4. Stockham.
5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

- ### B. Class 125, iron body, bronze trim, stainless steel springs, bronze disc, Buna N seals, wafer style ends.

2.25 WATER PRESSURE REDUCING VALVES

A. Manufacturers:

1. Amtrol Inc.
2. Cla-Val Co.
3. Watts Regulator Company.
4. Spence Engineering Co.
5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Up to 2 Inches:

1. MSS SP-80, bronze body, stainless steel and thermoplastic internal parts, fabric reinforced diaphragm, strainer, threaded single union ends.

C. Over 2 Inches:

1. MSS SP-85, cast iron body, bronze fitted, elastomeric diaphragm and seat disc, flanged.

2.26 RELIEF VALVES

A. Pressure Relief:

1. Manufacturers:
 - a. Cla-Val Co.
 - b. Henry Technologies.
 - c. Watts Regulator Company.
 - d. Spence Engineering Co.
 - e. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
2. AGA Z21.22 certified, bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F, capacity ASME (BPV IV) certified and labelled.

B. Temperature and Pressure Relief:

1. Manufacturers:
 - a. Cla-Val Co.
 - b. Henry Technologies.
 - c. Watts Regulator Company.
 - d. Spence Engineering Co.
 - e. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
2. AGA Z21.22 certified, bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F, capacity ASME (BPV IV) certified and labelled.

2.27 STRAINERS

A. Manufacturers:

1. Armstrong International, Inc.
2. Green Country Filtration.
3. WEAMCO.
4. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

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

1. Class 125, flanged iron body, Y pattern with 1/16 inch stainless steel perforated screen.
- C. Size 5 inch and Larger:
 1. Class 125, flanged iron body, basket pattern with 1/8 inch stainless steel perforated screen.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that excavations are to required grade, dry, and not over-excavated.

3.2 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.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- D. Install piping to maintain headroom, conserve space, and not interfere with use of space.
- E. Group piping whenever practical at common elevations.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 22 07 19.
- H. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors.
- I. Establish elevations of buried piping outside the building to ensure not less than 3 ft of cover.

- J. Install vent piping penetrating roofed areas to maintain integrity of roof assembly.
- K. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- L. Provide support for utility meters in accordance with requirements of utility companies.
- M. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting.
- N. Install bell and spigot pipe with bell end upstream.
- O. Install valves with stems upright or horizontal, not inverted.
- P. Pipe vents from gas pressure reducing valves to outdoors and terminate in weather proof hood.
- Q. Install water piping to ASME B31.9.
- R. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.
- S. Sleeve pipes passing through partitions, walls and floors.
- T. Inserts:
 - 1. Provide inserts for placement in concrete formwork.
 - 2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
 - 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
 - 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
 - 5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut recessed into and grouted flush with slab.
- U. Pipe Hangers and Supports:
 - 1. Install in accordance with ASME B31.9.
 - 2. Support horizontal piping as scheduled.

3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 4. Place hangers within 12 inches of each horizontal elbow.
 5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 6. Support vertical piping at every floor. Support riser piping independently of connected horizontal piping.
 7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
 8. Provide copper plated hangers and supports for copper piping.
 9. Provide hangers adjacent to motor driven equipment with vibration isolation.
 10. Support cast iron drainage piping at every joint.
- V. Where water pressure within the building exceeds 75 psi static, install an approved water-pressure reducing valve conforming to ASSE 1003 with strainer to reduce the building pressure to 75 psi static or less.

3.4 APPLICATION

- A. Use grooved mechanical couplings and fasteners only in accessible locations.
- B. Install unions downstream of valves and at equipment or apparatus connections.
- C. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
- D. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- E. Install ball valves for throttling, bypass, or manual flow control services.
- F. Provide lug end butterfly valves adjacent to equipment when provided to isolate equipment.
- G. Provide spring loaded check valves on discharge of water pumps.
- H. Provide ball valves in natural gas systems for shut-off service.
- I. Provide flow controls in water recirculating systems where indicated.

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- J. All sanitary waste and vent pipe installed above grade in fire-rated walls, fire-rated plenum spaces or return air plenums shall be cast iron.

3.5 TOLERANCES

- A. Drainage Piping: Maintain invert elevations within 1/4 inch vertically of location indicated on drawings. Slope to drain at minimum of 1/4 inch per foot slope for pipes 3 inch and smaller and 1/8 inch per foot slope for pipes larger than 3 inch.
- B. Contractor must maintain inverts as indicated on the drawings. The contractor shall employ the latest precision technology available to insure the accuracy of the installation. If the contractor is unable to maintain, the contractor should notify the engineer IMMEDIATELY to obtain direction.
- C. Water Piping: Slope at minimum of 1/32 inch per foot and arrange to drain at low points.

3.6 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Disinfect water distribution system in accordance with Arkansas state and local codes.
- B. Prior to starting work, verify system is complete, flushed and clean.
- C. Ensure Ph of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
- D. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.
- E. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
- F. Maintain disinfectant in system for 24 hours.
- G. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- H. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
- I. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

3.7 SERVICE CONNECTIONS

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- A. Provide new sanitary sewer services. Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.
- B. Provide new water service complete with approved reduced pressure backflow preventer and water meter with by-pass valves, pressure reducing valve, and sand strainer.
- C. Connections to existing manholes shall be made at the locations shown on the plans. An opening shall be cut in the wall of the manhole and shall be of sufficient size to permit installation of the pipe at the designated elevation. The invert of the existing manhole shall be removed and a new invert constructed. The end of the pipe shall be flush with the inside wall of the manhole and shall be sealed in the wall with mortar to provide a water tight joint.
- D. Connection of dissimilar pipe materials shall be made with the specified adapter couplings.
- E. Sewers shall be encased or cradled in concrete where shown on the plans or as directed by the Engineer. Unless otherwise noted on the plans, concrete encasement shall encircle the pipe and shall be a minimum thickness of four inches.
- F. Provide new gas service complete with gas meter and regulators. Gas service distribution piping to have initial minimum pressure of 5 psi. Provide regulators on each line serving gravity type appliances, sized in accordance with equipment.
- G. This Contractor shall extend the system of gas piping, to the various outlets as indicated on plans, complete with stop ball valves, drip pockets, valves and other accessories that may be required to give proper and adequate service.
- H. Provide gas ball valves in final connection to all equipment. Unions will not be permitted, except in final connections to equipment. Proper reducing fittings shall be used. Bushings will not be accepted. Gas piping in building shall be standard weight schedule 40 black steel pipe with malleable fittings, unless contractor wishes to weld all joints. Welded rod shall be of same material as piping. No. 22 bronze welding will be permitted.
- I. All underground gas service exterior to the building (5 psi or less) shall be a polyethylene plastic pipe manufactured in accordance with ASTM No. D-2517 or D-2513 and shall be indicated on the pipe. Gas piping shall be laid at least 36" below grade at all points. Provide a #12 THN copper wire in trench with pipe and leave both ends exposed for future accessibility.

- J. All gas piping in ground, including service, shall be checked with a "Holiday" detector to assure that the coating is free of holes, voids, contamination, cracks, etc. This test shall be performed after the completion of joint and finish coating and touch-up. This test shall be conducted in the presence of the Owner's inspector and performed by experienced personnel.
- K. For corrosion protection, all underground and exposed exterior steel pipe and fittings must be coated and wrapped.
- L. Test all gas piping operating at 6 oz. with air pump and mercury gauge to pressure that will maintain 25 psig for 20 minutes and inspected by gas service official.
- M. All gas piping operating at more than 1 psig shall be tested at 100 psig for steel and 50 psig for plastic, for a minimum of 15 minutes and inspected by gas service official.
- N. The pressure regulator at the building shall be sized, and approved by gas service official.
- O. All above ground piping shall be rigid steel pipe designated for natural gas use. Pipe shall be painted with a rust inhibiting primer and a final coat the color of which shall be determined by governing regulations or as directed by the Engineer if no governing regulations exist regarding finish color.
- P. All gas piping systems within a building and other above ground gas piping shall be electrically continuous and bonded to a grounded electrode as defined in NFPA 70.
- Q. Medium and high pressure gas regulators installed in the medium and high pressure gas lines (2 psi or greater) shall comply with the following provisions:
 - 1. Shall be suitable for the inlet and outlet gas pressure.
 - 2. Shall comply with Code and gas official requirements.
 - 3. Shall be accessible for servicing.
 - 4. Shall be vented to outdoors when located indoors.
 - 5. Shall be installed in the gas piping system so that it cannot be concealed by building construction.
- R. Provide a listed shut off valve immediately ahead of and immediately behind each medium pressure regulator.
- S. Underground gas piping shall be installed in a separate ditch.

3.8 SCHEDULES

A. Pipe Hanger Spacing:

1. Metal Piping:

- a. Pipe size: 1/2 inches to 1-1/4 inches:
 - 1) Maximum hanger spacing: 8 ft.
 - 2) Hanger rod diameter: 1/4 inch.
- b. Pipe size: 1-1/2 inches to 2 inches:
 - 1) Maximum hanger spacing: 8 ft.
 - 2) Hanger rod diameter: 1/4 inch.
- c. Pipe size: 2-1/2 inches to 3 inches:
 - 1) Maximum hanger spacing: 8 ft.
 - 2) Hanger rod diameter: 3/8 inch.
- d. Pipe size: 4 inches to 6 inches:
 - 1) Maximum hanger spacing: 8 ft.
 - 2) Hanger rod diameter: 3/8 inch.
- e. Pipe size: 8 inches to 12 inches:
 - 1) Maximum hanger spacing: 10 ft.
 - 2) Hanger rod diameter: 1/2 inch.
- f. Pipe size: 14 inches and Over:
 - 1) Maximum hanger spacing: 10 ft.
 - 2) Hanger rod diameter: 7/8 inch..

2. Plastic Piping:

- a. All sizes:
 - 1) Maximum hanger spacing: 6 ft.

2) Hanger rod diameter: 3/8 inch.

END OF SECTION

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SECTION 22 10 06

PLUMBING SPECIALTIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Floor drains.
- B. Downspouts.
- C. Floor Sinks.
- D. Cleanouts.
- E. Hydrants.
- F. Refrigerator valve and recessed box.
- G. Backwater valves.
- H. Backflow preventers.
- I. Water hammer arrestors.
- J. Thermostatic mixing valves.

1.2 RELATED REQUIREMENTS

- A. Section 22 10 05 - Plumbing Piping.
- B. Section 22 40 00 - Plumbing Fixtures.
- C. Section 22 30 00 - Plumbing Equipment.

1.3 REFERENCE STANDARDS

- A. ASME A112.6.3 - Floor Drains; 2022.
- B. ASSE 1011 - Performance Requirements for Hose Connection Vacuum Breakers; 2023.
- C. ASSE 1012 - Performance Requirements for Backflow Preventers with an Intermediate Atmospheric Vent; 2021.
- D. ASSE 1019 - Performance Requirements for Wall Hydrant with Backflow Protection and Freeze Resistance; 2023.

- E. NSF 61 - Drinking Water System Components - Health Effects; 2024.
- F. NSF 372 - Drinking Water System Components - Lead Content; 2024.
- G. PDI-WH 201 - Water Hammer Arresters; 2017.

1.4 SUBMITTALS

- A. See Section 22 01 00 - General Plumbing Provisions, for submittal procedures.
- B. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.
- C. Shop Drawings: Indicate dimensions, weights, and placement of openings and holes.
- D. Manufacturer's Instructions: Indicate Manufacturer's Installation Instructions: Indicate assembly and support requirements.
- E. Project Record Documents: Record actual locations of equipment and cleanouts.
- F. Operation Data: Indicate frequency of treatment required for interceptors.
- G. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
- I. Product Data: Manufacturer's standard data sheets describing components including materials, dimensions, relationship to adjacent construction, and attachments.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than five years documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Accept specialties on site in original factory packaging. Inspect for damage.

PART 2 PRODUCTS

2.1 DRAINS

- A. Manufacturers:
 - 1. Josam Company.

2. Jay R. Smith Manufacturing Company.
3. Zurn Industries, Inc.
4. Wade Tyler Pipe.
5. MIFAB, Inc.
6. Watts Water Technologies.
7. Substitutions: See Section 22 10 00 - General Plumbing Provisions.

B. Downspout Nozzles and Boots:

1. Bronze round with straight bottom section.
2. Bell reducer with cap. Size bell reducer as required to fit downspout. Cut cap to match size of downspout and seal around downspout watertight.
3. Cast iron coated rectangular downspout boot with no-hub outlet and securing strap.

C. Floor Drain:

1. ASME A112.6.3; lacquered cast iron two piece body with double drainage flange, weep holes, reversible clamping collar, and round, adjustable round nickel bronze strainer with removable perforated sediment bucket.

D. Floor Sink:

1. Square lacquered cast iron body with integral seepage pan, epoxy coated interior, aluminum dome strainer, clamp collar, sediment bucket; and nickel bronze frame; half grate.

2.2 CLEANOUTS

A. Manufacturers:

1. Jay R. Smith Manufacturing Company.
2. Josam Company.
3. Ward Manufacturing, Inc.
4. Zurn Industries, Inc.
5. Wade Tyler Pipe.

6. Watts Water Technologies.
7. MIFAB.
8. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Cleanouts at Exterior Surfaced Areas:

1. Round cast nickel bronze access frame and heavy duty, non-skid cover.

C. Cleanouts at Exterior Unsurfaced Areas:

1. Line type with lacquered cast iron body and round heavy duty, epoxy coated gasketed tractor-type cover.

D. Cleanouts at Interior Finished Wall Areas:

1. Line type with lacquered cast iron body and round epoxy coated gasketed cover, and round stainless steel access cover secured with machine screw.

E. Cleanouts at Interior Unfinished Accessible Areas: Calked or threaded type. Provide bolted stack cleanouts on vertical rainwater leaders.

2.3 HYDRANTS

A. Manufacturers:

1. Jay R. Smith Manufacturing Company.
2. Zurn Industries, Inc.
3. Wade Tyler Pipe.
4. Woodford.
5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Wall Hydrants:

1. ASSE 1019; freeze resistant, self-draining type with chrome plated lockable recessed box hose thread spout, lockshield and removable key, and integral vacuum breaker.

2.4 REFRIGERATOR VALVE AND RECESSED BOX

A. Box Manufacturers:

1. Guy Gray Manufacturing.

2. IPS Corporation/Water-Tite.
 3. Oatey.
 4. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Valve Manufacturers:
1. Guy Gray Manufacturing.
 2. IPS Corporation/Water-Tite.
 3. Zurn Industries, Inc.
 4. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- C. Description: Painted metal preformed rough-in box with brass valves with wheel handle, slip in finishing cover.

2.5 BACK WATER VALVES

- A. Manufacturers:
1. Jay R. Smith Manufacturing Company; Model ____: www.jayrsmith.com.
 2. Savko Plastic Pipe & Fittings, Inc; Model ____: www.savko.com/#sle.
 3. Zurn Industries, Inc; Model ____: www.zurn.com/#sle.
 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Cast Iron Back Water Valves: ANSI A112.21.2M; lacquered cast iron body and cover, brass valve, extension sleeve, and access cover.
- C. Plastic Back Water Valves: ABS body and valve, extension sleeve, and access cover.

2.6 BACKFLOW PREVENTERS

- A. Manufacturers:
1. Conbraco Industries.
 2. Valve Solutions, Inc.
 3. Watts Regulator Company.
 4. Zurn Industries, Inc.
 5. FEBCO.

6. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Reduced Pressure Backflow Preventers:

1. ASSE 1013; bronze body with bronze internal parts and stainless steel springs; two independently operating, spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; third check valve that opens under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two gate valves, strainer, and four test cocks.

2.7 WATER HAMMER ARRESTORS

A. Manufacturers:

1. Jay R. Smith Manufacturing Company.
2. Watts Regulator Company.
3. Zurn Industries, Inc.
4. Wade Tyler Pipe.
5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Water Hammer Arrestors:

1. Stainless steel construction, bellows type sized in accordance with PDI-WH 201, precharged suitable for operation in temperature range -100 to 300 degrees F and maximum 250 psi working pressure.

2.8 MIXING VALVES

A. Thermostatic Mixing Valves:

1. Manufacturers:
 - a. ESBE.
 - b. Leonard Valve Company.
 - c. Honeywell Water Controls.
 - d. Powers Process Controls.
 - e. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
2. Valve: Chrome plated cast brass body, stainless steel or copper alloy bellows, integral temperature adjustment.

3. Accessories:
 - a. Check valve on inlets.
 - b. Volume control shut-off valve on outlet.
 - c. Stem thermometer on outlet.
 - d. Strainer stop checks on inlets.
 4. Cabinet: 16 gage stainless steel, for surface mounting with keyed lock.
- B. Pressure Balanced Mixing Valves:
1. Manufacturers:
 - a. Delta Faucet Company.
 - b. H.G. Specialties.
 - c. Powers Process Controls.
 - d. Taconova.
 - e. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
 2. Valve: Chrome plated cast brass body, stainless steel cylinder, integral temperature adjustment.
 3. Accessories:
 - a. Volume control shut-off valve on outlet.
 - b. Stem thermometer on outlet.
 - c. Strainer stop checks on inlets.
 - d. Cabinet: 16 gage stainless steel, for surface mounting with keyed lock.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Extend cleanouts to finished wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.

- C. Encase exterior cleanouts in concrete flush with grade. Refer to plans for detail.
- D. Install approved potable water protection devices on plumbing lines where contamination of domestic water may occur; janitor rooms, flush valves, interior and exterior hose bibbs.
- E. Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to lavatories, sinks, washing machine outlets and water closets.
- F. Install city approved backwater valve on all building sewers at the exterior of the building and prior to connection to the public sewer system.
- G. Install components in accordance with manufacture's instructions and approved product data submittals.

END OF SECTION

SECTION 22 10 08

PLUMBING SOLDER

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Lead-free plumbing solder.

1.2 RELATED SECTIONS

- A. Section 22 10 05 - Plumbing Piping.
- B. Section 22 40 00 - Plumbing Fixtures.
- C. Section 22 30 00 - Plumbing Equipment.

1.3 REFERENCES

- A. ASTM B 32 - Standard Specification for Solder Metal; 1996.
- B. NSF 61 - Drinking Water System Components - Health Effects; 2002 (ANSI/NSF 61).

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: The Harris Products Group
- B. Substitutions: See Section 22 01 00 - General Plumbing Provisions for equipment and material substitutions.
- C. Provide all plumbing solder from a single manufacturer.

2.2 MATERIALS

- A. Plumbing Solder: Sterling® solder or equal, ASTM B 32, Alloy Grade TC; 95 percent tin, 4.85 percent copper, 0.15 percent selenium.
 - 1. Certified to comply with NSF 61.
 - 2. Melting Temperature: 410 degrees F.
 - 3. Tensile Strength: 7,130 psi.
 - 4. Shear Strength: 5,979 psi.
 - 5. Elongation Percent: 19.1.

6. Brinell Hardness: 15.1.
 7. Burst Strength: 5,800 psi.
 8. Pressure/Temperature Test Data on Copper Tube Assemblies comprised of 3 inch, 2 inch, 1 inch, 3/4 inch, and 1/2 inch Tubing with a Reducing Tee:
 - a. No leaks at 70 degrees F., 200 psi, held for 2 minutes.
 - b. No leaks at 180 degrees F., 200 psi, held for 2 minutes.
 - c. No leaks at 70 degrees F., 2,000 psi, held for 5 minutes.
- B. No lead in plumbing solder.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Apply plumbing solder in accordance with manufacturer's recommendations.

END OF SECTION

SECTION 22 30 00

PLUMBING EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Water heaters.
- B. Pumps.
 - 1. Circulators.

1.2 RELATED REQUIREMENTS

- A. Division 26 - Equipment wiring; electrical characteristics and wiring connections.

1.3 REFERENCE STANDARDS

- A. Comply with State of Arkansas adopted ADA Accessible Guidelines in regard to accessible or handicapped features.
- B. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1: Rules for Construction of Pressure Vessels; 2025, with Errata .
- C. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.
- D. UL 174 - Standard for Household Electric Storage Tank Water Heaters; Current Edition, Including All Revisions.

1.4 SUBMITTALS

- A. See Section 22 01 00 - General Plumbing Provisions, 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. Shop Drawings:

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1. Indicate heat exchanger dimensions, size of tappings, and performance data.
 2. Indicate dimensions of tanks, tank lining methods, anchors, attachments, lifting points, tappings, and drains.
- 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.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum five years of documented experience.
- B. Identification: Provide pumps with manufacturer's name, model number, and rating/capacity identified by permanently attached label.
- C. Standards: Ensure products and installation of specified products are in conformance with recommendations and requirements of the following organizations:
1. National Sanitation Foundation (NSF).
 2. American Society of Mechanical Engineers (ASME).
 3. National Board of Boiler and Pressure Vessel Inspectors (NBBPVI).
 4. National Electrical Manufacturers' Association (NEMA).
 5. Underwriters Laboratories (UL).
- D. 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.

1.6 CERTIFICATIONS

- A. Water Heaters: NSF approved.
- B. Electric Water Heaters: UL listed and labeled to UL 174.
- C. Pressure Vessels for Heat Exchangers: ASME labeled, to ASME (BPV VIII, 1).
- D. Conform to ASME (BPV VIII 1) for tanks.

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

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.8 WARRANTY

- A. Provide five year manufacturer warranty for domestic water heaters.
- B. All warranties to begin at Date of Substantial Completion as accepted by the Owner.

PART 2 PRODUCTS

2.1 WATER HEATER MANUFACTURERS

- A. Tank Type Water Heater Manufacturers
 - 1. A.O. Smith Water Products Co.
 - 2. State Industries.
 - 3. Rheem Manufacturing Company.
 - 4. Bock Water Heaters, Inc.
 - 5. Lochinvar, LLC.
 - 6. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

2.2 COMMERCIAL ELECTRIC WATER HEATERS

- A. Type: Factory-assembled and wired, electric, vertical storage.
- B. Performance:
 - 1. As specified in drawing schedule.
- C. Electrical Characteristics:
 - 1. As specified in drawing schedule.
- D. Tank: Glass lined welded steel; 4 inch diameter inspection port, thermally insulated with minimum 2 inches glass fiber encased in corrosion-resistant steel jacket; baked-on enamel finish.

- E. Controls: Automatic immersion water thermostat; externally adjustable temperature range from 60 to 180 degrees F, flanged or screw-in nichrome elements, high temperature limit thermostat.
- F. Accessories: Provide:
 - 1. Water connections: Brass.
 - 2. Dip tube.
 - 3. Drain Valve.
 - 4. Anode: Magnesium.
 - 5. Temperature and Pressure Relief Valve: ASME labelled.
 - 6. Provide approved manufacturer's drain pan or shop fabricated 24 gage galvanized steel drain pan.

2.3 DIAPHRAGM-TYPE COMPRESSION TANKS

- A. Manufacturers:
 - 1. Amtrol Inc.
 - 2. ITT Bell & Gossett.
 - 3. Taco, Inc.
 - 4. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Construction: Welded steel, tested and stamped in accordance with ASME (BPV VIII, 1); supplied with National Board Form U-1, rated for working pressure of 125 psig, with flexible EPDM diaphragm sealed into tank, and steel legs or saddles.
- C. Accessories: Pressure gage and air-charging fitting, tank drain; precharge to 12 psig.
- D. Size: Refer to plans or as required to match system volume.

2.4 IN-LINE CIRCULATOR PUMPS

- A. Manufacturers:
 - 1. Armstrong Pumps Inc.
 - 2. ITT Bell & Gossett.
 - 3. Sterling Fluid Systems.

- 4. Grundfos.
- 5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Casing: Bronze, rated for 150 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. Performance:
 - 1. As scheduled on drawings.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install plumbing equipment in accordance with manufacturer's instructions, as required by code, and complying with conditions of certification, if any.
- B. Install water heaters in accordance with manufacturer's instructions and to AGA or UL requirements.
- C. Coordinate with plumbing piping and related electrical work to achieve operating system.
- D. Pumps:
 - 1. Provide air cock and drain connection on horizontal pump casings.
 - 2. Provide line sized isolating valve and strainer on suction and line sized soft seated check valve and balancing valve on discharge.
 - 3. Decrease from line size with long radius reducing elbows or reducers. Support piping adjacent to pump such that no weight is carried on pump casings. Provide supports under elbows on pump suction and discharge line sizes 4 inches and over.
 - 4. 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.

5. Align and verify alignment of base mounted pumps prior to start-up.
6. Provide electrical interlocking from cooling condensate pump safety switch to associated HVAC unit(s) furnished under other Sections.

3.2 SCHEDULES

A. Water Heaters:

1. Refer to plan schedule.

B. Recirculating Pumps:

1. Refer to plan schedule.

END OF SECTION

SECTION 22 40 00

PLUMBING FIXTURES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Water closets.
- B. Lavatories.
- C. Sinks.
- D. Service sinks.

1.2 RELATED REQUIREMENTS

- A. Section 22 10 05 - Plumbing Piping.
- B. Section 22 10 06 - Plumbing Specialties.
- C. Section 22 30 00 - Plumbing Equipment.
- D. Division 26 - Equipment wiring, electrical characteristics and wiring connections.

1.3 REFERENCE STANDARDS

- A. Comply with State of Arkansas adopted ADA Accessible Guidelines in regard to accessible or handicapped features.
- B. ASME A112.18.1 - Plumbing Supply Fittings; 2024.
- C. ASME A112.19.2 - Ceramic Plumbing Fixtures; 2024.
- D. NSF 61 - Drinking Water System Components - Health Effects; 2024.
- E. NSF 372 - Drinking Water System Components - Lead Content; 2024.

1.4 SUBMITTALS

- A. Section 22 01 00 - General Plumbing Provisions: Procedures for submittals.
- 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.

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- E. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.5 QUALITY ASSURANCE

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

1.6 REGULATORY REQUIREMENTS

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

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Accept fixtures on site in factory packaging. Inspect for damage.
- B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

1.8 WARRANTY

- A. Provide five year manufacturer warranty for drinking fountain.
- B. All warranties to begin at Date of Substantial Completion as accepted by the Owner.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

- 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.

2.2 FLUSH VALVE WATER CLOSETS

- A. Water Closets: Vitreous china, ASME A112.19.2, wall hung, powerful direct-fed siphon jet flush action , china bolt caps.
 - 1. Bowl: Height as indicated on plans, with elongated rim.
 - 2. Flush Volume: 1.6 gallon, maximum.
 - 3. Flush Valve: Exposed (top spud).
 - a. Dual-Filtered Bypass.
 - 4. Flush Operation: Manual, oscillating handle.

5. Manufacturers:
 - a. American Standard Inc.
 - b. Kohler Company.
 - c. Zurn Industries, Inc.
 - d. Sloan.
 - e. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Flush Valves: ASME A112.18.1, diaphragm type, dual-filtered bypass, complete with vacuum breaker stops and accessories.
 1. Exposed Type: Chrome plated, escutcheon, integral screwdriver stop.
 - a. Valve shall be equal to Sloan Valve Company; Model Sloan #111-DFB.
 2. Manufacturers:
 - a. Sloan Valve Company.
 - b. Substitutions: Not permitted.
 3. Manual Operated:
 - a. Type: ASME A112.18.1 or ASME A112.19.5; diaphragm type complete with vacuum breaker stops, and accessories.
 - b. Supplied Volume Capacity: 1.5 gal per flush.
- C. Seats:
 1. Manufacturers:
 - a. Beneke Magnolia.
 - b. Bemis Manufacturing Company.
 - c. Church Seat Company.
 - d. Olsonite.
 - e. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
 2. Solid white plastic, open front, self-sustaining hinge, brass bolts, without cover.

2.3 LAVATORIES

- A. Lavatory Manufacturers:
 - 1. American Standard Inc.
 - 2. Zurn Industries, Inc.
 - 3. Kohler Company.
 - 4. Sloan.
 - 5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Vitreous China Under-Mount Basin: ASME A112.19.2; vitreous china under-mount lavatory, rectangular basin with overflow drain.
- C. Supply Faucet Manufacturers:
 - 1. Kohler Company.
 - 2. Sloan Valve Company.
 - 3. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- D. Metered Faucet: ASME A112.18.1; chrome plated metered mixing faucet with low voltage operated solenoid operator and infrared sensor, aerator and cover plate, open grid strainer.
 - 1. ASME A112.18.1; chrome plated metered mixing faucet with low voltage operated solenoid operator and infrared sensor, aerator and cover plate, open grid strainer.
- E. Accessories:
 - 1. Chrome plated 17 gage brass P-trap with clean-out plug and arm with escutcheon.
 - 2. Offset waste with plug and strainer where required.
 - 3. Wheel handle stops.
 - 4. Rigid supplies.
- F. All lavatory faucets shall be listed to ASSE 1070 for temperature and pressure protection with a maximum control flow of 0.5 gpm (2.2 lpm). Faucet shall feature a single cartridge design for ease of repair and maintenance and shall provide an approach temperature of no greater than 5°F (3°C). Faucet shall include integral check

valves to prevent cross flow and shall be in compliance with the American with Disabilities Act (ADA). Faucet shall feature ceramic disc mixing and shall be constructed using Lead Free material.

2.4 SINKS

A. Sink Manufacturers:

1. American Standard Inc.
2. Elkay.
3. Kohler Company.
4. Just.
5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Undermount-Installed Double Compartment Bowl:

1. ASME A112.19.3, stainless steel with ledge back drilled for trim.
2. ASME A112.19.3; See schedule for outside dimensions, 18-gauge stainless steel, undermount sink.
 - a. Drain size: 3-3/4" inch, rear placement.
 - b. ADA compliant.

C. Single Compartment Bowl:

1. ASME A112.19.3; See schedule outside dimensions, 18 gage thick, Type 304 stainless steel, self-rimming and undercoated, with ledge back drilled for trim.
 - a. Drain: 3-1/2 inch stainless steel drain.

D. Trim: ASME A112.18.1; chrome plated brass supply with high rise swing spout, water economy aerator with maximum 1.5 gpm flow, wrist blades .

E. Accessories: Chrome plated 17 gage brass P-trap with clean-out plug and arm with escutcheon, wheel handle stop, rigid supplies.

2.5 SERVICE SINKS

A. Service Sink Manufacturers:

1. Elkay Manufacturing Company.

2. American Standard. Inc..
3. Williams.
4. Crane-Fiat.
5. Florestone
6. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Bowl:

1. 24 x 24 x 12 inch high white terrazzo, floor mounted, with two inch wide shoulders, vinyl bumper guard, stainless steel strainer.

C. Trim:

1. ASME A112.18.1 exposed wall type supply with cross handles, spout wall brace, vacuum breaker, hose end spout, strainers, eccentric adjustable inlets, integral screwdriver stops with covering caps, hot and cold water supply check valves, and adjustable threaded wall flanges.

D. Accessories:

1. 5 feet of 1/2 inch diameter plain end reinforced rubber hose.
2. Hose clamp hanger.
3. Mop hanger.
4. 20 ga. stainless steel splash catcher panels for all adjacent walls.

PART 3 EXECUTION

3.1 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.

3.2 PREPARATION

- A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.3 INSTALLATION

- A. Install each fixture with trap, easily removable for servicing and cleaning.
- B. Provide chrome plated rigid supplies to fixtures with hand wheel stops, reducers, and escutcheons.
- C. Install components level and plumb.
- D. Install and secure fixtures in place with wall carriers and bolts.
- E. Seal fixtures to wall and floor surfaces with sealant as specified in Section 07 92 00, color to match fixture
- F. Solidly attach water closets to floor with lag screws. Lead flashing is not intended hold fixture in place.
- G. Install handicap valve handles to the accessible side.
- H. Provide HandiLav or approved equal molded trap and supply insulation kit for all exposed drain and supply handicap lavatories.
- I. Install a check valve in the hot and cold water supply lines at every service sink.

3.4 INTERFACE WITH WORK OF OTHER SECTIONS

- A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

3.5 ADJUSTING

- A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.6 CLEANING

- A. Clean plumbing fixtures and equipment.

3.7 PROTECTION

- A. Protect installed products from damage due to subsequent construction operations.
- B. Repair or replace damaged products before Date of Substantial Completion.

3.8 SCHEDULES

- A. Fixture Heights: Install fixtures to heights above finished floor as indicated.

1. Water Closet Flush Valves:
 - a. Standard: 11 inches min. above bowl rim.
 2. Lavatory:
 - a. Standard: 31 inches to top of basin rim.
 - b. Accessible: 34 inches maximum to top of basin rim.
 - c. Youth: Refer to Architectural Plans.
- B. Minimum fixture rough-in sizes or as required for particular fixtures.
1. Water Closet (Flush Valve Type):
 - a. Cold Water: 1 Inch.
 - b. Waste: 4 Inch.
 - c. Vent: 2 Inch.
 2. Lavatory:
 - a. Hot Water: 1/2 Inch.
 - b. Cold Water: 1/2 Inch.
 - c. Waste: 1-1/2 Inch.
 - d. Vent: 1-1/4 Inch.
 3. Sink:
 - a. Hot Water: 1/2 Inch.
 - b. Cold Water: 1/2 Inch.
 - c. Waste: 1-1/2 Inch.
 - d. Vent: 1-1/4 Inch.
 4. Service Sink:
 - a. Hot Water: 1/2 Inch.
 - b. Cold Water: 1/2 Inch.
 - c. Waste: 3 Inch.

d. Vent: 2 Inch.

END OF SECTION

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SECTION 23 01 00

GENERAL HVAC PROVISIONS

PART 1 GENERAL

1.1 WORK INCLUDED

- A. The work covered by Division 23 sections consist of furnishing all labor, equipment, appliances and material for the heating, air conditioning, piping and plumbing systems in strict accordance with Codes, Specifications and the applicable drawings and subject to the terms and conditions of the contract. Include all appurtenances necessary to the proper operation of the systems and equipment specified.
- B. General Contractor shall install all concrete pads and bases required for installing mechanical equipment. Mechanical Contractor is responsible for the exact sizes required, location of anchor bolts, etc.
- C. Some equipment may be furnished by other divisions. Mechanical Contractor is responsible to check the drawings and specifications for equipment that will be furnished by the Owner. Furnish the duct, insulation, controls, etc., on all equipment furnished by other divisions.
- D. General Contractor shall furnish and install all ceiling access panels required to service mechanical equipment, valves and controls above gyp board or hidden spline ceilings.

1.2 RELATED SECTIONS

- A. The General Conditions and Division 1, General Requirements, as bound in the specification preamble, apply to all work under Division 23. Carefully note its contents in performance of the work.
- B. The Architectural, Plumbing, Electrical, and Structural plans and Specifications, including Information to Bidders and other pertinent documents issued by the Engineer are a part of this Specifications and the accompanying mechanical plans. Comply with them in every respect. Examine all the above carefully. Failure to comply does not relieve the Contractor of responsibility nor may it be used as a basis for additional compensation due to omission of architectural, electrical and structural details from the mechanical drawings.
- C. All electrical power wiring is specified under Division 26 of the Specifications. Mechanical Contractor shall furnish all motor starters required for the control and protection of all motors furnished for the Division 23. Provide and install all

automatic temperature and interlock wiring required for controlling mechanical equipment furnished under Division 23, in compliance with Division 26 of the Project Manual.

- D. All concrete pads and bases required for installing mechanical equipment are specified in another section of the Specifications. Advise the General Contractor as to the exact sizes required, location of anchor bolts, etc.
- E. Paint all roof top mechanical equipment ducts, supports and other exposed material. Do not paint indoor equipment supplied with painted finish, such as the main mechanical equipment unless damaged during handling and installation. In such cases, use touch-up paint of the same type and color as original paint. Conform to requirements in other sections of the Specifications and match wall finish to the room in which installed.

1.3 CODES, FEES AND LATERAL COSTS

- A. Comply with all applicable codes, specifications, local ordinances, industry standards, utility company regulations, and the applicable requirements of the following latest nationally accepted codes and standards:
 - 1. 2021 Ozark, Arkansas City Building Code.
 - 2. 2021 Arkansas State Mechanical Code.
 - 3. 2018 Arkansas State Plumbing Code.
 - 4. 2014 Arkansas Energy Code.
 - 5. IBC - International Building Code; latest accepted edition.
 - 6. IFC - International Fire Code; latest accepted edition.
 - 7. IGC - International Gas Code; latest accepted edition.
 - 8. IMC - International Mechanical Code; latest accepted edition.
 - 9. IPC - International Plumbing Code; latest accepted edition.
 - 10. IECC - International Energy Conservation Code
 - 11. AMCA - Air Moving & Conditioning Association.
 - 12. ASA - American Standards Association.
 - 13. ASHRAE - American Society of Heating, Refrigerating and Air Conditioning Engineers.

14. ASME - American Society of Mechanical Engineers.
 15. ASTM - American Society of Testing Materials.
 16. AWWA - American Water Works Association.
 17. NBS - National Bureau of Standards.
 18. NEMA - National Electrical Manufacturers Association.
 19. NFPA - National Fire Protection Association.
 20. SMACNA - Sheet Metal & Air Conditioning Contractors' National Association.
 21. UL - Underwriters' Laboratories, Inc.
 22. AGA - American Gas Association.
 23. OSHA - Occupational Safety and Hazard Association.
 24. AABC - Associated Air Balance Councils
 25. NEBB - National Environmental Balancing Bureau
- B. Comply with State of Arkansas adopted ADA Accessible Guidelines in regard to accessible or handicapped features.
- C. In case of difference between building codes, Specifications, state Laws, local ordinances, industry standards and utility company regulations and the Contract Documents, the most stringent governs. Promptly notify the Engineer in writing of any such difference.
- D. Remove any work installed that does not comply with the requirements of the applicable building codes, state laws, local ordinances, industry standards, or utility company regulations, correct the deficiencies, and reinstall all work at no cost to the Owner.
- E. The mechanical drawings show the general arrangement of all piping, equipment and appurtenances. Follow as closely as actual building construction and the work of other trades will permit. Final layout will be governed by actual field conditions with all measurements verified at the site. Conform to the requirements shown on all of the drawings. General and structural drawings take precedence over mechanical drawings. Because of the small scale of the mechanical drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. Investigate the existing and finish conditions affecting the work and arrange the work accordingly, providing such fittings, valves and accessories as may be required to meet such

conditions. Contractor shall verify that all equipment, ducts, pipes and all other components will fit in the space provided before fabrication or ordering.

- F. Obtain any and all required permits in connection with this work under the Contract and pay any and all fees in connection therewith. Arrange with the serving utility companies for the connections to all utilities and pay all charges for same including inspection fees and meters if required. Refundable deposits will be paid by the Owner.

1.4 GUARANTEE

- A. Furnish a written certificate guaranteeing all materials, equipment and labor furnished to be free of all defects for a period of one (1) year from and after the date of final acceptance of the work by the Owner and further guarantee to replace such work without charges if any defects appear within the stipulated guaranty period.

1.5 SOIL CONDITIONS

- A. The Specifications and the drawings in no way imply the conditions of the soil to be encountered. When excavating may be required in execution of the work, this Contractor agrees that he has informed himself regarding conditions affecting the work.

1.6 INSPECTION OF PREMISES

- A. Before submitting a bid, visit the site of the proposed job and determine the conditions relating to this work.

1.7 UTILITIES, LOCATIONS AND ELEVATIONS

- A. Locations and elevations of the various utilities included within the scope of this work have been obtained from substantially reliable sources and are offered as a general guide only, without guarantee as to accuracy. Verify the location and elevation of all utilities and their relation to the work before entering into a contract.
- B. Identify outdoor underground lines with continuous strip of plastic utility marker tape at regular intervals (maximum of 10 feet) "Caution (state utility) pipe below". Install one foot directly above pipe before backfilling to grade.

1.8 EQUIPMENT NOT SPECIFIED UNDER DIVISION 23

- A. Equipment which requires plumbing and other mechanical connections may be specified in another division of this Specification. Under these conditions, provide necessary utilities including waste, water, natural gas, duct, insulation and controls.

- B. Rough-in work from approved shop drawings only.

PART 2 PRODUCTS

2.1 EQUIPMENT AND MATERIALS

- A. Provide new materials bearing the manufacturer's name, trade name and the UL label in every case where a standard has been established for the particular material.
Furnish the standard product of a manufacturer regularly engaged in the production of the required type of equipment. Provide the manufacturer's latest approved design.
- B. Deliver equipment and materials to the site and store in original containers, suitably sheltered from the elements, but readily accessible for inspection by the Engineer until installed. Store all items subject to moisture damage (such as controls) in dry, heated spaces.
- C. Provide equipment and materials of the same general type and of the same make throughout the work to provide uniform appearance, operation and maintenance.
- D. Tightly cover equipment and protect against dirt, water and chemical or mechanical injury and theft. At the completion of the work, clean fixtures, equipment and materials and polish thoroughly. Turn over to the Owner in a condition satisfactory to the Engineer. Repair damage or defects developing before acceptance of the work at no expense to the Owner.
- E. Insure that items to be furnished fit the space available. Make necessary field measurements to ascertain space requirements, including those for connections.
Furnish and install such sizes and shapes of equipment that the final installation suits the true intent and meaning of the drawings and Specifications.
- F. Follow manufacturer's directions completely in the delivery, storage, protection and installation of all equipment and materials. Promptly notify the Engineer in writing of any conflicts between any requirements of the Contract Documents and the manufacturers' directions. Obtain the Engineer's written instruction before proceeding with the work. Replace any work that does not comply with the manufacturers' directions or such written instructions from the Engineer, at no cost to the Owner.
- G. Support all products by service organizations with adequate spare parts inventory and personnel located reasonably close to the site.
- H. Where multiple units of the same type or class of products are required, provide all units of the same manufacturer.

2.2 EQUIPMENT ACCESSORIES

- A. Furnish and install all equipment, accessories, connections and incidental items necessary to fully complete all work, ready for use, occupancy and operation by the Owner.
- B. Where equipment requiring different arrangement or connections from those shown is provided, install the equipment to operate properly and in harmony with the intent of the drawings and Specifications.
- C. Support, plumb, rigid and true to line, all work and equipment furnished. Study thoroughly all general, structural, electrical, fire suppression and mechanical drawings, shop drawings and catalog data to determine how equipment, fixtures, piping, ductwork, etc., are to be supported, mounted or suspended and provide extra steel bolts, inserts, pipe stands, brackets and accessories for proper supports whether or not shown on the drawings. When directed, submit drawings showing supports.
- D. If accessories are required to complete the work and meet the intent of the specification, it is the responsibility of the Contractor to provide such accessories.

2.3 MATERIAL AND EQUIPMENT SCHEDULE

- A. Submit to the Engineer as soon as practical, six (6) complete sets of the schedule of materials and equipment proposed for the installation, or electronic submittals as detailed below. Include manufacturers' names, catalog data, diagrams, drawings and other descriptive data and submit under one cover with an index sheet in front.
 - 1. If Electronic files are submitted, a complete set of the schedule of materials and equipment proposed for the installation shall be included. Include manufacturers' names, catalog data, diagrams, drawings and other descriptive data. All information shall be submitted electronically in "pdf" format, and shall be separated into electronic "pdf" files according to the corresponding specification section (i.e. "23 40 00 - Air Cleaning Devices.pdf"). Unless incomplete submittals are authorized by the project engineer, all Division 23 submittals shall be electronically sent at one time. Without authorization, incomplete submittals shall be rejected.
- B. Provide written certification that shop drawings are in accordance with the specifications and are dimensionally correct with reference to available space.
- C. All submittals will be reviewed a maximum of two (2) times. The cost of additional submittal reviews beyond those two specified will be charged to the Contractor.
- D. Shop drawings for the Engineer's files are required on the following items:
 - 1. Small Capacity Air Conditioning Units.
 - 2. Furnace Units.

3. Condensing Units.
4. Filters.
5. Wall Louvers.
6. Exhaust Fans.
7. Grilles and Registers.
8. Air Balance Certification.
9. Ductwork Materials Including Duct Accessories.
10. Duct Insulation Materials.
11. Complete Mechanical Equipment Electrical Data and Wiring Details.

2.4 EQUIPMENT AND MATERIAL SUBSTITUTIONS

- A. It is the responsibility of the Contractor to investigate any desired substitutions for specified equipment prior to submission of his bid. The Mechanical Contractor shall be responsible for any changes required in mechanical, electrical, structural or vibration isolation systems and shall bear all cost for those changes whether the substitute equipment is named by manufacturer in the specifications or is submitted to the Architect for "or equal" consideration. All changes shall be accomplished in a manner acceptable to the Architect per Section 01 60 00 at no additional cost to the Owner.
- B. In order to obtain prior approval on equipment or material not specified in Division 23 Specifications or Equipment Schedules, Mechanical Contractor MUST submit to the Engineer any proposed equipment or material ten (10) working days prior to the bid date.
- C. If ANY substitute equipment is submitted to Engineer for approval, without said equipment having been pre-approved, the entire submittal will be rejected for resubmittal.
- D. Any equipment manufacturers which are a subsidiary to the listed acceptable manufacturers are not considered equal. Therefore, it is the responsibility of the Contractor and equipment supplier to obtain prior approval as described in paragraph 2.4, this Section.

2.5 ELECTRICAL MOTORS

- A. Provide motors of a recognized manufacturer, wound for the voltage specified, and in conformance to latest standards of the manufacturer and performance of the National Electrical Manufacturers Association and the Institute of Electrical and Electronic Engineers. Provide motors as manufactured by General Electric, Westinghouse, Century or Siemens-Allis, Baldor or approved equal.
- B. Provide motors rated for continuous duty at 100% of rated capacity and temperature raise of 40 degrees Centigrade open type; 50 degrees Centigrade drip and splash proof; 55 degrees Centigrade explosion proof and totally enclosed above an ambient of 40 degrees Centigrade.
- C. Unless otherwise required, provide integral horsepower, polyphase motors, Class B, general purpose, squirrel cage, open type induction motors, T-frame.
- D. Provide single phase fractional horsepower motors of the open capacitor type. Generally, motors under 1/2 horsepower may be split phase type unless otherwise specified. Provide motors rated 1/2 horsepower or less with integral overcurrent protection.
- E. Insure the insulation resistance between stator conductor and frames of motors is not less than 1/2 megohm. Provide shop test of motors including temperature rise, insulation resistance, motor terminal voltage, normal operating line current, RPMs, breaker or switch size with fusing and overload relay sizes.

PART 3 EXECUTION

3.1 COORDINATION OF WORK

- A. Compare the mechanical drawings and Specifications with the drawings and Specifications for other trades and report any discrepancies between them to the Engineer and obtain from him written instruction for changes necessary in the mechanical work. Install the mechanical work in cooperation with other trades installing inter-related work. Before installation, make proper provisions to avoid interferences in a manner approved by the Engineer. Make all changes required in the work caused either by neglect or existing field conditions at no cost to the Owner.
- B. It is the responsibility of the General Contractor, Plumbing Contractor, Mechanical Contractor and Electrical Contractor, and Sprinkler Contractor to coordinate installation of all equipment. Equipment installed prior to proper coordination, which interferes with the harmony and intent of the specifications and drawings, will be removed and reinstalled at the cost of the responsible Contractor.

- C. Furnish anchor bolts, sleeves, inserts and supports required for the mechanical work. Locate anchor bolts, sleeves, inserts and supports as directed by the trade requiring them and insure that they are properly installed.
- D. Slots, chases, openings and recesses in existing structure shall be cut, patched and repaired by the Contractor.
- E. Adjust locations of pipes, ducts, equipment fixtures, etc., to accommodate the work and for interferences anticipated and encountered. Determine the exact route and location of each pipe and duct prior to fabrication.
 - 1. Provide right-of-way to lines that pitch over those that do not pitch. For example, Plumbing drains normally have right-of-way. Lines whose elevations cannot be changed have the right-of-way over lines whose elevations can be changed.
 - 2. Make offsets, transitions and changes in direction in pipes and ducts as required to maintain proper head room and pitch.
- F. Install all mechanical work to permit removal without damage to other parts, to coils, fan shafts and wheels, filters, belt guards, sheaves and drives and all other parts requiring periodic replacement or maintenance. Arrange pipes, ducts and equipment to permit ready access to valves, cocks, traps, starters, motors, control components and to clear the openings of swinging and overhead doors and of access panels.
- G. Change the cross sectional dimensions of ductwork when required to meet job conditions, but maintain at least the same equivalent cross sectional area. Secure the approval of the Engineer prior to fabrication of ductwork requiring such changes. Sizes shown on the plans are clear dimensions; add for internal insulation if specified.

3.2 RECORD DRAWINGS

- A. Maintain record drawings showing exact locations and sizes, as actually installed, of piping, drains, cleanouts, ductwork, controls and equipment as specified herein. Deliver to the Owner/Architect upon completion and acceptance of the work, one (1) complete set of contract drawings marked to indicate all deviations from intended installation.
- B. Record drawings shall be provide in hard copy form, as well as, on a DVD in PDF form.

3.3 CUTTING AND PATCHING

- A. The General Contractor shall be responsible for all required cutting, patching, etc., incidental to this work and shall make all required repairs thereafter to the satisfaction

of the Engineer. Do not cut into any major structural element, beam or column without the written approval of the Engineer.

- B. Openings in fire or smoke barriers for air handling ductwork or air movement shall be protected in accordance with NFPA 90A and 90B and the Mechanical Code.
- C. Pipes, conduits, cables, wires, air ducts, pneumatic tubes and ducts and similar handling service equipment that pass through fire or smoke barriers shall be protected in accordance with NFPA 101.
- D. All fire stopping assemblies must be UL approved assemblies.

3.4 EQUIPMENT START-UP AND TESTING

- A. Instruct the Owner's operating personnel during start-up and separate operating tests of each major item of equipment. During the operating tests, prove the operation of each item of equipment to the satisfaction of the Engineer. Give at least seven (7) days notice to the Engineer of equipment start-up and operating tests.
- B. Refer to Section 23 08 00 for additional information.

3.5 CATALOG DATA FOR OWNER

- A. Provide, in looseleaf binders, two (2) sets of a compilation of catalog data of each manufactured item of equipment used in the mechanical work and present this compilation to the Owner/Architect for transmittal to the Owner before final payment is made. Include descriptive data and printed installation, operating and maintenance instructions for each item of equipment. Provide a complete double index as follows:
 - 1. Listing of products alphabetically by name.
 - 2. Listing the names of manufacturers whose products have been incorporated in the work alphabetically together with their addresses and the names and addresses of the local sales representatives.
 - 3. Certificates of Final Inspections.
 - 4. Complete spare parts data with current prices and supply sources.
 - 5. Extended warranties.
- B. Deliver to the Owner all special tools, lubricants, extra materials and any other products necessary for the proper operation and maintenance of the mechanical and plumbing systems.

- C. Provide project record documents indicating all changes from contract documents made during construction.
- D. Submit all Certificates of Final Inspections from the Administrative Authorities.
- E. Submit TAB reports on approved forms. Final TAB report submittals shall include all required rebalances if any are required.

3.6 INSTRUCTION OF OWNER'S REPRESENTATIVE

- A. Instruct the representative of the Owner in the proper operation and maintenance of all elements of the mechanical system. Spend not less than five (5) days in such formal instruction and additional time as directed by the Engineer to fully prepare the Owner to operate and maintain the mechanical equipment.
- B. Provide classroom and hands-on training of Owner's designated personnel on operation and maintenance of the HVAC system, control system, and all equipment items indicated. Provide the following training as required to fully qualify the Owner's designated personnel. All training must be video taped to a CD and a copy included in each operation and maintenance closeout manual.
 - 1. Furnace / Condenser Units.
 - 2. Return Fan/Relief Fan.
 - 3. Small Capacity Air Conditioning Units.

3.7 PROTECTIVE COATINGS

- A. Paint exterior surfaces of steel piping run in or through concrete floor fill, under tile floors or underground, and aluminum surfaces in contact with masonry, with one coat of acid resisting bituminous base paint.
- B. Paint all exposed galvanized ducts behind grilles flat black.

3.8 NOISE CONTROL

- A. It is intended that the mechanical systems as installed under this contract be free from objectionable noise when the system is operating. The system shall operate at noise levels below criteria recommended for the application by ASHRAE. Provide vibration isolation accessories and isolate equipment, pipeline, ductwork, etc., as required so as to insure an acceptable noise level in all of the mechanical systems.

3.9 CLEANING AND ADJUSTING

- A. Do not allow waste material and rubbish to accumulate in or above the premises. After completion of this work, remove rubbish, tools, scaffolding and surplus materials from and about the building and leave all work clean and ready for use. Clean all equipment, pipes, valves and fittings of grease, metal cuttings and sludge. Repair any stoppage, discoloration or other damage to parts of the building, its finish or furnishings due to failure to properly clean the mechanical systems, without additional cost to the Owner. Adjust all automatic control devices for proper operation.

3.10 SYSTEM OPERATING TESTS

- A. After the successful completion of all equipment start-up and test requirements, perform the following tests on the complete mechanical systems:
 - 1. First Operating Test by Contractor: Prove the operation of the mechanical systems and of each individual item in the systems. Give at least 10 day prior notice to the Engineer of such tests. Adjust and set proper quantities to all items and equipment. Should any item of the systems fail to perform in an approved manner, repeat this test until approved by the Engineer. During this test, balance circulation of heating and cooling water to balancing cocks, valves, thermostats and similar Items to insure that the mechanical systems perform as intended.
 - 2. Checking by Owner and Engineer: Following the successful completion of first operating tests by the Contractor, the Owner and the Engineer have the privilege of making such tests as they may desire during a period of three weeks to ascertain in detail if any corrections are to be made to the system. At the end of the testing by the Owner and the Engineer, the Engineer may direct the Contractor in writing to make such corrections to the systems as are within the scope of the contract.
 - 3. Contractor's Corrections to Systems: Make all required corrections to the systems and notify the Engineer in writing that the corrections outlined have been completed. Give at least seven (7) days notice of a final three-day operating test.
 - 4. Three-Day Operating Test: Perform an operating test to the satisfaction of the Engineer for a period of three (3) days. Should any element of the systems not perform properly, make all required corrections and repeat the test until successfully performed.

- a. Submit the Form of Record proposed by the Contractor for the recording of all measurements to the Engineer for approval at least two weeks before the approved form will be required by the Contractor.
- b. Measurements: Make the following measurements at two-hour intervals (5 measurements per 8-hour day) during the three-day operating test.
 - 1) Electrical: Running amperes and voltage of each motor 3/4 horsepower or larger.
 - 2) Air temperatures in each heated or air conditioned space and outdoor temperatures.
- c. Instruments: Provide all instruments, materials and labor to perform the tests and to obtain and record the measurements specified herein, including the furnishing of all required record forms as approved by the Engineer. Submit for the Engineer's approval, complete shop drawings or catalog data for all instruments to be used for the three day operating test and obtain approval at least two weeks before the instruments will be required for test measurements.
- d. Report: Submit four (4) copies of a written report of the three-day operating test on the approved Form of Record to the Engineer for approval and subsequent transmittal to the Owner.

3.11 MOTOR CONTROL

- A. General: Provide each motor 1/8 horsepower or larger with a suitable controller and devices that will perform the functions as specified for the respective motors, together with manual reset thermal overload, protection in each undergrounded conductor. Provide the controller either integral with circuit protective device or mounted in separate enclosure. Starters shall be Allen-Bradley, G.E., Westinghouse, Square D or approved equal.
- B. Control: Automatic control devices such as thermostats, float or pressure switches may control the starting and stopping of motor directly, provided the device used is designated for that purpose and has an adequate horsepower rating. When automatic control device does not have such a rating, use a magnetic starter with the automatic control device actuating the pilot control circuit. When combination manual and automatic control is specified and the control device operates the motor directly, provide a manual motor starter and selector switch. When combination manual and automatic control is specified and the automatic control device actuates the pilot control circuit, a magnetic control device actuates the pilot control provided. Provide

all magnetic starters with push buttons or selector switches in the covers. Provide connections to the selector switch such that only the normal automatic regulating control devices will be bypassed when the switch is in the manual position. Connect all safety control devices, such as low or high pressure cutouts, high temperature cutouts and motor overload protective devices in the motor control circuit in both the manual and automatic positions of the selector switch control circuit. Make connections to any selector switch or to more than one (1) automatic regulatory control device in accordance with wiring diagrams recommended by the manufacturer and approved by the Engineer. Where required for manual control, provide push-button stations consisting of two (2) momentary contact operators, 600 volts, 10 amperes installed and wired for three wire control to provide under-voltage relays, auxiliary contacts or other devices required for a complete system.

- C. Location: Where the controller is located within sight of the motor driven equipment (fifty feet or less), the controller and circuit protective device shall be capable of being locked in the open position. Where the controller is located out of sight of the motor driven equipment (more than fifty feet) provide a non-fused safety disconnect, suitable for the service, and which opens all ungrounded conductors simultaneously, at or on the motor driven equipment.
- D. Enclosure: Enclosure to be general purpose, NEMA Type 1 unless noted otherwise (NEMA Type 1 gasketed). The circuit breaker shall be operable by hand from outside the enclosure and shall be so interlocked with the door or doors that it must be returned to the "OFF" position before the door can be opened.
- E. Push-buttons: Provide maintained contact, standard duty type in a general purpose, NEMA Type 1 enclosure for surface mounting rated for 10 amperes continuous at 600 volts or less.

3.12 ACCESS PANELS

- A. Provide access panels as required in all walls, ceilings and ductwork to service and have access to all valves, operating parts and duct mounted fire dampers. For all ceiling and wall access doors that are required in gypsum board and plaster, provide minimum 24" x 24", unless due to structural restraints the access door can be reduced to a minimum of 18" x 18", Milcor type appropriate for the construction involved.

3.13 TEMPORARY HEATING AND COOLING

- A. Permanent heating and cooling systems may be used to provide temporary heating and cooling to the building during construction, if the following requirements are met:
 - 1. Provide filters in equipment filter racks.

2. Provide filter material at entrance to all return air ducts or over permanent return air grilles. All return air ductwork is to be protected from construction dust and debris. If return air duct work is not protected prior to equipment startup for temporary use, the Contractor will pay to have the entire ductwork system of the affected equipment thoroughly cleaned prior to Owner occupancy.
 3. Contractor shall provide and pay for operation, maintenance, regular replacement of filters and worn or consumed parts.
 4. Shall replace any equipment that is damaged during temporary usage with new equipment.
 5. All warranty periods shall not begin until Certificate of Substantial Completion is issued.
 6. Verify with engineer that the installation is ready and approved for operation.
- B. Just prior to turning the building or portions of the building over to the Owner, Contractor will replace all filters on equipment used for temporary ventilation, heat or cooling during construction.
- C. Do not turn water into the system until the systems have been thoroughly cleaned and approved by the Engineer.

3.14 FINALLY

- A. It is the intention that this specification shall provide a complete installation except as herein before specifically excepted. All accessory construction and apparatus necessary or advantageous in the operation and testing of the work shall be included. The omission of specific reference to any part of the work necessary for such complete installation shall not be interpreted as relieving this Contractor from furnishing and installing such parts.

END OF SECTION

SECTION 23 05 53

IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Stencils.
- D. Pipe markers.
- E. Ceiling tacks.

1.2 REFERENCE STANDARDS

1.3 SUBMITTALS

- A. See Section 23 01 00 - General HVAC Provisions, for submittal procedures.
- B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number. Valve locations with tag numbers shall also be indicated on "as-built" drawings.
- D. Product Data: Provide manufacturers catalog literature for each product required.
- E. Manufacturer's Installation Instructions: Indicate special procedures, and installation.
- F. Project Record Documents: Record actual locations of tagged valves.

PART 2 PRODUCTS

2.1 IDENTIFICATION APPLICATIONS

- A. Air Handling Units: Nameplates.
- B. Dampers: Ceiling tacks, where located above lay-in ceiling.
- C. Ductwork: Stencilled painting.
- D. Instrumentation: Tags.

- E. Relays: Tags.
- F. Small-sized Equipment: Tags.
- G. Thermostats: Nameplates.
- H. Valves: Tags and ceiling tacks where located above lay-in ceiling.

2.2 NAMEPLATES

- A. Manufacturers:
 - 1. Advanced Graphic Engraving.
 - 2. Kolbi Pipe Marker Co.
 - 3. Seton Identification Products.
 - 4. Substitutions: See Section 23 01 00 - General HVAC Provisions.
- B. Description: Laminated three-layer plastic with engraved letters.
 - 1. Letter Color: White.
 - 2. Letter Height: 1/2 inch.
 - 3. Background Color: Black.
 - 4. Plastic: Conform to ASTM D709.

2.3 TAGS

- A. Manufacturers:
 - 1. Advanced Graphic Engraving.
 - 2. Brady Corporation.
 - 3. Kolbi Pipe Marker Co.
 - 4. Seton Identification Products.
 - 5. Substitutions: See Section 23 01 00 - General HVAC Provisions.
- B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.
- C. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.

- D. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame. Valve tag chart should indicate valve size, valve model and valve location. Valve locations with tag numbers shall also be indicated on "as-built" drawings.

2.4 STENCILS

A. Manufacturers:

1. Brady Corporation.
2. Kolbi Pipe Marker Co.
3. Seton Identification Products.
4. Substitutions: See Section 23 01 00 - General HVAC Provisions.

B. Stencils: With clean cut symbols and letters of following size:

1. 3/4 to 1-1/4 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 1/2 inch high letters.
2. 1-1/2 to 2 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 3/4 inch high letters.
3. 2-1/2 to 6 inch Outside Diameter of Insulation or Pipe: 12 inch long color field, 1-1/4 inch high letters.
4. 8 to 10 inch Outside Diameter of Insulation or Pipe: 24 inch long color field, 2-1/2 inch high letters.
5. Over 10 inch Outside Diameter of Insulation or Pipe: 32 inch long color field, 3-1/2 inch high letters.
6. Ductwork and Equipment: 2-1/2 inch high letters.

2.5 PIPE MARKERS

A. Manufacturers:

1. Brady Corporation.
2. Kolbi Pipe Marker Co.
3. MIFAB.
4. Seton Identification Products.
5. Substitutions: See Section 23 01 00 - General HVAC Provisions.

- B. Color: Conform to ASME A13.1.
- C. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
- D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
- E. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.
- F. Color code as follows:
 - 1. Heating, Cooling, and Boiler Feedwater: Green with white letters.
 - 2. Toxic and Corrosive Fluids: Orange with black letters.

2.6 CEILING TACKS

- A. Manufacturers:
 - 1. Marking Services Incorporated.
 - 2. Seton.
 - 3. Substitutions: See Section 23 01 00 - General HVAC Provisions.
- B. Description: Steel with 3/4 inch diameter color coded head.
- C. Color code as follows:
 - 1. Yellow - HVAC equipment.
 - 2. Blue - Heating/cooling valves.

PART 3 EXECUTION

3.1 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.
- B. Prepare surfaces in accordance with Section 09 91 00 for stencil painting.

3.2 INSTALLATION

- A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

- B. Install tags with corrosion resistant chain.
- C. Install plastic pipe markers in accordance with manufacturer's instructions.
- D. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- E. Use tags on piping 3/4 inch diameter and smaller.
 - 1. Identify service, flow direction, and pressure.
 - 2. Install in clear view and align with axis of piping.
 - 3. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.
- F. Install ductwork with stencilled painting. Identify with air handling unit identification number and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.
- G. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION

SECTION 23 05 93

TESTING, ADJUSTING, AND BALANCING

PART 1 GENERAL

1.1 SECTION INCLUDES

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

1.2 REFERENCE STANDARDS

- A. AABC MN-1 - AABC National Standards for Total System Balance; Associated Air Balance Council; 2002.
- B. ASHRAE Std 111 - Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems; American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.; 1988, with 1997 Errata.
- C. NEBB (TAB) - Procedural Standards for Testing Adjusting Balancing of Environmental Systems; National Environmental Balancing Bureau; 2005, Seventh Edition.
- D. SMACNA (TAB) - HVAC Systems Testing, Adjusting, and Balancing; Sheet Metal and Air Conditioning Contractors' National Association; 2002.

1.3 SUBMITTALS

- A. See Section 23 01 00 - General HVAC Provisions, for submittal procedures.
- B. Qualifications: Submit name of adjusting and balancing agency and TAB supervisor for approval within 30 days after award of Contract.
- C. 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. Preface: An explanation of the intended use of the control system.
 - b. List of all air flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
 - c. 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.
 - d. Identification and types of measurement instruments to be used and their most recent calibration date.
 - e. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
 - f. Final test report forms to be used.
 - g. Detailed step-by-step procedures for TAB work for each system and issue, including:
 - 1) Terminal flow calibration (for each terminal type).
 - 2) Diffuser proportioning.
 - 3) Branch/submain proportioning.
 - 4) Rechecking.
 - 5) Diversity issues.
 - h. Expected problems and solutions, etc.
 - i. Criteria for using air flow straighteners or relocating flow stations and sensors .
 - j. 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.
 - k. Specific procedures that will ensure that air side is operating at the lowest possible pressures and methods to verify this.

- l. Confirmation of understanding of the outside air ventilation criteria under all conditions.
 - m. Method of verifying and setting minimum outside air flow rate will be verified and set and for what level (total building, zone, etc.).
 - n. Method of checking building static and exhaust fan and/or relief damper capacity.
 - o. Methods for making coil or other system plant capacity measurements, if specified.
 - p. Time schedule for TAB work to be done in phases (by floor, etc.).
 - q. Description of TAB work for areas to be built out later, if any.
 - r. Exhaust fan balancing and capacity verifications, including any required room pressure differentials.
 - s. Procedures for field technician logs of discrepancies, deficient or uncompleted work by others, contract interpretation requests and lists of completed tests (scope and frequency).
 - t. Procedures for formal progress reports, including scope and frequency.
 - u. Procedures for formal deficiency reports, including scope, frequency and distribution.
- D. Field Logs: Submit at least once a week to Construction Manager and Engineer. Field logs should be submitted with weekly progress reports and include a record of all discrepancies and issues encountered during the period covered.
- E. Control System Coordination Reports: Communicate in writing to the controls installer all setpoint and parameter changes made or problems and discrepancies identified during TAB that affect, or could affect, the control system setup and operation.
- F. Progress Reports.
- G. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
- 1. Submit to the Construction Manager, HVAC controls contractor, and Engineer within two weeks after completion of testing, adjusting, and balancing.
 - 2. Revise TAB plan to reflect actual procedures and submit as part of final report.

3. 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.
4. Provide reports in soft cover, letter size, 3-ring binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.
5. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
6. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
7. Units of Measure: Report data in I-P (inch-pound) units only.
8. 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. Project altitude.
 - j. Report date.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 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 HVAC Systems Testing, Adjusting, and Balancing.
 5. Maintain at least one copy of the standard to be used at project site at all times.
- 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 two years documented experience.
 3. Certified by one of the following agencies or methods:
 - 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.
 - d. Test and Balance under direct supervision of a Professional Engineer registered in the State of Arkansas.
- E. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.
- F. Acceptable TAB Agencies:
1. NEBB.
 2. AABC.
 3. SMACNA.

4. TABB.

5. Substitutions: Not permitted.

3.2 EXAMINATION

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
 - 1. Systems are started and operating in a safe and normal condition.
 - 2. Temperature control systems are installed complete and operable.
 - 3. Proper thermal overload protection is in place for electrical equipment.
 - 4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
 - 5. Duct systems are clean of debris.
 - 6. Fans are rotating correctly.
 - 7. Fire and volume dampers are in place and open.
 - 8. Air coil fins are cleaned and combed.
 - 9. Access doors are closed and duct end caps are in place.
 - 10. Air outlets are installed and connected.
 - 11. Duct system leakage is minimized.
- 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. Since work will occur in phases, provide listing of system deficiencies for systems to be balanced during the specified phases.

3.3 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.
- B. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Architect to facilitate spot checks during testing.

- C. Provide additional balancing devices as required.

3.4 ADJUSTMENT TOLERANCES

- A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply and outside air 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.

3.5 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.
- G. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Owner.
- H. Check and adjust systems approximately six months after final acceptance and submit report.
- I. After all adjustments and corrections have been performed to balance system as designed, additional readjustment shall be performed to satisfy desired temperature.

3.6 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities . Test and balance all air handlers for the three design positions i.e. minimum (5% adjustable) outside air, design outside air and economizer operation.
- B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.
- C. Measure air quantities at air inlets and outlets.
- D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.
- E. 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.
- F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.
- G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.
- H. 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.
- I. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.
- J. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.
- K. Where modulating dampers are provided, take measurements and balance at extreme conditions.
- L. Measure building static pressure and adjust supply, return, barometric relief dampers, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches positive static pressure near the building entries.
- M. Check multi-zone units for motorized damper leakage. Adjust air quantities with mixing dampers set first for cooling, then heating, then modulating.

- N. Measure and record supply, return, outside and exhaust air cfm, fan rpm, motor amps, coil entering and leaving air, temperatures (both wet and dry bulb temperatures), outside air (wet and dry bulb temperatures) for cooling and heating operations, system static pressures shall be measured at the required conditions at the minimum and maximum fan speeds.
- O. Measure and record the following air handling and distribution systems.
 - 1. Supply, return, outside air and exhaust when system is in the economizer operation. Measure and record supply air and outside air temperatures (both wet and dry bulb).

3.7 SCOPE

- A. Test, adjust, and balance the following:
 - 1. Forced Air Furnaces
 - 2. Air Cooled Refrigerant Condensers
 - 3. Small Capacity Air Conditioning Units.
 - 4. Fans.
 - 5. Air Filters.
 - 6. Air Inlets and Outlets.

3.8 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
 - 6. Service factor
 - 7. Starter size, rating, heater elements
 - 8. Sheave Make/Size/Bore

B. V-Belt Drives:

1. Identification/location
2. Required driven RPM
3. Driven sheave, diameter and RPM
4. Belt, size and quantity
5. Motor sheave diameter and RPM
6. Center to center distance, maximum, minimum, and actual

C. Combustion Equipment:

1. Model number
2. Serial number
3. Firing rate
4. Overfire draft
5. Gas meter timing dial size
6. Gas meter time per revolution
7. Gas pressure at meter outlet
8. Gas flow rate
9. Heat input
10. Burner manifold gas pressure
11. Percent carbon monoxide (CO)
12. Percent carbon dioxide (CO₂)
13. Percent oxygen (O₂)
14. Percent excess air
15. Flue gas temperature at outlet
16. Ambient temperature
17. Net stack temperature

18. Percent stack loss
 19. Percent combustion efficiency
 20. Heat output
- D. Air Cooled Condensers:
1. Identification/number
 2. Location
 3. Manufacturer
 4. Model number
 5. Serial number
 6. Entering DB air temperature, design and actual
 7. Leaving DB air temperature, design and actual
 8. Number of compressors
- E. 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
 12. Sheave Make/Size/Bore

13. Number of Belts/Make/Size

14. Fan RPM

F. Return Air/Outside Air:

1. Identification/location

2. Design air flow

3. Actual air flow

4. Design return air flow

5. Actual return air flow

6. Design outside air flow

7. Actual outside air flow

8. Return air temperature

9. Outside air temperature

10. Required mixed air temperature

11. Actual mixed air temperature

12. Design outside/return air ratio

13. Actual outside/return air ratio

G. Exhaust Fans:

1. Location

2. Manufacturer

3. Model number

4. Serial number

5. Air flow, specified and actual

6. Total static pressure (total external), specified and actual

7. Inlet pressure

8. Discharge pressure

9. Sheave Make/Size/Bore
 10. Number of Belts/Make/Size
 11. Fan RPM
- H. 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
 9. Air temperature
 10. Air correction factor
- I. Flow Measuring Stations:
1. Identification/number
 2. Location
 3. Size
 4. Manufacturer
 5. Model number
 6. Serial number
 7. Design Flow rate
 8. Design pressure drop
 9. Actual/final pressure drop
 10. Actual/final flow rate

11. Station calibrated setting

J. Air Distribution Tests:

1. Air terminal number
2. Room number/location
3. Terminal type
4. Terminal size
5. Area factor
6. Design velocity
7. Design air flow
8. Test (final) velocity
9. Test (final) air flow
10. Percent of design air flow

END OF SECTION

SECTION 23 07 13

DUCT INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Duct insulation.
- B. Duct Liner.
- C. Insulation jackets.
- D. Adhesive, tie wires, tape

1.2 RELATED REQUIREMENTS

- A. Section 23 01 00 - General HVAC Provisions.
- B. Section 23 05 53 - Identification for HVAC Piping and Equipment.
- C. Section 23 31 00 - Ducts: Glass fiber ducts.

1.3 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 C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2024.
- D. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014 (Reapproved 2019).
- E. ASTM C916 - Standard Specification for Adhesives for Duct Thermal Insulation; 2020.
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.
- G. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2024a.

- H. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.
- I. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association; 2006.
- J. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.
- K. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.4 SUBMITTALS

- A. See Section 23 01 00 - General HVAC Provisions, for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- C. Manufacturer's Instructions: Indicate installation procedures necessary to ensure acceptable workmanship and that installation standards will be achieved.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section with not less than five years of documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with a minimum five years of documented experience and approved by manufacturer.
- C. Perform work at ambient and equivalent temperatures as recommended by the adhesive manufacturer. Work shall be performed only by mechanics who regularly perform this type of work only.

1.6 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.

1.7 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

2.1 REQUIREMENTS FOR ALL PRODUCTS OF THIS SECTION

- A. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84, NFPA 255, or UL 723.
- B. Adhesives to be waterproof.
- C. Recovering jackets 6 ounce per square yard canvas attached with a lagging fire retardant adhesive. Install on exposed ductwork insulation. Cover thoroughly with several coats of sizing.

2.2 GLASS FIBER, FLEXIBLE

- A. Manufacturer:
 - 1. Knauf Insulation.
 - 2. Johns Manville Corporation.
 - 3. Owens Corning Corp.
 - 4. CertainTeed Corporation.
 - 5. Substitutions: See Section 23 01 00 - General HVAC Provisions.
- B. Insulation: ASTM C553; flexible, noncombustible blanket.
 - 1. 'K' value: 0.36 at 75 degrees F, when tested in accordance with ASTM C518.
 - 2. Maximum Service Temperature: 450 degrees F.
 - 3. Maximum Water Vapor Sorption: 5.0 percent by weight.
 - 4. Maximum Moisture Absorption: 0.20 percent by volume.
- C. Vapor Barrier Jacket:
 - 1. Kraft paper with glass fiber yarn and bonded to aluminized film.
 - 2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E 96/E 96M.
 - 3. Moisture Vapor Transmission: ASTM E 96; 0.02 perm.

- 4. Secure with pressure sensitive tape.
- D. Vapor Barrier Tape:
 - 1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.
- E. Outdoor Vapor Barrier Mastic:
 - 1. Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.
- F. Tie Wire: Annealed steel, 16 gage.

2.3 GLASS FIBER, RIGID

- A. Manufacturer:
 - 1. Knauf Insulation.
 - 2. Johns Manville Corporation.
 - 3. Owens Corning Corp.
 - 4. CertainTeed Corporation.
 - 5. Substitutions: See Section 23 01 00 - General HVAC Provisions.
- B. Insulation: ASTM C612; rigid, noncombustible blanket.
 - 1. 'K' value: 0.24 at 75 degrees F, when tested in accordance with ASTM C518.
 - 2. Maximum service temperature: 450 degrees F.
 - 3. Maximum Water Vapor Sorption: 5.0 percent.
 - 4. Maximum Moisture Absorption: 0.20 percent by volume.
 - 5. Maximum Density: 8.0 lb/cu ft.
 - 6. Density: 3.0 lb/cu ft.
- C. Vapor Barrier Jacket:
 - 1. Kraft paper with glass fiber yarn and bonded to aluminized film.
 - 2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E 96/E 96M.
 - 3. Moisture vapor transmission: ASTM E 96; 0.04 perm.

4. Secure with pressure sensitive tape.
- D. Vapor Barrier Tape:
 1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.
- E. Indoor Vapor Barrier Finish:
 1. Cloth: Untreated; 9 oz/sq yd weight, glass fabric.
 2. Vinyl emulsion type acrylic, compatible with insulation, white color.

2.4 JACKETS

- A. Canvas Jacket: UL listed 6 oz/sq yd plain weave cotton fabric treated with dilute fire retardant lagging adhesive.
 1. Lagging Adhesive:
 - a. Compatible with insulation.
- B. Mineral Fiber (Outdoor) Jacket: Asphalt impregnated and coated sheet, 50 lb/square.
- C. Aluminum Jacket: ASTM B209 (ASTM B209M).
 1. Thickness: 0.016 inch sheet.
 2. Finish: Embossed.
 3. Joining: Longitudinal slip joints and 2 inch laps.
 4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
 5. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.

2.5 DUCT LINER

- A. Manufacturers:
 1. Knauf Insulation.
 2. Johns Manville Corporation.
 3. Owens Corning Corp.
 4. CertainTeed Corporation.

5. Substitutions: See Section 23 01 00 - General HVAC Provisions. .
- B. Insulation: Non-corrosive, incombustible glass fiber complying with ASTM C1071; semi-rigid duct liner; impregnated surface and edges coated with poly vinyl acetate polymer, acrylic polymer, or black composite.
 1. Fungi Resistance: ASTM G21.
 2. Substitutions: See Section 23 01 00 - General HVAC Provisions.
 3. Apparent Thermal Conductivity: Maximum of 0.31 at 75 degrees F.
 4. Service Temperature: Up to 250 degrees F.
 5. Rated Velocity on Coated Air Side for Air Erosion: 5,000 fpm, minimum.
 6. Minimum Noise Reduction Coefficients:
 - a. 1/2 inch Thickness: 0.30.
 - b. 1 inch Thickness: 0.45.
 - c. 1-1/2 inches Thickness: 0.60.
 - d. 2 inch Thickness: 0.70.
- C. Adhesive: Waterproof, fire-retardant type, ASTM C916.
- D. Liner Fasteners: Galvanized steel, welded with press-on head.

2.6 MATERIALS

- A. External Insulation
 1. Concealed Round and Rectangular Ducts: Flexible glass fiber insulation, minimum installed R-value of R-6, with factory applied reinforced aluminum foil vapor barrier for systems conveying air at less than room temperature.
- B. Internal Insulation
 1. Rectangular Ducts and Plenums: Internal duct insulation shall be semi-rigid duct liner board manufactured from glass fibers bonded with a thermosetting resin. Insulation shall be coated on one side with a fire resistant black coating and shall have a minimum installed R-value of R-6. Duct liner shall be installed by cutting side pieces of insulation to lap both top and bottom sections for maximum support. Install side pieces first. Side pieces and bottom piece shall be attached with 4" strips of adhesive at one foot intervals. Top section of insulation shall be

attached with Stick-Klip fasteners secured by Miracle adhesive spaced one fastener per two square feet of insulation. Edges of insulation shall be butted with adhesive to insure a tight joint and provide a smooth surface.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that ducts have been tested before applying insulation materials.
- B. Verify that surfaces are clean, foreign material removed, and dry.
- C. Finish with system at ambient conditions.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NAIMA National Insulation Standards.
- C. Insulated ducts conveying air below ambient temperature:
 - 1. Provide insulation with vapor barrier jackets.
 - 2. Finish with tape and vapor barrier jacket.
 - 3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
 - 4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.
- D. Insulated ducts conveying air above ambient temperature:
 - 1. Provide with or without standard vapor barrier jacket.
 - 2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.
- E. Ducts Exposed in Mechanical Equipment Rooms or Finished Spaces : Finish with canvas jacket sized for finish painting.
- F. Duct and Plenum Liner Application:
 - 1. Adhere insulation with adhesive for 100 percent coverage.
 - 2. Secure insulation with welded mechanical liner fasteners. Refer to SMACNA HVAC Duct Construction Standards - Metal and Flexible and NAIMA Fibrous Glass Duct Liner Standards (latest edition) for spacing.

3. Seal and smooth joints. Seal and coat transverse joints.
4. Seal liner surface penetrations with adhesive.
5. Duct dimensions indicated are net inside dimensions required for air flow.
Increase duct size to allow for insulation thickness.

3.3 SCHEDULES

- A. Exhaust Ducts: Externally wrap.
- B. Outside Air Intake Ducts:
 1. Round: Externally insulate with 2-inch thick insulation, minimum installed R-value of R-6.
 2. Rectangular: Internally insulate with 1-inch thick semi-rigid duct liner with adhesive and welded mechanical fasteners, minimum installed R-value of R-6.
- C. Plenums: Internally insulate with 1-inch thick insulation, minimum installed R-value of R-6.
- D. Concealed Supply Ducts:
 1. Round Duct: Externally insulate with 2-inch thick insulation, minimum installed R-value of R-6.
 2. Rectangular: Internally insulate with 1-inch thick, semi-rigid duct liner, minimum installed R-value of R-6, with adhesive and welded mechanical fasteners.
- E. Concealed Return Air Ducts and Plenums:
 1. Round: Externally insulate with 2-inch thick insulation, minimum installed R-value of R-6.
 2. Rectangular: Internally insulate with 1-inch thick, minimum installed R-value of R-6, semi-rigid duct liner with adhesive and welded mechanical fasteners.
 3. Plenums: Internally insulate with 1-inch thick, minimum installed R-value of R-6, semi-rigid duct liner with adhesive and welded mechanical fasteners.

END OF SECTION

SECTION 23 23 00

REFRIGERANT PIPING AND SPECIALTIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Piping.
- B. Refrigerant.
- C. Moisture and liquid indicators.
- D. Valves.
- E. Strainers.
- F. Check valves.
- G. Filter-driers.
- H. Solenoid valves.
- I. Expansion valves.

1.2 RELATED REQUIREMENTS

- A. Section 23 54 00 - Furnaces.
- B. Section 23 63 13 - Air Cooled Refrigerant Condensers.
- C. Section 23 81 27 - Small Split-System Heating and Cooling.
- D. Division 26 - Equipment Wiring: Electrical characteristics and wiring connections.

1.3 REFERENCE STANDARDS

- A. AHRI 710 - Performance Rating of Liquid-Line Driers; 2009.
- B. AHRI 750 - Thermostatic Refrigerant Expansion Valves; 2007.
- C. AHRI 760 - Performance Rating of Solenoid Valves for Use With Volatile Refrigerants; 2007.
- D. ASHRAE Std 15 - Safety Standard for Refrigeration Systems; 2024, with Errata (2025).

- E. ASHRAE Std 34 - Designation and Safety Classification of Refrigerants; 2024, with Addendum (2025).
- F. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1: Rules for Construction of Pressure Vessels; 2025, with Errata .
- G. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators; 2025.
- H. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes; 2024.
- I. ASME B31.5 - Refrigeration Piping and Heat Transfer Components; 2022.
- J. ASME B31.9 - Building Services Piping; 2025.
- K. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2024.
- L. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2020.
- M. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2019.

1.4 SUBMITTALS

- A. See Section 23 01 00 - General HVAC Provisions, for submittal procedures.
- B. Product Data: Provide general assembly of specialties, including manufacturers catalogue information. Provide manufacturers catalog data including load capacity.
- C. Shop Drawings: Indicate schematic layout of system, including equipment, critical dimensions, and sizes.
- D. Design Data: Submit design data indicating pipe sizing. Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers.
- E. Test Reports: Indicate results of leak test, acid test.
- F. Manufacturer's Installation Instructions: Indicate support, connection requirements, and isolation for servicing.
- G. Submit welders certification of compliance with ASME BPVC-IX.
- H. Project Record Documents: Record exact locations of equipment and refrigeration accessories on record drawings.

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- I. Maintenance Data: Include instructions for changing cartridges, assembly views, spare parts lists.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum three years of documented experience.
- B. Design piping system under direct supervision of a licensed hvac company experienced in design of this type of work and licensed in the state where the Project is located.

1.6 REGULATORY REQUIREMENTS

- A. Conform to ASME B31.9 for installation of piping system.
- B. Welding Materials and Procedures: Conform to ASME (BPV IX) .
- C. Welders Certification: In accordance with ASME (BPV IX).
- D. Products Requiring Electrical Connection: Listed and classified by UL, as suitable for the purpose indicated.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store piping and specialties in shipping containers with labeling in place.
- B. Protect piping and specialties from entry of contaminating material by leaving end caps and plugs in place until installation.
- C. Dehydrate and charge components such as piping and receivers, seal prior to shipment, until connected into system.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Where more than one piping system material is specified ensure system components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.
- B. Provide pipe hangers and supports in accordance with ASME B31.5 unless indicated otherwise.
- C. Liquid Indicators:

1. Use line size liquid indicators in main liquid line leaving condenser.
 2. If receiver is provided, install in liquid line leaving receiver.
 3. Use line size on leaving side of liquid solenoid valves.
- D. Valves:
1. Use service valves on suction and discharge of compressors.
 2. Use gage taps at compressor inlet and outlet.
 3. Use gage taps at hot gas bypass regulators, inlet and outlet.
 4. Use check valves on compressor discharge.
 5. Use check valves on condenser liquid lines on multiple condenser systems.
- E. Refrigerant Charging (Packed Angle) Valve: Use in liquid line between receiver shut-off valve and expansion valve.
- F. Strainers:
1. Use line size strainer upstream of each automatic valve.
 2. Where multiple expansion valves with integral strainers are used, use single main liquid line strainer.
 3. On steel piping systems, use strainer in suction line.
 4. Use shut-off valve on each side of strainer.
- G. Filter-Driers:
1. Use a filter-drier on suction line just ahead of compressor.
 2. Use sealed filter-driers in lines smaller than 1/2 inch outside diameter.
 3. Use sealed filter-driers in low temperature systems.
 4. Use sealed filter-driers in systems utilizing hermetic compressors.
 5. Use replaceable core filter-driers in lines of 3/4 inch outside diameter or greater.
 6. Use filter-driers for each solenoid valve.
- H. Solenoid Valves:

1. Use in liquid line of systems operating with single pump-out or pump-down compressor control.
2. Use in liquid line of single or multiple evaporator systems.
3. Use in oil bleeder lines from flooded evaporators to stop flow of oil and refrigerant into the suction line when system shuts down.

I. Receivers:

1. Use on systems with long piping runs.

2.2 PIPING

A. Copper Tube to 7/8 inch OD: ASTM B88 (ASTM B88M), Type K (A), annealed.

1. Fittings: ASME B16.26 cast copper.
2. Joints: Flared.

B. Pipe Supports and Anchors:

1. Conform to ASME B31.5.
2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Carbon steel adjustable swivel, split ring.
3. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
6. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
7. Vertical Support: Steel riser clamp.
8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
9. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
10. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.

11. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.3 REFRIGERANT

- A. Refrigerant: As defined in ASHRAE Std 34.

1. R-32.
2. R-454B.

2.4 MOISTURE AND LIQUID INDICATORS

- A. Manufacturers:

1. Henry Technologies.
2. Parker Hannifin/Refrigeration and Air Conditioning.
3. Sporlan Valve Company.
4. Substitutions: See Section 23 01 00 - General HVAC Provisions.

- B. Indicators: Single port type, UL listed, with copper or brass body, flared or solder ends, sight glass, color coded paper moisture indicator and plastic cap; for maximum temperature of 200 degrees F and maximum working pressure of 460 psi.

2.5 VALVES

- A. Manufacturers:

1. Hansen Technologies Corporation.
2. Henry Technologies.
3. Danfoss Automatic Controls.
4. Substitutions: See Section 23 01 00 - General HVAC Provisions.

- B. Diaphragm Packless Valves:

1. UL listed, globe or angle pattern, forged brass body and bonnet, phosphor bronze and stainless steel diaphragms, rising stem and handwheel, stainless steel spring, nylon seat disc, solder or flared ends, with positive backseating; for maximum working pressure of 500 psi and maximum temperature of 275 degrees F.

- C. Packed Angle Valves:

1. Forged brass , forged brass seal caps with copper gasket, rising stem and seat , molded stem packing, solder or flared ends; for maximum working pressure of 500 psi and maximum temperature of 275 degrees F.

D. Ball Valves:

1. Two piece forged brass body with teflon ball seals and copper tube extensions, brass seal cap, chrome plated ball, stem with neoprene ring stem seals; for maximum working pressure of 500 psi and maximum temperature of 325 degrees F.

E. Service Valves:

1. Forged brass body with copper stubs, brass caps, removable valve core, integral ball check valve, flared or solder ends, for maximum pressure of 500 psi.

2.6 STRAINERS

A. Straight Line or Angle Line Type:

1. Brass or steel shell, steel cap and flange, and replaceable cartridge, with screen of stainless steel wire or monel reinforced with brass; for maximum working pressure of 430 psi.

B. Straight Line, Non-Cleanable Type:

1. Steel shell, copper plated fittings, stainless steel wire screen, for maximum working pressure of 500 psi.

2.7 CHECK VALVES

A. Manufacturers:

1. Hansen Technologies Corporation.
2. Parker Hannifin/Refrigeration and Air Conditioning.
3. Sporlan Valve Company.
4. Substitutions: See Section 23 01 00 - General HVAC Provisions.

B. Globe Type:

1. Cast bronze or forged brass body, forged brass cap with neoprene seal, brass guide and disc holder, phosphor-bronze or stainless steel spring, teflon seat disc; for maximum temperature of 300 degrees F and maximum working pressure of 425 psi.

C. Straight Through Type:

1. Brass body and disc, phosphor-bronze or stainless steel spring, neoprene seat; for maximum working pressure of 500 psi and maximum temperature of 250 degrees F.

2.8 FILTER-DRIERS

A. Manufacturers:

1. Flow Controls Division Emerson Electric Co.
2. Parker Hannifin/Refrigeration and Air Conditioning.
3. Sporlan Valve Company.
4. Substitutions: See Section 23 01 00 - General HVAC Provisions.

B. Performance:

1. Flow Capacity - Liquid Line: As indicated in schedule, minimum, rated in accordance with AHRI 710.
2. Flow Capacity - Suction Line: As indicated in schedule, minimum, rated in accordance with AHRI 730 (I-P).
3. Pressure Drop: 2 psi, maximum, when operating at full connected evaporator capacity.
4. Design Working Pressure: 500 psi, minimum.

C. Cores: Molded or loose-fill molecular sieve desiccant compatible with refrigerant, activated alumina, and filtration to 40 microns; of construction that will not pass into refrigerant lines.

D. Construction: UL listed.

1. Replaceable Core Type: Steel shell with removable cap.
2. Sealed Type: Copper shell.
3. Connections: As specified for applicable pipe type.

2.9 SOLENOID VALVES

A. Manufacturers:

1. Flow Controls Division of Emerson Electric.

2. Parker Hannifin/Refrigeration and Air Conditioning.
 3. Sporlan Valve Company.
 4. Substitutions: See Section 23 01 00 - General HVAC Provisions.
- B. Valve: AHRI 760, pilot operated, copper or brass body and internal parts, synthetic seat, stainless steel stem and plunger assembly (permitting manual operation in case of coil failure), integral strainer, with flared, solder, or threaded ends; for maximum working pressure of 500 psi.
- C. Coil Assembly: UL listed, replaceable with molded electromagnetic coil, moisture and fungus proof, with surge protector and color coded lead wires, integral junction box.

2.10 EXPANSION VALVES

- A. Manufacturers:
1. Flow Controls Division of Emerson Electric.
 2. Parker Hannifin/Refrigeration and Air Conditioning.
 3. Sporlan Valve Company.
 4. Substitutions: See Section 23 01 00 - General HVAC Provisions.
- B. Angle or Straight Through Type: AHRI 750; design suitable for refrigerant, brass body, internal or external equalizer, mechanical pressure limit (maximum operating pressure MOP feature), adjustable superheat setting, replaceable inlet strainer, with replaceable capillary tube and remote sensing bulb.
- C. Selection: Evaluate refrigerant pressure drop through system to determine available pressure drop across valve. Select valve for maximum load at design operating pressure and minimum 10 degrees F superheat. Select to avoid being undersized at full load and excessively oversized at part load.

PART 3 EXECUTION

3.1 PREPARATION

- A. Ream pipe and tube ends. Remove burrs.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.2 INSTALLATION

- A. Install refrigeration specialties in accordance with manufacturer's instructions.
- B. Route piping in orderly manner, with plumbing parallel to building structure, and maintain gradient.
- C. Install piping to conserve building space and avoid interference with use of space.
- D. Group piping whenever practical at common elevations and locations. Slope piping one percent in direction of oil return.
- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- F. Inserts:
 - 1. Provide inserts for placement in concrete formwork.
 - 2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
 - 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
 - 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
 - 5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.
- G. Pipe Hangers and Supports:
 - 1. Install in accordance with ASME B31.5.
 - 2. Support horizontal piping as scheduled.
 - 3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 - 4. Place hangers within 12 inches of each horizontal elbow.
 - 5. Support vertical piping at every 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.
- H. Arrange piping to return oil to compressor. Provide traps and loops in piping, and provide double risers as required. Slope horizontal piping 0.40 percent in direction of flow.
- I. Provide clearance for installation of insulation and access to valves and fittings.
- J. Provide access to concealed valves and fittings.
- K. Flood piping system with nitrogen when brazing.
- L. Where pipe support members are welded to structural building frame, brush clean, and apply one coat of zinc rich primer to welding.
- M. Prepare unfinished pipe, fittings, supports, and accessories ready for finish painting.
- N. Insulate piping and equipment; refer to Section and Section 23 07 16.
- O. Follow ASHRAE Std 15 procedures for charging and purging of systems and for disposal of refrigerant.
- P. Provide replaceable cartridge filter-driers, with isolation valves and valved bypass.
- Q. Locate expansion valve sensing bulb immediately downstream of evaporator on suction line.
- R. Provide external equalizer piping on expansion valves with refrigerant distributor connected to evaporator.
- S. Install flexible connectors at right angles to axial movement of compressor, parallel to crankshaft.
- T. Fully charge completed system with refrigerant after testing.
- U. Provide electrical connection to solenoid valves. Refer to Division 26.

3.3 FIELD QUALITY CONTROL

- A. Test refrigeration system in accordance with ASME B31.5.
- B. Pressure test system with dry nitrogen to 200 psi. Perform final tests at 27 inches vacuum and 200 psi using electronic leak detector. Test to no leakage.

3.4 SCHEDULES

- A. Hanger Spacing for Copper Tubing.

1. 1/2 inch, 5/8 inch, and 7/8 inch OD: Maximum span, 5 feet; minimum rod size, 1/4 inch.
2. 1-1/8 inch OD: Maximum span, 6 feet; minimum rod size, 1/4 inch.
3. 1-3/8 inch OD: Maximum span, 7 feet; minimum rod size, 3/8 inch.
4. 1-5/8 inch OD: Maximum span, 8 feet; minimum rod size, 3/8 inch.
5. 2-1/8 inch OD: Maximum span, 8 feet; minimum rod size, 3/8 inch.
6. 2-5/8 inch OD: Maximum span, 9 feet; minimum rod size, 3/8 inch.
7. 3-1/8 inch OD: Maximum span, 10 feet; minimum rod size, 3/8 inch.
8. 3-5/8 inch OD: Maximum span, 11 feet; minimum rod size, 1/2 inch.
9. 4-1/8 inch OD: Maximum span, 12 feet; minimum rod size, 1/2 inch.

END OF SECTION

SECTION 23 31 00

DUCTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Metal ductwork.
- B. Duct cleaning.

1.2 RELATED REQUIREMENTS

- A. Section 23 07 13 - Duct Insulation: External insulation and duct liner.
- B. Section 23 33 00 - Duct Accessories.
- C. Section 23 33 30 - Air Duct Sealants.
- D. Section 23 37 00 - Air Outlets and Inlets.
- E. Section 23 05 93 - Testing, Adjusting, and Balancing for HVAC.

1.3 REFERENCE STANDARDS

- A. ASHRAE (FUND) - ASHRAE Handbook - Fundamentals; Most Recent Edition Cited by Referring Code or Reference Standard.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- C. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2015b.
- D. ASTM A480/A480M - Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip; 2015.
- E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2025.
- F. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2023.

- G. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- H. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.
- I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.
- J. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements; 2018, with Editorial Revision (2020).
- K. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry; 2018, with Editorial Revision (2020).
- L. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2017, with Editorial Revision (2020).
- M. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.
- N. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2024.
- O. SMACNA (LEAK) - HVAC Air Duct Leakage Test Manual; Sheet Metal and Air Conditioning Contractors' National Association; 2012, 2nd Edition.
- P. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.
- Q. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors; Current Edition, Including All Revisions.

1.4 DEFINITIONS

- A. Duct Sizes: Duct sizes indicated on drawings are inside clear dimensions.
- B. Low Pressure: Static pressure in duct less than 1" WG and velocities less than 2000 fpm (10 meters/second).
- C. Medium Pressure: Static pressure between 1 and 6 inches WG and velocities between 1500 and 3000 fpm.

1.5 SUBMITTALS

- A. See Section 23 01 00 - General HVAC Provisions, for submittal procedures.
- B. Product Data: Provide data for duct materials, duct liner, and duct connections.

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- C. Shop Drawings: Indicate duct fittings, particulars such as gages, sizes, welds, and configuration prior to start of work for all systems.
- D. Test Reports: Indicate pressure tests performed. Include date, section tested, test pressure, and leakage rate, following SMACNA (LEAK) - HVAC Air Duct Leakage Test Manual.
- E. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.
- F. Confirm ductwork has been fabricated and installed in accordance with recommendations and SMACNA standards.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum five years of documented experience.
- B. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum five years of documented experience.

1.7 REGULATORY REQUIREMENTS

- A. Construct ductwork to NFPA 90A, NFPA 90B, and NFPA 96, standards.

1.8 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

2.1 MATERIALS

- A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G90/Z275 coating.
- B. Aluminum for Ducts: ASTM B209 (ASTM B209M); aluminum sheet, alloy 3003-H14. Aluminum Connectors and Bar Stock: Alloy 6061-T651 or of equivalent strength.
- C. Stainless Steel for Ducts: ASTM A 240/A 240M, Type 316.

- D. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
 - 1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
 - 2. VOC Content: Not more than 250 g/L, excluding water.
 - 3. Surface Burning Characteristics: Flame spread of zero, smoke developed of zero, when tested in accordance with ASTM E84.
 - 4. For Use With Flexible Ducts: UL labeled.
 - 5. Products:
 - a. Seal all joints and seams on sheet metal supply, return, makeup air and exhaust ductwork with "Hardcast" type DT sealing tape and type FTA adhesive or "Hardcast" iron grip 601 duct sealant installed in strict accordance with manufacturer's instructions. Clean all dirt, oil, moisture, etc., before applying adhesive. Duct tape, UL listed or not, is not acceptable.
 - b. Substitutions: See Section 23 01 00 - General HVAC Provisions.
- E. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.
- F. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
 - 1. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
 - 2. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.
 - 3. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
 - 4. Masonry Screw Type Anchors: Complying with ICC-ES AC106.
 - 5. Other Types: As required.

2.2 DUCT ASSEMBLIES

- A. All Ducts: Galvanized steel, unless otherwise indicated.
- B. Low Pressure Supply (Heating Systems): 1 inch w.g. pressure class, galvanized steel.
- C. Medium and High Pressure Supply: 3 inch w.g. pressure class, galvanized steel.

- D. Return and Relief: 1 inch w.g. pressure class, galvanized steel.
- E. General Exhaust: 1 inch w.g. pressure class, galvanized steel.
- F. Outside Air Intake: 1 inch w.g. pressure class, galvanized steel.
- G. Combustion Air: 1 inch w.g. pressure class, galvanized steel.

2.3 DUCTWORK FABRICATION

- A. Fabricate and support in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
- B. No variation of duct configuration or size permitted except by written permission. Size round duct installed in place of rectangular ducts in accordance with ASHRAE Handbook - Fundamentals.
- C. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- D. Provide air foil turning vanes when rectangular elbows must be used.
- E. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- F. Fabricate continuously welded round duct fittings two gages heavier than duct gages indicated in SMACNA Standard. Joints shall be minimum 4 inch cemented slip joint, brazed or electric welded. Prime coat welded joints.
- G. Provide standard 45 degree lateral wye takeoffs unless otherwise indicated where 90 degree conical tee connections may be used.
- H. Lap metal duct in direction of air flow. Hammer down edges and slips to leave smooth duct interior.
- I. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide duct transition to louver area. Use same material as duct, painted black on exterior side; seal to louver frame and duct.
- J. Size round ducts installed in place of rectangular ducts from ASHRAE Table of Equivalent Rectangular and Round Ducts. No variation of duct configuration or sizes permitted except by written permission.

- K. Rigidly construct metal ducts with joints mechanically tight, substantially airtight, braced and stiffened so as not to breathe, rattle, vibrate or sag. Caulk duct joints and connections with sealant as ducts are being assembled.

2.4 MANUFACTURED DUCTWORK AND FITTINGS

- A. Flexible Ducts: Two ply vinyl film supported by helically wound spring steel wire.
 - 1. Insulation: Fiberglass insulation with aluminized fiberglass scrim vapor barrier film.
 - 2. Pressure Rating: 6 inches WG positive and 1.0 inches WG negative.
 - 3. Maximum Velocity: 5000 fpm.
 - 4. Temperature Range: -10 degrees F to 160 degrees F.
 - 5. R-6.0 Formaldehyde free insulation.
 - 6. UL -181 (UL listed).
 - 7. Manufacturers:
 - a. Hart & Cooley.
 - b. Flex Master.
 - c. Substitutions: See Section 23 01 00 - General HVAC Provisions.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install, support, and seal ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- B. Install in accordance with manufacturer's instructions.
- C. Comply with safety standards NFPA 90A and NFPA 90B.
- D. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- E. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- F. Flexible Ducts: Connect to metal ducts with draw bands.

- G. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.
- H. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal cap with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.
- I. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- J. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with crimp in direction of air flow.
- K. Use double nuts and lock washers on threaded rod supports.
- L. Connect diffusers or light troffer boots to low pressure ducts with 5 feet maximum length of flexible duct held in place with strap or clamp.
- M. Connect flexible ducts to metal ducts per manufacturer's recommendations.
- N. At exterior wall louvers, seal duct to louver frame and install blank-out panels.
- O. Louver Fit-out:
 - 1. Provide blank-out panels sealing available area of wall-mounted exterior-faced louver when connected ductwork is smaller than actual louver free area, and duct outlet is smaller than the louver frame.
 - 2. Use the same duct material painted black on the exterior side, then seal louver frame and duct.
- P. Duct Insulation: Provide duct insulation in compliance with Section 23 07 13.
- Q. All round and rectangular duct installed in exposed areas shall be painted duct.

3.2 CLEANING

- A. If determined by the Architect and/or Engineer, that during construction the duct systems were not adequately protected and dirt/debris was allowed to enter the installed ductwork, then it will be required by the HVAC contractor for the duct system to be cleaned. If required, clean duct systems with high power vacuum machines. Protect equipment that could be harmed by excessive dirt with filters, or bypass during cleaning. Provide adequate access into ductwork for cleaning purposes.

END OF SECTION

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SECTION 23 33 00

DUCT ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Air turning devices/extractors.
- B. Backdraft dampers - metal.
- C. Duct access doors.
- D. Duct test holes.
- E. Fire dampers.
- F. Flexible duct connections.
- G. Volume control dampers.

1.2 RELATED REQUIREMENTS

- A. Section 23 31 00 - Ducts.
- B. Division 26 - Electrical: Electrical characteristics and wiring connections.

1.3 REFERENCE STANDARDS

- A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.
- B. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.
- C. UL 33 - Safety Heat Responsive Links for Fire-Protection Service; Current Edition, Including All Revisions.

1.4 SUBMITTALS

- A. See Section 23 01 00 - General HVAC Provisions, for submittal procedures.
- B. Project Record Drawings: Record actual locations of access doors, volume dampers, test holes, and fire dampers.
- C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

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1. Extra Fusible Links: Two of each type and size.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum five years of documented experience.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect dampers from damage to operating linkages and blades.

PART 2 PRODUCTS

2.1 AIR TURNING DEVICES/EXTRACTORS

- A. Manufacturers:
 1. Krueger.
 2. PCI Industries, Inc; Pottorff Brand.
 3. Ruskin Company.
 4. Titus.
 5. Substitutions: See Section 23 01 00 - General HVAC Provisions.
- B. Multi-blade device with blades aligned in short dimension; steel or aluminum construction; with individually adjustable blades, mounting straps.
- C. Multi-blade device with radius blades attached to pivoting frame and bracket, steel or aluminum construction, with worm drive mechanism with removable key operator.

2.2 BACKDRAFT DAMPERS - METAL

- A. Manufacturers:
 1. Louvers & Dampers, Inc.
 2. Nailor Industries Inc.
 3. PCI Industries, Inc; Pottorff Brand.
 4. Ruskin Company.

5. Substitutions: See Section 23 01 00 - General HVAC Provisions.

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

2.3 DUCT ACCESS DOORS

A. Manufacturers:

- 1. Nailor Industries Inc.
- 2. Ruskin Company.
- 3. Greenheck Fan Corporation.
- 4. SEMCO Incorporated.

5. Substitutions: See Section 23 01 00 - General HVAC Provisions.

B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.

C. Fabrication: Rigid and close-fitting of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ducts, install minimum 1 inch thick insulation with sheet metal cover.

- 1. Less Than 12 inches Square: Secure with sash locks.
- 2. Up to 18 inches Square: Provide two hinges and two sash locks.
- 3. Up to 24 x 48 inches: Three hinges and two compression latches with outside and inside handles.
- 4. Larger Sizes: Provide an additional hinge.

D. Access doors with sheet metal screw fasteners are not acceptable.

2.4 DUCT TEST HOLES

A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

- B. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

2.5 FIRE DAMPERS

- A. Manufacturers:
 - 1. Louvers & Dampers, Inc.
 - 2. Nailor Industries Inc.
 - 3. Ruskin Company.
 - 4. Greenheck Fan Corporation.
 - 5. Substitutions: See Section 23 01 00 - General HVAC Provisions.
- B. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.
- C. Ceiling Dampers: Galvanized steel, 22 gage frame and 16 gage flap, two layers 0.125 inch ceramic fiber on top side and one layer on bottom side for round flaps, with locking clip.
- D. Horizontal Dampers: Galvanized steel, 22 gage frame, stainless steel closure spring, and lightweight, heat retardant non-asbestos fabric blanket.
- E. 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.
- F. Multiple Blade Dampers: 16 gage galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, 1/8 x 1/2 inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock.
- G. Curtain Type Dampers: Galvanized steel with interlocking blades. Provide dynamic style dampers with stainless steel closure springs and latches for closure under air flow conditions. Configure with blades out of air stream.
- H. Fusible Links: UL 33, separate at 160 degrees F with adjustable link straps for combination fire/balancing dampers.

2.6 FLEXIBLE DUCT CONNECTIONS

- A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
- B. Connector: Fabric crimped into metal edging strip.

1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz per sq yd.
 - a. Net Fabric Width: Approximately 3 inches wide.
2. Metal: 3 inches wide, 24 gage thick galvanized steel.

2.7 VOLUME CONTROL DAMPERS

A. Manufacturers:

1. Louvers & Dampers, Inc.
2. Nailor Industries Inc.
3. Ruskin Company.
4. Greenheck Fan Company.
5. Jer-Air Manufacturing.
6. United Enertech.
7. Substitutions: See Section 23 01 00 - General HVAC Provisions.

B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.

C. Single Blade Dampers: Fabricate for duct sizes up to 6 x 30 inch.

1. Fabricate for duct sizes up to 6 x 30 inch.
2. Blade: 24 gage, minimum.

D. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 x 72 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.

1. Blade: 18 gage, minimum.

E. End Bearings: Except in round ducts 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon or sintered bronze bearings.

F. Quadrants:

1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.

2. On insulated ducts mount quadrant regulators on minimum 2-inch stand-off mounting brackets, bases, or adapters.
3. Where rod lengths exceed 30 inches provide regulator at both ends.

2.8 MISCELLANEOUS PRODUCTS

- A. Duct Opening Closure Film: Mold-resistant, self-adhesive film to keep debris out of ducts during construction.
 1. Thickness: 2 mils.
 2. High tack water based adhesive.
 3. UV stable light blue color.
 4. Elongation Before Break: 325 percent, minimum.

PART 3 EXECUTION

3.1 PREPARATION

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

3.2 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA HVAC Duct Construction Standards - Metal and Flexible. Refer to Section 23 31 00 for duct construction and pressure class.
- B. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.
- C. Provide duct access doors for inspection and cleaning before and after filters, coils, fans and elsewhere as indicated. Provide minimum 8 x 8 inch size for hand access, size for shoulder access, and as indicated. Provide 4 x 4 inch for balancing dampers only. Review locations prior to fabrication.
- D. Provide duct test holes where indicated and required for testing and balancing purposes.
- E. Provide fire dampers at locations indicated, where ducts and outlets pass through fire rated components, and where required by Authorities Having Jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.
- F. 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 duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

END OF SECTION

SECTION 23 33 30

AIR DUCT SEALANTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Air duct sealants for permanently sealing fabricated joints and seams of HVAC air ducts and thermal insulation.
- B. Reinforcing membrane for sealants.

1.2 RELATED SECTIONS

- A. Section 23 07 13 - Duct Insulation.
- B. Section 23 31 00 - HVAC Ducts and Casings.
- C. Section 23 33 00 - Duct Accessories.

1.3 REFERENCES

- A. ASTM D 1668 - Standard Specification for Glass Fabrics (Woven and Treated) for Roofing and Waterproofing; 1995.
- B. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2005.
- C. ASTM E 96/E 96M - Standard Test Methods for Water Vapor Transmission of Materials; 2005.
- D. UL 181A - Closure Systems for Use with Rigid Air Ducts and Air Connectors; Underwriters Laboratories Inc.; 2005.
- E. UL 181B - Closure Systems for Use with Flexible Air Ducts and Air Connectors; Underwriters Laboratories Inc.; 2005.

1.4 SUBMITTALS

- A. See Section 23 01 00 - General HVAC Provisions, for submittal procedures.
- B. Product Data: Manufacturer's product data, including physical properties and application instructions.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer and material.
- B. Store materials in accordance with manufacturer's instructions. Protect from freezing.
 - 1. Storage Temperature: 40 to 100 degrees F.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Do not apply below 35 degrees F. or above 120 degrees F.
- B. Avoid high humidity.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer:
 - 1. Hardcast, Inc.
 - 2. RCD Corporation.
- B. Substitutions: See Section 23 01 00 - General HVAC Provisions.
- C. Supply all products specified in this section from a single manufacturer.

2.2 AIR DUCT SEALANTS

- A. Low to High Velocity Air Duct Sealant: Non-toxic, water-based, fiber-reinforced adhesive-sealant; for permanently sealing fabricated joints and seams of sheet metal air ducts, UL 181 listed rigid fiberglass air ducts, UL 181 listed flexible air ducts, and thermal insulation; for repairing damaged and leaking air ducts; for sealing conditioned spaces from air infiltration.
 - 1. Type: Elastomeric terpolymer emulsion.
 - 2. Underwriters Laboratories Listed: UL 181A-M and UL 181B-M.
 - 3. Solids by Weight: 67 percent, plus or minus 2 percent.
 - 4. Weight per Gallon: 10.5 pounds, plus or minus 0.20 pounds.
 - 5. Wet Film Coverage: 100 linear feet per gallon at 1/16 inch thick by 3 inches wide.

6. Consistency: Thixotropic, non-sagging.
 7. Adhesive Cure: 72 hours at 50 percent humidity and 70 degrees F.
 8. Service Temperature Limits: Minus 10 degrees to 180 degrees F.
 9. Water Vapor Transmission Rate: 0.6157 perms in accordance with ASTM E 96.
 10. Flame Spread Index: Not greater than 5, when tested in accordance with ASTM E 84.
 11. Smoke Developed Index: Zero, when tested in accordance with ASTM E 84.
- B. Low to High Velocity Air Duct Sealant: Hardcast Iron Grip 601 non-toxic, water-based, adhesive-sealant; for permanently sealing fabricated joints and seams of sheet metal air ducts, UL 181 listed rigid fiberglass air ducts, UL 181 listed flexible air ducts, and thermal insulation; for repairing damaged and leaking air ducts; for sealing conditioned spaces from air infiltration.
1. Type: Elastomeric terpolymer emulsion.
 2. Underwriters Laboratories Listed: UL 181A-M and UL 181B-M.
 3. Solids by Weight: 70 percent, plus or minus 2 percent.
 4. Wet Film Coverage: 320 linear feet per gallon at 20 mil thick by 3 inches wide.
 5. Consistency: Thixotropic, non-sagging.
 6. Adhesive Cure: 48 hours at 50 percent humidity and 70 degrees F.
 7. Flame Spread Index: Not greater than 5, when tested in accordance with UL-723.
 8. Smoke Developed Index: Zero, when tested in accordance with UL-723.
- C. Reinforcing Membrane: RCD "Glasscoat" inorganic woven fiberglass reinforcing membrane; conforming to irregular surfaces for sealing and coating thermal insulation, air ducts, return air plenums, equipment, vessels, pipes, and fittings.
1. ASTM D 1668, Type III.
 2. Nominal Dry Weight: 1.2 to 2.0 ounces per square yard.
 3. Saturated Weight: 1.6 to 2.6 ounces per square yard.
 4. Nominal Thread Count: 10 by 20.
 5. Breaking Strength, Saturated: 75 warp, 75 fill minimum.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to receive air duct sealants.
- B. Notify Architect of conditions that would adversely affect application of sealants. Do not proceed with application until unsatisfactory conditions are corrected.

3.2 SURFACE PREPARATION

- A. Prepare surfaces in accordance with manufacturer's instructions.
- B. Remove water, dirt, oil, grease, and corrosion from surfaces to receive air duct sealants.

3.3 APPLICATION

- A. Apply air duct sealants in accordance with manufacturer's instructions.
- B. Apply to sheet metal air ducts, UL 181 listed rigid fiberglass air ducts, UL 181 listed flexible air ducts, thermal insulation, and other surfaces where indicated.
- C. Do not thin or mix.
- D. Apply tack coat at rate of 2 gallons per 100 square feet.
- E. Embed reinforcing membrane into tack coat.
- F. Apply finish coat at rate of 2 gallons per 100 square feet.
- G. Allow drying time as follows:
 - 1. Minimum 6 hours when used outdoors if wet weather is imminent.
 - 2. Minimum 24 hours before using air duct system.
 - 3. Additional time as required by air temperature and humidity conditions.

END OF SECTION

SECTION 23 34 23

POWER VENTILATORS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Cabinet and Ceiling exhaust fans.

1.2 RELATED REQUIREMENTS

- A. Section 23 31 00 - HVAC Ducts and Casings.
- B. Section 23 33 00 - Duct Accessories: Backdraft dampers.
- C. Division 26 - Electrical: Equipment Wiring.

1.3 REFERENCE STANDARDS

- A. AMCA 261 - Directory of Products Licensed to Use the AMCA Certified Ratings Seal; Air Movement and Control Association International, Inc.; <http://www.amca.org/licenses/search.aspx>.
- B. AMCA 300 - Reverberation Room Methods of Sound Testing of Fans; 2024.
- C. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data; 2022.
- D. NEMA MG 00001 - Motors and Generators; 2024.
- E. UL 705 - Power Ventilators; Current Edition, Including All Revisions.

1.4 SUBMITTALS

- A. See Section 23 01 00 - General HVAC Provisions, for submittal procedures.
- B. Product Data: Provide data on fans and accessories including fan curves with specified operating point clearly plotted, power, RPM, sound power levels at rated capacity, and electrical characteristics and connection requirements.
- C. Manufacturer's Instructions: Indicate installation instructions.
- D. Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum five years of documented experience.
- B. Equivalent fan selections shall not increase or decrease motor horsepower, increase top speed by more than 10%, or increase inlet air velocity by more than 20% from that specified.
- C. Provide fans capable of accommodating static pressure variations of plus or minus 10%.
- D. Provide balanced variable for motors 15 horsepower and under.
- E. Statically and dynamically balance fans to eliminate vibration or noise transmission to occupied areas of the building.
- F. Provide belt guards on belt driven fans.
- G. Provide safety screen where inlet or outlet is exposed.
- H. Prime coat fan wheels and housing factory inside and outside. Prime coating on aluminum parts is not required.

1.6 FIELD CONDITIONS

- A. Permanent ventilators may be used for ventilation during construction only after ductwork is clean, filters are in place, bearings have been lubricated, and fan has been test run under observation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acme.
- B. Captive Aire.
- C. Greenheck.
- D. Loren Cook Company.
- E. Twin Cities Blower.
- F. Substitutions: See Section 23 01 00 - General HVAC Provisions.

2.2 POWER VENTILATORS - GENERAL

- A. Performance Ratings: Determined in accordance with AMCA 210 and bearing the AMCA Certified Rating Seal.
- B. Sound Ratings: AMCA 301, tested to AMCA 300, and bearing AMCA Certified Sound Rating Seal.
- C. Fabrication: Conform to AMCA 99.
- D. UL Compliance: UL listed and labeled, designed, manufactured, and tested in accordance with UL 705.
- E. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

2.3 CABINET AND CEILING EXHAUST FANS

- A. Performance Ratings:
 - 1. Refer to fan schedule on plan sheet for fan performance.
- B. Centrifugal Fan Unit: V-belt or direct driven with galvanized steel housing lined with acoustic insulation, resilient mounted motor, gravity backdraft damper in discharge.
- C. Disconnect Switch: Cord and plug in housing for thermal overload protected motor and factory mounted solid state speed controller.
- D. Grille: Molded white plastic.
- E. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheaves selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Hung Cabinet Fans:
 - 1. Install flexible connections specified in Section 23 33 00 between fan and ductwork. Ensure metal bands of connectors are parallel with minimum one inch flex between ductwork and fan while running.
- C. Provide sheaves required for final air balance.

- D. Provide backdraft dampers on outlet from ceiling exhauster fans and as indicated.

3.2 SCHEDULES

- A. Drawing Code: See plan Schedule.
- B. Air Flow Capacity: See plan Schedule.
- C. Static Pressure: See plan Schedule.
- D. Motor hp:
 - 1. Electrical Characteristics: See plan Schedule.
- E. Accessories:
 - 1. See plan Schedule.

END OF SECTION

SECTION 23 37 00

AIR OUTLETS AND INLETS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Registers/grilles.
 - 1. Ceiling-mounted, linear exhaust and return register/grilles.
 - 2. Ceiling-mounted, supply register/grilles.

- B. Louvers:

1.2 REFERENCE STANDARDS

- A. AHRI 880 (I-P) - Performance Rating of Air Terminals; 2017 (Reaffirmed 2023).
- B. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating; 2023.
- C. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Air Inlets; 2023.
- D. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.
- E. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2024.

1.3 SUBMITTALS

- A. See Section 23 01 00 - General HVAC Provisions, 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.

1.4 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.

1.5 QUALITY ASSURANCE

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

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Air Devices, Inc.
- B. Carnes Company HVAC.
- C. Krueger.
- D. Nailor.
- E. Price Industries.
- F. Ruskin.
- G. Titus.
- H. Tuttle-Bailey.
- I. Substitutions: See Section 23 01 00 - General HVAC Provisions.

2.2 CEILING SUPPLY REGISTERS/GRILLES

- A. Type: Streamlined and individually adjustable curved blades to discharge air along face of grille, 3/4" blade spacing with one-way deflection.
- B. Frame: 1-1/4 inch margin with countersunk screw mounting and gasket.
- C. Fabrication: Steel or aluminum as indicated on drawings with baked enamel finish.
- D. Color: As shown on drawings.
- E. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face, where indicated on plans.
- F. See Air Distribution Schedule on drawings for details and accessories.

2.3 CEILING RETURN REGISTERS/GRILLES

- A. Type: Streamlined blades, 1/2 inch minimum depth, 1/2 inch maximum spacing, with blades set at 45 degrees, horizontal face.

- B. Frame: 1-1/4 inch margin with countersunk screw mounting.
- C. Fabrication: Steel or aluminum as indicated on drawings with baked enamel finish.
- D. Color: As shown on the drawings.
- E. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face where not individually connected to exhaust fans, where indicated on plans.
- F. See Air Distribution Schedule on drawings for details and accessories.

2.4 LOUVERS

- A. Type: 6 inch deep with blades on 45 degree slope , heavy channel frame, 1/4 inch square mesh screen over exhaust and 1/4 inch square mesh screen over intake.
- B. Color: As shown on the drawings.
- C. Fabrication: 12 gage thick extruded aluminum, welded assembly, with finish as indicated on Air Distribution Schedule.
- D. Mounting: Furnish with exterior flat flange for installation.

2.5 COUNTER BALANCED BACKDRAFT DAMPERS

- A. Frame shall be 0.90 inch minimum wall thickness extruded aluminum with 12 gage galvanized steel structural brace at each corner.
- B. Blades shall be 0.025 inch minimum roll-formed aluminum with extruded vinyl blade edge seals mechanically locked into the blades.
- C. Blades shall include field adjustable, zinc plated steel counter balance weights to allow pressure relief at less than .05 inches water gage.
- D. Bearings shall be corrosive resistant, long life synthetic type for quiet operation.
- E. Linkage shall be 1/2 inch wide tiebar concealed in the frame.

PART 3 EXECUTION

3.1 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.

- C. Install diffusers to ductwork with air tight connection.
- D. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly.
- E. Paint ductwork visible behind air outlets and inlets matte black.
- F. Provide minimum 6" deep plenum box on back of all return and exhaust grilles.
- G. Install counter balanced backdraft dampers where indicated on the plans.

3.2 SCHEDULES

- A. Air Outlet and Inlet Schedule
 - 1. Drawing Code: Refer to plan schedule.
 - 2. Manufacturer: As scheduled on drawings.
 - 3. Model: As scheduled on drawings.
 - 4. Description: As scheduled on drawings.
 - 5. Finish: As scheduled on drawings.
 - 6. Service: As scheduled on drawings.
 - 7. Mounting: As scheduled on drawings.
 - 8. Accessories: As scheduled on drawings.

END OF SECTION

SECTION 23 40 00

AIR CLEANING DEVICES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Disposable, extended area panel filters.

1.2 RELATED REQUIREMENTS

- A. Division 26 - Electrical: Electrical characteristics and wiring connections.

1.3 REFERENCE STANDARDS

- A. AHRI 850 (I-P) - Performance Rating of Commercial and Industrial Air Filter Equipment; 2013 (Reaffirmed 2023).
- B. ASHRAE Std 52.1 - Gravimetric and Dust-Spot Procedures for Testing Air Cleaning Devices Used in General Ventilation for Removing Particulate Matter; American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.[CHOICE TEXT]
- C. ASHRAE Std 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size; 2025.

1.4 PERFORMANCE REQUIREMENTS

- A. Conform to Section 7.4.
 - 1. Dust Spot Efficiency: Plus or minus 5 percent.

1.5 SUBMITTALS

- A. See Section 23 01 00 - General HVAC Provisions, for submittal procedures.
- B. Product Data: Provide data on filter media, filter performance data, filter assembly and filter frames, dimensions and connection requirements.
- C. Shop Drawings: Indicate filter assembly and filter frames, dimensions and connection requirements.
- D. Manufacturer's Installation Instructions: Indicate assembly and change-out procedures.

- E. Operation and Maintenance Data: Include instructions for operation, changing, and periodic cleaning.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Filters: One additional set of each type and size of disposable panel filters to be installed at the time the building is conveyed to the Owner.

1.6 QUALITY ASSURANCE

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

PART 2 PRODUCTS

2.1 FILTER MANUFACTURERS

- A. American Filtration Inc.
- B. AAF International/American Air Filter.
- C. Camfil Farr Company.
- D. Substitutions: See Section 23 01 00 - General HVAC Provisions.

2.2 DISPOSABLE, EXTENDED AREA PANEL FILTERS

- A. Media: UL 900 Class 1, pleated, lofted, non-woven, reinforced cotton and synthetic fabric; supported and bonded to welded wire grid .
 - 1. Frame: Cardboard.
 - 2. Nominal size: to match equipment filter size requirements.
 - 3. Nominal thickness: 2 inches.
- B. Rating, per ASHRAE Std 52.1:
 - 1. Dust spot efficiency: MERV 8.
 - 2. Initial resistance at 500 FPM face velocity: 0.30 inch WG.
 - 3. Recommended final resistance: 0.9 inch WG.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install air cleaning devices in accordance with manufacturer's instructions.
- B. Prevent passage of unfiltered air around filters with felt, rubber, or neoprene gaskets.
- C. Do not operate fan system until filters (temporary or permanent) are in place. Replace temporary filters used during construction and testing, with clean set.

3.2 SCHEDULES

A. Air Filter Schedule

- 1. Refer to plan Equipment Schedule.

END OF SECTION

SECTION 23 54 00

FURNACES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Forced air furnaces.
- B. Controls.

1.2 RELATED REQUIREMENTS

- A. Section 23 01 00 - General HVAC Provisions.
- B. Section 23 07 13 - Duct Insulation: Duct Liner.
- C. Section 23 31 00 - Ducts.
- D. Section 23 51 23 - Breechings, Chimneys, and Stacks for Condensing Appliances.
- E. Section 23 62 13 - Air Cooled Condensing Units.
- F. Section 23 31 00 - Ducts.
- G. Division 26 - Electrical.

1.3 REFERENCE STANDARDS

- A. NFPA 54 - National Fuel Gas Code; 2024.
- B. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.

1.4 SUBMITTALS

- A. See Section 23 01 00 - General HVAC Provisions, for submittal procedures.
- B. Product Data: Provide rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.
- C. Shop Drawings: Indicate assembly, required clearances, and location and size of field connections.
- D. Manufacturer's Instructions: Indicate rigging, assembly, and installation instructions.
- E. Project Record Documents: Record actual locations of components and connections.

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- F. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.
- G. Warranty: Submit manufacturers warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum five years of documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum five years of documented experience and approved by manufacturer.

1.6 REGULATORY REQUIREMENTS

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

1.7 WARRANTY

- A. Provide five year manufacturers warranty for solid state ignition modules.
- B. Provide ten year manufacturers warranty for heat exchangers.
- C. Provide one year manufacturers parts warranty for entire unit.
- D. All warranties to begin at Date of Substantial Completion as accepted by the Owner.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Trane Inc.
- B. Daikin.
- C. York
- D. Rheem Manufacturing Company / RUUD.
- E. Substitutions: See Section 23 01 00- General HVAC Provisions.

2.2 GAS FIRED FURNACES

- A. Annual Fuel Utilization Efficiency (AFUE): 0.96 ("condensing").

- B. Units: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, heating element, controls, air filter, and accessories; wired for single power connection with control transformer.
1. Safety certified by CSA in accordance with ANSI Z21.47.
 2. Venting System: Direct.
 3. Combustion: Sealed
 4. Air Flow Configuration: Upflow.
 5. Air Flow Configuration: Refer to drawings.
 6. Heating: Natural gas fired.
 7. Accessories:
 - a. See schedule on drawings for required accessories.
- C. Performance:
1. Refer to Furnace Schedule. Gas heating capacities are sea level ratings.
- D. Cabinet: Steel with baked enamel finish, easily removed and secured access doors with safety interlock switches, glass fiber insulation with reflective liner.
- E. Primary Heat Exchanger:
1. Material: Hot-rolled steel
 2. Shape: Tubular type.
 3. Shape: _____
- F. Gas Burner:
1. Atmospheric type with adjustable combustion air supply,
 2. Gas valve provides 100 percent safety gas shut-off; 24 volt combining pressure regulation, safety pilot, manual set (On-Off), pilot filtration, automatic electric valve.
 3. Electronic pilot ignition, with hot surface igniter.
 4. Non-corrosive combustion air blower with permanently lubricated motor.
- G. Gas Burner Safety Controls:

1. Thermocouple sensor: Prevents opening of gas valve until pilot flame is proven and stops gas flow on ignition failure.
 2. Flame rollout switch: Installed on burner box and prevents operation.
 3. Vent safety shutoff sensor: Temperature sensor installed on draft hood and prevents operation, manual reset.
 4. Limit Control: Fixed stop at maximum permissible setting, de-energizes burner on excessive bonnet temperature, automatic resets.
- H. Supply Fan: Centrifugal type rubber mounted with direct or belt drive with adjustable variable pitch motor pulley.
- I. Motor: 1750 rpm single speed, permanently lubricated, hinge mounted.
- J. Air Filters: 2 inch thick glass fiber, disposable type arranged for easy replacement.
- K. Operating Controls
1. Supply Fan Control: Energize from bonnet temperature independent of burner controls, with adjustable timed off delay and fixed timed on delay, with manual switch for continuous fan operation.

2.3 THERMOSTATS

- A. Manufacturers:
1. Trane.
 2. Daikin.
 3. York.
 4. Rheem Manufacturing Company/RUUD.
 5. Substitutions: See Section: See Section 23 01 00 - General HVAC Provisions. .
- B. Room Thermostat: Low voltage, electric solid state microcomputer based room thermostat with remote sensor:
1. System selector switch (heat-off) and fan control switch (auto-on).
 2. Preferential rate control to minimize overshoot and deviation from setpoint.
 3. Set-up for four separate temperatures per day.

4. Instant override of setpoint for continuous or timed period from one hour to 31 days.
5. Short cycle protection.
6. Programming based on every day of the week.
7. Selection features including degree F or degree C display, 12 or 24 hour clock, keyboard disable, remote sensor, fan on-auto.
8. Battery replacement without program loss.
9. Thermostat Display:
 - a. Time of day.
 - b. Actual room temperature.
 - c. Programmed temperature.
 - d. Programmed time.
 - e. Duration of timed override.
 - f. Day of week.
 - g. System Mode Indication: Heating, cooling, fan auto, off, and on, auto or on, off.

PART 3 EXECUTION

3.1 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 located correctly.
- C. Verify that proper fuel supply and pressure are available for connection.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions and requirements of authorities having jurisdiction.
- B. Install furnace on insulated furnace stand.
- C. Install in accordance with NFPA 90A.

- D. Install gas fired furnaces in accordance with NFPA 54.
- E. Provide vent connections in accordance with NFPA 211.
- F. Pipe drain from humidifier to nearest drain.
- G. Mount air cooled condenser on 4 inch thick concrete pad. Allow minimum 6 inches on all sides of equipment.

3.3 SCHEDULES

A. Furnaces:

1. See Schedule on drawings.

END OF SECTION

SECTION 23 51 23

BREECHINGS, CHIMNEY, AND STACKS FOR CONDENSING APPLIANCES

PART 1- GENERAL

1.1 SUMMARY

A. Section Includes:

1. Venting for the removal of products of combustion for Category II, III, IV gas burning appliances

1.2 REFERENCES

A. Underwriters Laboratories (UL):

1. UL1738

B. National Fire Protection Association (NFPA):

1. NFPA 54 - National Fuel Gas Code

1.3 QUALITY ASSURANCE

A. Comply with NFPA 54

B. Must install duct in accordance to manufacturer's listings and installation instructions.

C. Components coming in contact with the products of combustion shall carry the appropriate UL or cUL listing, mark or label.

1.4 WARRANTY

- A. Condensing Appliance vent listed to UL1738 shall have a limited lifetime warranty to begin at the date of installation. Any portion of the vent repaired or replaced under warranty shall be warranted for the remainder of the original warranty period.

PART 2- PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Metal Fab, Inc.

B. Substitutions: See Section 23 01 00 - General HVAC Provisions.

2.2 LISTED VENTING FOR CONDENSING APPLIANCES

- A. The condensing appliance vent shall be double-wall for use with Category II natural draft appliances and Category III or IV positive pressure appliances.
- B. Maximum temperature shall not exceed 550° F (288° C).
- C. Vent shall be listed for an internal static pressure of 6" w.g. and tested to 15" w.g. for diameters 6-36 inches and 10" w.g. for diameters 3-5.
- D. Vent shall be constructed of a material tested to UL1738, .015 thickness for 3"-12" diameters, .024 thickness for 14" to 24" diameters, and .035 thickness for 26" to 36" diameters.
- E. Outer casing shall be constructed of aluminized steel of .018 thickness for 3"to 12" diameters, .024 thickness for 14" to 24" diameters, and .035 thickness for 26" to 36" diameters.
- F. Condensing appliances may be vented with schedule 40 PVC if approved by equipment manufacturer.

PART 3-EXECUTION

3.1 STORAGE AND CONSTRUCTION

- A. Protect materials from accidental damage.
- B. All supports, roof or wall penetrations, terminations, appliance connectors and drain fittings required to install the vent system shall be included.
- C. Joint assembly utilizes flanged mating surfaces with a factory supplied gaskets for diameters 6" through 24", for diameters 26" to 36" P070 sealant will be used on the flange surface. Flanges are joined with a vee band secured by tightening draw bolts. Diameters 3-5 inch utilize a snap-lock, gasketed connection.
- D. Where exposed to weather, the outer closure band shall be sealed to prevent moisture from entering the space between the walls.
- E. All parts exposed to the weather shall be protected by one (1) coat of corrosion and heat resistant base primer and one (1) coat of heat resistant paint unless constructed of 430, 304 or 316 stainless steel.
- F. Vent shall terminate in accordance with installation instructions and local codes.
- G. Installation shall conform to manufacturers installation instructions.

END OF SECTION

23 51 23 - 3

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SECTION 23 62 13

AIR COOLED CONDENSING UNITS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Condensing unit package.
- B. Charge of refrigerant and oil.
- C. Controls and control connections.
- D. Refrigerant piping connections.
- E. Motor starters.
- F. Electrical power connections.

1.2 RELATED REQUIREMENTS

- A. Section 23 23 00 - Refrigerant Piping and Specialties.
- B. Section 23 54 00 - Furnaces.
- C. Division 26 - Electrical: Electrical characteristics and wiring connections.

1.3 REFERENCE STANDARDS

- A. AHRI 210/240 - Standard for Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment; 2008.
- B. AHRI 365 (I-P) - Performance Rating of Commercial and Industrial Unitary Air-Conditioning Condensing Units; 2009.
- C. ASHRAE Std 15 - Safety Standard for Refrigeration Systems; 2024, with Errata (2025).
- D. ASHRAE Std 23.1 - Methods for Performance Testing Positive Displacement Refrigerant Compressors and Condensing Units that Operate at Subcritical Pressures of the Refrigerant; 2019.
- E. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

- F. UL 207 - Standard for Refrigerant-Containing Components and Accessories, Nonelectrical; Current Edition, Including All Revisions.

1.4 PERFORMANCE REQUIREMENTS

- A. Condenser:
 - 1. Refer to plan Schedule.
- B. Electrical Characteristics:
 - 1. Refer to plan Schedule.

1.5 SUBMITTALS

- A. Section 23 01 00 - General HVAC Provisions: Procedures for submittals.
- B. Product Data: Provide rated capacities, weights specialties and accessories, electrical nameplate data, and wiring diagrams. Make submission with air handling units with coils to ensure capacities are complementary.
- C. Shop Drawings: Indicate components, assembly, dimensions, weights and loadings, required clearances, and location and size of field connections. Include schematic layouts showing condensing units, cooling coils, refrigerant piping, and accessories required for complete system.
- D. Design Data: Indicate pipe and equipment sizing.
- E. Manufacturer's Instructions: Submit manufacturer's complete installation instructions.
- F. Operation and Maintenance Data: Include start-up instructions, maintenance instructions, parts lists, controls, and accessories.
- G. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

1.6 QUALITY ASSURANCE

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

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.

1.8 WARRANTY

- A. Provide a five year warranty to include coverage for refrigerant compressors.
- B. All warranties to begin at Date of Substantial Completion as accepted by the Owner.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Trane.
- B. York.
- C. Rheem Manufacturing Company / RUUD.
- D. Daikin.
- E. Substitutions: See Section 23 01 00 - General HVAC Provisions.

2.2 MANUFACTURED UNITS

- A. Units: Self-contained, packaged, factory assembled and pre-wired units suitable for outdoor use consisting of cabinet, compressors, condensing coil and fans, integral sub-cooling coil, controls, liquid receiver, and screens.
- B. Construction and Ratings: In accordance with AHRI 210/240. Test in accordance with ASHRAE Std 23.
- C. Construction and Ratings: In accordance with ARI 210/240, ARI 365, and UL 207. Testing shall be in accordance with ASHRAE Std 23.
- D. Refrigerant: Use only refrigerants that have ozone depletion potential (ODP) of zero and global warming potential (GWP) of less than 50.

2.3 CASING

- A. House components in welded steel frame with steel panels with weather resistant, baked enamel finish.
- B. Mount starters, disconnects, and controls in weatherproof panel provided with full opening access doors. Provide mechanical interlock to disconnect power when door is opened.
- C. Provide removable access doors or panels with quick fasteners .

2.4 CONDENSER COILS

- A. Coils: Aluminum fins mechanically bonded to seamless copper tubing. Provide sub-cooling circuits. Air test under water to 425 psig, and dehydrate. Seal with holding charge of nitrogen.
- B. Coil Guard: Hail Guard.

2.5 FANS AND MOTORS

- A. Vertical discharge direct driven propeller type condenser fans with fan guard on discharge.
- B. Weatherproof motors suitable for outdoor use, single phase permanent split capacitor or 3 phase, with permanent lubricated ball bearings and built in thermal overload protection.
- C. Horizontal discharge, double width, double inlet forward curved centrifugal type condenser fans, equipped with roller or ball bearings with grease fittings extended to outside of casing, V-belt drive with belt guard.

2.6 COMPRESSORS

- A. Compressor: Hermetic reciprocating type or hermetic scroll type.
- B. Mounting: Statically and dynamically balance rotating parts and mount on rubber-in-shear vibration isolators.
- C. Motor: Constant speed 1800 rpm suction gas cooled with electronic sensor and winding over temperature protection, designed for across-the-line starting. Furnish with starter.

2.7 REFRIGERANT CIRCUIT

- A. Provide each unit with one refrigerant circuit or two independent refrigerant circuits, factory supplied and piped. Refer to Section 23 23 00.
- B. For each refrigerant circuit, provide:
 - 1. Filter dryer replaceable core type.
 - 2. Liquid line sight glass and moisture indicator.
 - 3. Thermal expansion valve for maximum operating pressure.
 - 4. Insulated suction line.

5. Suction and liquid line service valves and gage ports.
6. Liquid line solenoid valve.
7. Charging valve.
8. Discharge line check valve.
9. Compressor discharge service valve.
10. Condenser pressure relief valve.

2.8 CONTROLS

- A. On unit, mount weatherproof steel control panel, NEMA EN 10250, containing power and control wiring, factory wired with single point power connection.
- B. For each compressor, provide across-the-line or part winding starter, non-recycling compressor overload, starter relay, and control power transformer or terminal for controls power. Provide manual reset current overload protection. For each condenser fan, provide across-the-line starter with starter relay.
- C. Provide safety controls arranged so any one will shut down machine:
 1. High discharge pressure switch (manual reset) for each compressor.
 2. Low suction pressure switch (manual reset) for each compressor.
 3. Oil Pressure switch (manual reset).
- D. Provide the following operating controls:
 1. Five minute off timer prevents compressor from short cycling.
 2. Low ambient temperature controls.
 3. Hot gas bypass sized for minimum compressor loading bypasses hot refrigerant gas to evaporator.
 4. Low ambient thermostat to lock out compressor at low ambient temperatures.
- E. Provide controls to permit operation down to 0 degrees F ambient temperature.
 1. Thermostat to cycle fan motors in response to outdoor ambient temperature.
 2. Head pressure switch to cycle fan motors in response to refrigerant condensing pressure.

3. Solid state control to vary speed of one condenser fan motor in response to refrigerant condensing pressure.
4. Electronic control consisting of mixing damper assembly, controlled to maintain constant refrigerant condensing pressure.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's installation instructions.
- B. Complete structural, mechanical, and electrical connections in accordance with manufacturer's installation instructions.
- C. Provide for connection to electrical service.
- D. Install units on concrete base as indicated.
- E. Provide connection to refrigeration piping system and evaporators. Refer to Section 23 23 00. Comply with ASHRAE Std 15.

3.2 SYSTEM STARTUP

- A. Supply initial charge of refrigerant and oil for each refrigeration system. Replace losses of oil or refrigerant prior to end of correction period.
- B. Charge system with refrigerant and test entire system for leaks after completion of installation. Repair leaks, put system into operation, and test equipment performance.
- C. Shut-down system if initial start-up and testing takes place in winter and machines are to remain inoperative. Repeat start-up and testing operation at beginning of first cooling season.
- D. Provide cooling season start-up, and winter season shut-down for first year of operation.

3.3 SCHEDULES

- A. Air Cooled Condensing Units
 1. As scheduled on drawings.

END OF SECTION

SECTION 23 81 27

SMALL SPLIT-SYSTEM HEATING AND COOLING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Indoor ductless fan & coil units.
- B. Controls.

1.2 RELATED REQUIREMENTS

- A. Section 23 81 27 - Small Split-System Heating and Cooling.
- B. Division 26 - Electrical: Electrical characteristics and wiring connections.

1.3 REFERENCE STANDARDS

- A. AHRI 210/240 - Standard for Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment; 2008.
- B. ASHRAE Std 15 - Safety Standard for Refrigeration Systems; 2024, with Errata (2025).
- C. ASHRAE Std 23.1 - Methods for Performance Testing Positive Displacement Refrigerant Compressors and Condensing Units that Operate at Subcritical Pressures of the Refrigerant; 2019.
- D. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.
- E. UL 207 - Standard for Refrigerant-Containing Components and Accessories, Nonelectrical; Current Edition, Including All Revisions.

1.4 SUBMITTALS

- A. See Section 23 01 00 - General HVAC Provisions, for submittal procedures.
- B. Product Data: Provide rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.
- C. Shop Drawings: Indicate assembly, required clearances, and location and size of field connections.
 - 1. Design Data: Indicate refrigerant pipe sizing.

- D. Manufacturer's Instructions: Indicate rigging, assembly, and installation 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, maintenance and repair data, and parts listing.
- G. Warranty: Submit manufacturers warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Filters: Two filters for each indoor unit.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum five years of documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum five years of documented experience and approved by manufacturer.
- C. Provide five year manufacturers warranty for compressors.
- D. All warranties to begin at Date of Substantial Completion as accepted by the Owner.

PART 2 PRODUCTS

2.1 SUMMARY

- A. This section provided for reference only. Equipment is to be provided directly by owner through a national buying agreement.
- B. The contractor shall install owner furnished mini-split system(s) as shown and scheduled on the contract documents. The unit(s) shall be installed in accordance with this specification and perform at the specified conditions as scheduled.

2.2 MANUFACTURERS

- A. Daikin.
- B. LG.

- C. Samsung.
- D. Mitsubishi.
- E. Substitutions: See Section 23 01 00 - General HVAC Provisions.

2.3 INDOOR UNITS FOR DUCTLESS SYSTEMS

- A. Indoor Units: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, evaporator coil, and controls; wired for single power connection with control transformer.
 - 1. Location: High-wall.
 - 2. Capacity: Refer to drawings.
 - 3. Cabinet: Galvanized steel.
 - 4. Finish: White.

2.4 OUTDOOR UNITS

- A. Outdoor Units: Self-contained, packaged, pre-wired unit consisting of cabinet, with compressor and condenser.
 - 1. Comply with AHRI 210.
 - 2. Refrigerant: R-32 or R-454B
 - 3. Cabinet: Galvanized steel with baked enamel finish, easily removed and secured access doors with safety interlock switches, glass fiber insulation with reflective liner.
 - 4. Construction and Ratings: In accordance with AHRI 210/240 with testing in accordance with ASHRAE Std 23.1 and UL 207.
- B. Air Cooled Condenser: Aluminum fin and copper tube coil, with direct drive axial propeller fan resiliently mounted, galvanized fan guard.
- C. Accessories: Filter drier, high pressure switch (manual reset), low pressure switch (automatic reset), service valves and gage ports, thermometer well (in liquid line).
 - 1. Provide thermostatic expansion valves.
- D. Operating Controls:
 - 1. Control by room thermostat to maintain room temperature setting.

2. Low Ambient Kit: Provide refrigerant pressure switch to cycle condenser fan on when condenser refrigerant pressure is above 285 psig and off when pressure drops below 140 psig for operation to 0 degrees F.
- E. Mounting Pad: Roof curb, minimum 14 inches square; minimum of two located under cabinet feet.

2.5 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. System selector switch (heat-off-cool) and fan control switch (auto-on).
 2. Set-up for four separate temperatures per day.
 3. Instant override of setpoint for continuous or timed period from one hour to 31 days.
 4. Short cycle protection.
 5. Programming based on every day of the week.
 6. Selection features including degree F or degree C display, 12 or 24 hour clock, keyboard disable, remote sensor, fan on-auto.
 7. Battery replacement without program loss.
 8. Manufacturers:
 - a. Provided by Control Contractor.

PART 3 EXECUTION

3.1 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.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions and requirements of local authorities having jurisdiction.

- B. Install in accordance with NFPA 90A.
- C. Install refrigeration systems in accordance with ASHRAE Std 15.
- D. Pipe drain from cooling coils to nearest drain.

3.3 SCHEDULE

- A. Refer to plan Schedule.

END OF SECTION

SECTION 23 82 16

AIR COILS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Refrigerant coils.

1.2 RELATED REQUIREMENTS

- A. Section 23 23 00 - Refrigerant Piping and Specialties.
- B. Section 23 31 00 - Ducts: Installation of duct coils.
- C. Division 26 - Electrical. Electrical characteristics and wiring connections.

1.3 REFERENCE STANDARDS

- A. AHRI 410 - Standard for Forced-Circulation Air-Cooling and Air-Heating Coils; 2001 (R2011).
- B. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.

1.4 SUBMITTALS

- A. See Section 23 01 00 - General HVAC Provisions.
- B. Product Data: Provide coil and frame configurations, dimensions, materials, rows, connections, and rough-in dimensions.
- C. Shop Drawings: Indicate coil and frame configurations, dimensions, materials, rows, connections, and rough-in dimensions.
- D. Certificates: Certify that coils are tested and rated in accordance with ARI 410.
- E. Warranty: Submit manufacturer's warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum five years of documented experience.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect coil fins from crushing and bending by leaving in shipping cases until installation, and by storing indoors.
- B. Protect coils from entry of dirt and debris with pipe caps or plugs.

1.7 WARRANTY

- A. Provide five year manufacturer warranty for coils.
- B. All warranties to begin at Date of Substantial Completion as accepted by the Owner.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Same as equipment supplier.
- B. Substitutions: See Section 23 01 00 - General HVAC Provisions.

2.2 REFRIGERANT COILS

- A. Tubes: 5/8 inch OD seamless copper arranged in parallel or staggered pattern, expanded into fins, brazed joints.
- B. Fins: Aluminum continuous plate type with full fin collars.
- C. Casing: Die formed channel frame of 16 gage galvanized steel with 3/8 inch mounting holes on 3 inch centers. Provide tube supports for coils longer than 36 inches.
- D. Headers: Seamless copper tubes with silver brazed joints.
- E. Liquid Distributors: Brass or copper venturi type distributor with seamless copper distributor tubes, 5/16 inch outside diameter; maximum 12 circuits per distributor.
- F. Testing: Air test under water at 300 psi for working pressure of 250 psi; clean, dehydrate, and seal with dry nitrogen charge.
- G. Configuration: Down feed with bottom suction to prevent trapping of oil.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturers written instructions.

- B. Install in ducts and casings in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
 - 1. Support coil sections independent of piping on steel channel or double angle frames and secure to casings.
 - 2. Provide frames for maximum three coil sections.
 - 3. Arrange supports to avoid piercing drain pans.
 - 4. Provide airtight seal between coil and duct or casing.
 - 5. Refer to Section 23 31 00.
- C. Protect coils to prevent damage to fins and flanges. Comb out bent fins.
- D. Install coils level.
- E. Make connections to coils with unions and flanges.
- F. Insulate headers located outside air flow as specified for piping. Refer to Section 23 07 19.

3.2 SCHEDULES

- A. Heating and Cooling Coils: Same as equipment manufacturer.

END OF SECTION

SECTION 26 00 10

GENERAL ELECTRICAL PROVISIONS

PART 1 GENERAL

1.1 WORK INCLUDED

- A. Furnish and install all electrical wiring, systems, equipment and accessories in accordance with the specifications and drawings. Specifications and drawings are complimentary except that, in case of conflict, the most stringent will govern.
- B. Judgment shall be exercised to install electrical work in a practical manner to function properly, simplify future maintenance, and to fit building construction and finish. Items not shown or specified which are required to produce a complete, operative and finished system shall be provided.
- C. The electrical plans are a guide to the Contractor to show general arrangement of conduit and wiring and equipment required. If any error omissions or obscurities appear therein, which are questionable, do not conform to good practice, or appear contrary to the purpose and intent of the work, the Contractor shall promptly notify the Architect and Engineer and apply for directions before construction. The exact location of conduit runs and lengths shall be determined by the Contractor in the field.
- D. The drawings may be superseded by later revised or detailed drawings or specification addenda prepared by the Architect. The Contractor shall conform to all reasonable change without extra cost to the Owner. All items not specifically mentioned in the specifications or noted on the drawings, but which are obviously necessary to make a complete working installation, shall be included.
- E. Examine the premises in accordance with Division 1 and Division 2 of the specifications.
- F. The Owner may furnish some equipment. Electrical Contractor is responsible to check the drawings and specifications for equipment that will be furnished by the Owner. Furnish the electrical connections, etc., on all Owner furnished equipment.
- G. Should the particular equipment which any bidder proposes to install, require other space conditions than those indicated on the drawings, arrange for such space with the Engineer before submitting a bid. Should changes become necessary because of failure to comply with this clause, install the changes without additional expense.
- H. Where electrical equipment is installed that causes electrical noise interference with other electrical systems installed under this contract, equip the offending equipment

with isolating transformers, filters, shielding or any other means as required for the satisfactory suppression of the interference as determined by the Engineer.

- I. Comply with National Electric Code, NFPA, appropriate Building Code, and all local, state, and national ordinances.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. The General Conditions and Supplementary General Conditions of the contract are an integral part of Division 26 of the Specifications. Carefully note its contents in performance of the work.
- B. The General Requirements as included in Division 1 of the Specifications are an integral part of Division 26. Carefully note its contents in performance of the work.
- C. Examine all of the contract drawings and specifications, field verify existing conditions, or otherwise determine the extent of related work in other divisions before submitting a quotation for the work in this division. Coordinate the work in this division with work in other divisions through the Electrical Contractor. No extra payment will be made for additional work required by failure to coordinate the work. Should drastic changes from original drawings be necessary, the Contractor shall notify the Architect and secure written approval and agreement from the Architect on necessary adjustments.
- D. The architectural, mechanical and structural plans and specifications, including Information to Bidders and other pertinent documents issued by the Architect or Engineer are a part of this Specification and the accompanying electrical plans. Comply with them in every respect. Examine all the above carefully.
 1. Failure to comply does not relieve the Contractor of responsibility nor may it be used as a basis for additional compensation due to omission of architectural, mechanical and structural details from the electrical drawings.
- E. Related work in other divisions requiring cooperation and coordination with this division includes, but is not limited to, the following:
 1. Power arranged under Division 1.
 2. Perform all cutting and patching as required under Division 1.
 3. Furnish all sleeves, inserts, anchors and supports required by this work to be installed in concrete or masonry and coordinate with the respective trades under Division 3 and 4 for proper locations and installation.

4. Flash and seal roof penetrations in accordance with Division 7. Furnish locations and sizes and coordinate the installation with the respective trade.
5. Perform painting of electrical equipment and materials in finished areas as required under Division 9. Touch up or prime any surfaces required in this division in accordance with Division 9. Provide factory finishes as specified in other sections of this division.
6. Install branch circuits and make final connections to any equipment requiring electric power that is furnished and installed by the Contractor or by the Owner. Perform the electrical work according to approved shop drawings.
7. Install empty raceways and outlet boxes or branch circuits for equipment to be furnished by others and installed after completion of the contract.
8. Install and connect motor starters furnished under Division 23 where starters are not an integral part of the equipment. Insure that starters generally conform to the requirements of this division.
9. 120 volt control wiring is furnished and installed by the Electrical Contractor in accordance with the requirements of Division 23.
10. Mechanical equipment control conduit system furnished and installed by the Mechanical Contractor.
11. Motors are furnished and installed generally as an integral part of equipment specified under Division 23 and must conform to the requirements of this division.

1.3 FEES, PERMITS AND INSPECTIONS

- A. Obtain any and all required permits in connection with this work under the Contract and pay any and all fees in connection therewith to include fees by the utility companies.
- B. Under this section of work the Contractor shall, upon completion of the work, furnish a certificate of final inspection to the Architect from the inspection department having jurisdiction.

1.4 CODES AND STANDARDS

- A. All work shall be done in a good workmanlike manner. Materials and workmanship shall comply with all applicable local state and federal codes including, but not limited to, the following:

1. National Electrical Code, Latest Edition (NEC).
 2. Underwriters' Laboratories, Inc. (UL).
 3. Institute of Electrical and Electronic Engineers (IEEE).
 4. Insulated Power Cable Engineers' Association (IPCEA).
 5. National Electrical Manufacturers' Association (NEMA).
 6. American Standards Association (ASA).
 7. American Society for Testing Materials (ASTM).
 8. State Fire Prevention Code.
 9. Occupational Safety and Health Act (OSHA).
 10. National Fire Protection Association (NFPA).
 11. International Building Code (IBC).
- B. Comply with all State and Federal ADA Accessible Guidelines in regard to accessible or handicapped features.
- C. The latest specifications and standards available shall be used for the above.
- D. In case of discrepancy between the applicable codes, plans and specifications, the most stringent shall govern.
- E. Should the Contractor perform any work that does not comply with requirements of the applicable authorities, he shall bear all cost arising in correcting the deficiencies.
- F. Equipment and materials which are not covered by UL standard will be accepted provided equipment and material is listed, labeled, certified or otherwise determined to meet safety requirements of a nationally recognized testing laboratory.

PART 2 PRODUCTS

2.1 QUALIFICATION (PRODUCTS AND SERVICES)

- A. Approvals are required of products or services of proposed manufacturers, suppliers and installers and will be based upon submission by Contractor of certification.
- B. Manufacturer's Qualifications, provide submittal information with the following:
Manufacturer regularly and presently manufactures as one of the manufacturer's

principal products the following items and has manufactured these items for at least five (5) years.

1. Wire and Cable - all types.
 2. Light Fixtures.
 3. Lighting Switches and Receptacles.
 4. Dimmers.
 5. Molded Case Circuit Breakers.
 6. Fuses.
 7. Conduit.
 8. Wiring Devices.
 9. Low Voltage Fusible and Non-Fusible Switches.
 10. Fire Alarm Systems and Equipment.
 11. Conduit Supports and Fittings.
 12. Panelboards.
 13. Generator and Automatic Transfer Switch.
 14. Fire Sealant.
- C. Manufacturer's product submitted must have been in satisfactory operation on three (3) installations similar to this project for approximately five (5) years.
- D. There must be a permanent service organization maintained or trained by manufacturer which will render satisfactory service to this installation within eight (8) hours of receipt of notification that service is needed.
- E. Installer must have the technical qualifications, experiences, trained personnel and facilities to install specified items including at least three (3) years of successful installation of electrical work similar to that required on this project. Approval will not be given where the experience record is one of unsatisfactory performance.
- F. The lighting wholesale supplier shall have an office and a stocking warehouse within 100 miles of the project site. The distributor/manufacturer's representative shall have an office within 100 miles of the project site, and shall have on staff a full time

lighting designer as well as personnel who are available to service the project after completion.

2.2 MANUFACTURED PRODUCTS

- A. Insure that materials and equipment furnished is of current production by manufacturers regularly engaged in the manufacture of such items for which replacement parts should be available.
 - 1. Items not meeting this requirement but which otherwise meet technical specifications and merits of which can be established through reliable test reports or physical examination of representative samples will be considered.
- B. Provide products of a single manufacturer when more than one (1) unit of the same product is needed.
- C. Equipment Assemblies and Components:
 - 1. All components of an assembled unit need not be products of the same manufacturer.
 - 2. Manufacturers of equipment assemblies which include components made by others must assume complete responsibility for the final assembled unit.
 - 3. Components must be compatible with each other and with the total assembly for the intended service.
 - 4. Constituent parts which are similar must be the product of a single manufacturer.
 - 5. Moving parts of any element of equipment of the units normally requiring lubrication must have means provided for such lubrication and must be adequately lubricated at factory prior to delivery.
- D. Identify all factory wiring on the equipment being furnished and on all wiring diagrams.
- E. Equipment and materials shall be new and shall bear the manufacturer's name, trade name and the UL label in every case where a standard has been established for the particular material.
- F. Equipment and materials of the same general type shall be of the same make throughout the work to provide uniform appearance, operation and maintenance.
- G. Dimensions: It shall be the responsibility of the Contractor to insure that items furnished fit the space available. He shall make necessary field measurements to ascertain space requirements, including those for connections, and shall furnish and

install such sizes and shapes of equipment that the final installation shall suit the true intent and meaning of the drawings and specifications. Dimensions are to be taken from the architectural drawings.

- H. Manufacturer's directions shall be followed completely in the delivery, storage, protection and installation of equipment and materials. Notify the Architect of any conflict between any requirement of the contract documents and the manufacturer's directions and obtain the Architect's written instruction before proceeding with the work. Should the Contractor perform any work that does not comply with the manufacturer's directions or such written instructions from the Architect, he shall bear all costs arising in correcting the deficiencies.
- I. The Contractor shall provide and install all accessories, and incidental items to complete the work, ready to use and fully operational.

2.3 EQUIPMENT RATINGS AND APPROVAL OF "EQUAL" EQUIPMENT

- A. Equipment voltage ratings must be in accordance with the requirements indicated on the drawings or as specified.
- B. Obtain written approval for any equipment which differs from the requirements of the drawings and specifications.
 - 1. Furnish drawings showing all installation details, shop drawings, technical data and other pertinent information as required.
 - 2. Approval by the Engineer of the equal equipment does not relieve the Contractor of the responsibility of furnishing and installing the equipment at no additional cost.
 - 3. Furnish and install any other items required for the satisfactory installation of the equal equipment at no additional cost. This includes, but is not limited to, changes in branch circuits, circuit protective devices, conduits, wire, feeders, controls, panels, and correlation with other work, subject to the jurisdiction and approval of the Engineer.
- C. Equipment and materials specified herein are named to establish a standard of quality. Other material of equal quality may be substituted per Section 01 60 00 and with approval by the Architect.
- D. It is the responsibility of the Contractor to investigate any desired substitutions for specified equipment prior to submission of his bid. The contractor shall be responsible for any changes required in mechanical, electrical or structural systems resulting from equipment substitutions and shall bear all costs for those changes

whether the substitute equipment is named by Architect for "equal" consideration or not. All changes shall be accomplished in a manner acceptable to the Architect at no additional cost to the Owner.

- E. In order to obtain prior approval on equipment or material not specified in Division 26, 27 and 28 Specifications or Equipment Schedules, Contractor MUST submit to the Engineer any proposed equipment or material ten (10) working days prior to the bid date.

2.4 EQUIPMENT PROTECTION

- A. Store all materials and equipment to be installed in the work so as to insure the preservation of their quality, workability, and fitness for the work intended. Provide storage provisions for protection from the elements, rust and physical damage. Place stored materials on clean, hard surfaces above ground and keep covered at all times to insure protection from paint, plaster, dust, water and other construction debris or operations. Install heaters under the protective cover where the equipment may be damaged due to moisture and weather conditions. Keep conduit ends plugged or capped and all covers closed on boxes, panels, switches, fixtures, etc., until installation of each item. Store all plastic conduit or duct out of direct sunlight in shaded areas. Located stored materials and equipment to facilitate prompt inspection. All boxes and packaging must remain intact.
- B. Protect during installation, all equipment, controls, controllers, circuit protective devices, etc., against entry of foreign matter on the inside and be vacuum clean both inside and outside before testing, operating and painting.
- C. Replace damaged equipment, as determined by the Engineer, in first class operating condition or return to source of supply for repair or replacement.
- D. Protect painted surfaces with removable heavy Kraft paper, sheet vinyl or equal, installed at the factory and removed prior to final inspection.
- E. Repair damaged paint on equipment and materials. Finish with same quality of paint and workmanship as used by manufacturer so repaired areas are not obvious.
- F. All lighting fixtures are to be stored on the project in their original factory cartons.

2.5 EQUIPMENT ACCESSORIES

- A. Furnish and install all equipment, accessories, connections and incidental items necessary to fully complete all work, ready for use, occupancy and operation by the Owner.

- B. Where equipment requiring different arrangement or connections from those shown is provided, install the equipment to operate properly and in harmony with the intent of the drawings and specifications.
- C. Support, plumb, rigid and true to line all work and equipment included. Study thoroughly all general, structural, electrical and mechanical drawings, shop drawings and catalog data to determine how equipment is to be supported, mounted or suspended and provide extra steel bolts, inserts, pipe stands, brackets and accessories for proper supports whether or not shown on the drawings. When directed, submit drawings showing supports.

PART 3 EXECUTION

3.1 WORK PERFORMANCE

- A. Furnish and install a temporary electrical distribution system of adequate feeder sizes to prevent excessive voltage drop. Install all temporary work in a neat and safe manner. Provide temporary lighting as necessary to furnish 2.5 footcandles on all work surfaces.
- B. Field coordinate with other trades in ample time to build all chases and openings, set all sleeves, inserts and concealed materials, and provide clearances that may be required to accommodate materials and equipment. Lay out electrical work so that in case of interference with other items the layout may be altered to suit conditions encountered.
- C. Cutting and Patching:
 - 1. The Electrical Contractor shall be responsible for all required cutting, patching, etc., incidental to this work and shall make all required repairs thereafter to the satisfaction of the Engineer. Do not cut into any structural element, beam or column without the written approval of the Engineer.
 - 2. Pipes, conduits, cables, wires, wire ducts and similar equipment that pass through fire or smoke barriers shall be protected in accordance with NFPA 101.
- D. Wall Penetrations: When conduit, wireways, bus duct and other electrical raceways pass through fire partitions, fire walls, or walls and floors, install a firestop that provides an effective barrier against the spread of fire, smoke and gases. Firestop material must be packed tight and completely fill clearances between raceways and openings. Use firestop material conforming to the following:
 - 1. All wall penetrations shall be caulked and sealed. Provide fire barrier pillows to protect the interior of conduits/sleeves passing through fire rated walls.

2. The Contractor shall furnish and install all necessary sleeves and chases for all work passing through and attaching to walls, ceilings or the roof.
 3. Provide UL listed, fire rated poke through devices for floor penetrations as required by the Standard Building Code, National Fire Code and Life Safety Code.
 4. Provide UL approved fire rated chases and fire sealing as required to maintain fire rating for all penetrations in fire rated walls.
 5. Firestopping material must be of the latest type as supplied by leading manufacturers such as "3M".
 6. Floor, exterior wall and roof seals must be watertight. Sleeve walls and floors which are cored for installation of conduit with steel tubing, grouted and the space between the conduit and sleeve filled as specified herein. Where conduits pierce the roof, refer to architectural specifications and drawings for details. Provide pourable sealant as specified by the Roofing Contractor.
- E. Do not use electrical hangers and other supports for other than electrical equipment and materials. Provide not less than a safety factor of five (5) and conform with any specific requirements as shown on the drawings or in the specifications.
- F. Do not deviate from the plans and specifications without the full knowledge and consent of the Engineer. Should, at any time during the progress of the work, a new or existing condition be found which makes desirable a modification of the requirements of any particular item, report such item promptly to the Engineer for his decision and instruction.
- G. Notify all other contractors of any deviations or special conditions. Resolve interferences between the work of the various contractors prior to installation. Remove, if necessary, work installed which is not in compliance with the plans and specifications as specified above, and properly reinstall without additional cost to the Owner.
- H. This Contractor shall furnish all necessary scaffolding, cranes, tackle, tools and appurtenances of all kinds, and all labor required for the safe and expeditious execution of his contract.

3.2 EQUIPMENT INSTALLATION AND EQUIPMENT

- A. Installation:

1. "Provide" and "Install" as used on the drawings and in the specifications means furnish, install, connect, adjust and test except where otherwise specified.
 2. Install coordinated electrical systems, equipment and materials complete with auxiliaries and accessories installed.
- B. Equipment Location: As close as practical to locations shown on drawings.
- C. Working Spaces: Not less than specified in the National Electrical Code for all voltages specified.
- D. Inaccessible Equipment:
1. Where the Engineer determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, remove and reinstall equipment as directed at no additional cost.
 2. "Conveniently Accessible" is defined as being capable of being reached without the use of ladders or without climbing or crawling under or over obstacles such as motors, pumps, belt guards, transformers, piping and ductwork.
- E. Equipment and Materials:
1. Install new equipment and materials unless otherwise specified.
 2. Insure that equipment and materials are designed to provide satisfactory operation and operating life for environmental conditions where being installed. NEC and other code requirements applied to the installation and other code requirements apply to the installation in areas requiring special protection such as explosion proof, vapor-proof, water tight and weather-proof construction.

3.3 EQUIPMENT IDENTIFICATION

- A. In addition to the requirements of the National Electrical Code, install identification signage which will clearly indicate information required for use and maintenance of items such as panelboards, cabinets, motor controllers (starters), safety switches, time clocks, contactors, separately enclosed circuit breakers, individual breakers, and controllers in switchgear and motor control assemblies, control devices and other significant equipment.

3.4 DRAWINGS AND SPECIFICATIONS

- A. The drawings and specifications indicate the requirements for the systems, equipment, materials, operation and quality. They are not to be construed to mean limitation of competition to the products of specific manufacturers.

3.5 SYSTEM VOLTAGES

- A. System voltage is 120/240 volts, single-phase.

3.6 SUBMITTALS

- A. Obtain the Engineer's approval for all equipment and materials before purchasing or delivery to the job site. Delivery, storage or installation of equipment or material which has not had prior approval is not permitted at the job site. Only equipment and material which have been approved by submittals may be used on this project. Refer to Section 26 00 10, Paragraph 2.3.E for substitutions.
- B. Include in all submittals adequate descriptive literature, catalog cuts, shop drawings and other data necessary for the Engineer to ascertain that the proposed equipment and materials comply with specification requirements. Catalog cuts submitted for approval must be legible and clearly identify equipment being submitted.
- C. Submit to the Engineer within (30) days after the awarding of the Contract, a complete set of brochures of shop drawings and descriptive data of all material and equipment proposed for the installation. All information shall be submitted electronically in "pdf" format, and shall be separated into electronic "pdf" files in three groups, lighting, switchgear and all others.
- D. The submittals must include the following:
 - 1. Information which confirms compliance with contract requirements. Include the manufacturer's name, model or catalog numbers, catalog information, technical data sheets, shop drawings, pictures, nameplate data and test reports as required.
 - 2. Elementary and interconnection wiring diagrams for communication and signal systems, control system and equipment assemblies. All terminal points and wiring must be identified on wiring diagrams.
 - 3. Parts list which must include those replacement parts recommended by the equipment manufacturer.
 - 4. Approvals will be based on complete submission only.
- E. Furnish shop drawings for the work involved in sufficient time so that no delay or changes will be caused. Thermofax copies are not acceptable - only permanent type prints are allowed.
- F. Verify that shop drawings comply in all respects with the item originally specified. It is the Contractor's responsibility to procure the proper sizes, quantities,

rearrangements, structural modifications or other modifications in order for the substituted item to comply with the established requirements.

- G. Any shop drawings prepared to illustrate how equipment, conduit, fixtures, etc., can be fitted into available spaces will be examined under the assumption that the Contractor has verified all the conditions. Obtaining approval thereon does not relieve the Contractor of responsibility in the event the material cannot be installed as shown on the drawings.
- H. Shop drawings need not cover detailed installation drawings prepared for the Contractor's own use, but be limited, as in the case of raceways, to necessary departures from the plans as prepared by the Engineer.
- I. Submit working scale drawings of apparatus and equipment which in any way varies from these specifications and plans, to be reviewed by the Engineer before the work is started. Correct interferences with the structural conditions before the work proceeds.
- J. Submit all shop drawings at the same time in a loose-leaf binder with double index as follows:
 - 1. List the products by designated letter or number as indicated on plan sheets.
 - 2. List the name and manufacturers whose products have been incorporated in the work alphabetically together with their addresses and the name and addresses of the local sales representative.
 - 3. Provide indexes with sheet numbers and quantities of the products listed.

3.7 TESTS AND DEMONSTRATION

- A. As equipment and materials are being installed and connected, test the installation for the following:
 - 1. Short circuits and ground faults.
 - 2. Insulation resistance at 500 volts DC.
 - 3. Grounding continuity.
- B. After tests are completed and necessary corrections are made, put each system into operation and demonstrate its performance to the satisfaction of the Owner's authorized representative.
- C. Provide written documentation of tests and performance as requested by the Owner's authorized representative. The results are to be made part of the Closeout Documents.

- D. Furnish all instruments, test equipment and personnel that are required for the particular test. Certify that equipment and gauges are in good working order. Remove equipment subject to damage during test from line before test is applied.
- E. After installation is complete the Contractor shall conduct operating test of all electrical systems for approval by the Architect. Test shall include verification of direction of rotation for all motors. The equipment shall be demonstrated to operate in accordance with the requirements of the plans and specifications. The test shall be performed in the presence of the Architect or Engineer.
- F. Provide certified test of the grounding electrode system. It shall test to 5 ohms or less.

3.8 COMPLETION AND ACCEPTANCE

- A. Upon completion of the work and before final acceptance, perform the duties and provide the documents as follows in accordance with the General Conditions, Supplementary Conditions and Division 1 of Contract.
- B. Remove all rubbish, tools and surplus materials accumulated during the execution of the work in this Division.
- C. Touch up any equipment or finishes damaged during delivery or installation from the work in this Division.
- D. Provide a written one-year guarantee of materials and work except for items that are specified to have a longer warranty. Items that have a published or normal life expectancy of less than one year, such as incandescent lamps are to be covered by the manufacturer's guarantee.
- E. Provide systems and equipment installation, operating and maintenance instructions and catalog data for transmittal to the Owner. Place the data in a loose-leaf binder which contains an index of the products listed alphabetically by name and a separate index listing the manufacturers alphabetically by name and including the manufacturer's address and the name and address of their local representative.
- F. Instruct the Owner's representative in the proper operation and maintenance of the systems and their elements as required or directed to familiarize the Owner in the operation and maintenance of the systems.

3.9 RECORD DRAWINGS

- A. The Contractor shall keep a neat and accurate record of field changes made during construction. Changes shall be penciled in on a separate set of drawings used only for

recording changes. At completion of the project the Contractor shall deliver this set to the Architect for preparation of record drawings.

- B. Record drawings shall include corrected panel schedules and riser diagram as well as all plan sheets.

3.10 FINALLY

- A. It is the intention that this specifications shall provide a complete installation. All accessories and apparatus necessary for complete operational systems shall be included. The omission of specific reference to any part of the work necessary for such complete installation shall not be interpreted as relieving this Contractor from furnishing and installing such parts.

END OF SECTION

SECTION 26 05 19

WIRES AND CABLES

PART 1 GENERAL

1.1 WORK INCLUDED

- A. Wires and cables.

1.2 RELATED WORK

- A. Section 26 05 53: Identification.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Wire and cable shall be new, shall have size, grade of insulation, voltage and manufacturer name, permanently marked on outer covering at regular intervals.
- B. Building Wiring: 95% conductivity, soft drawn conforming to requirements of the NEC and relevant ASTM specifications, copper, 600 volt insulation, dual rated THHN-THWN.
- C. Branch Circuit Wiring: Conductors smaller than No. 12 AWG not permitted; No. 8 AWG and larger, stranded construction; smaller than No. 8, either solid or stranded.
- D. Fire Alarm System Wiring: UL Listed plenum-rated cable for conductors installed in plenum rated spaces. Coordinate with Authority Having Jurisdiction.
- E. Exterior Wiring: Bare stranded for ground, THWN-THHN for all other.
- F. Use pre-insulated pressure connectors such as Scotchlock on stranded conductors No. 10 and smaller. Use approved high-pressure crimp sleeve connectors on No. 8 and larger conductors.
- G. Where allowed by local inspecting authorities, type "MC" cable shall be allowed for fixture whips. It shall be installed using proper fittings and installation tools per NEC.
- H. Low voltage cable is to be installed in conduit in areas with no ceiling.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Make conductor length for parallel feeders identical.

- B. Lace or clip groups of conductors at panelboards, pull boxes and wireways.
- C. Provide copper grounding conductors and straps.
- D. Install wire and cable in code conforming raceway.
- E. Use wire pulling lubricant for pulling No. 4 AWG and larger wire.
- F. Install wire in conduit runs after concrete and masonry work is complete and after moisture is swabbed from conduits.
- G. Splice only in accessible junction or outlet boxes. Install splices and taps which have mechanical strength and insulation rating equivalent-or-better than conductor and are compatible with conductor material.
- H. Color code conductors to designate neutral conductor and phase as follows: 120/208V (phases) black, red, blue, (neutral) white, (ground) green; 277/480V (phases) orange, brown, yellow, (neutral) white with color stripe, (ground) green.
- I. All 20 amp circuits are 2-#12, 1-#12 ground unless noted. Use #10 AWG conductors on 20 amp branch circuits which exceed 75 feet to the first outlet.
- J. Install home runs as indicated on the panel schedules. Circuits may be grouped into 3-Phase home runs but in no case are more than 3 phase conductors allowed.
- K. Sharing of neutrals is not allowed, to include lighting and power circuits.
- L. Where conduit and wire are installed on the roof, refer to NEC Section 310.15.(B.)(2)(C) for derating/correcting factors for the distance installed from the roof.
- M. No low-voltage wiring is to be visible in open ceiling areas; install in conduit.

3.2 MARKING

- A. Identify circuits using wire markers at the following locations:
 - 1. All power and lighting branch circuits and feeders at pull boxes, fixtures, outlets, motors, etc., indicating panel and circuit number at which each circuit or feeder originates.
 - 2. All branch circuits in the panelboard gutters indicating corresponding branch circuit numbers.

3. All signal and control wires at all termination points such as cabinets, terminal boxes, equipment racks, control panels, consoles, etc. Install in accordance with approved schedules prepared by the equipment manufacturer or by the Contractor.
4. Mark both ends of all pull wires with tag reading "PULL WIRE" and numbered to refer to the same pull wire.

END OF SECTION

SECTION 26 05 26

GROUNDING

PART 1 GENERAL

1.1 WORK INCLUDED

- A. Power system grounding.
- B. Communication system grounding.
- C. Building ground system.

1.2 RELATED WORK

- A. Section 26 05 19: Wires and Cables.
- B. Section 26 05 34: Conduit.

1.3 REGULATORY REQUIREMENTS

- A. Install complete grounding system for the building(s) and all electrical equipment in accordance with National Electrical Code, Section 250.

PART 2 PRODUCTS

2.1 GROUNDING

- A. Provide copper grounding conductors for grounding connections sized according to NEC.

PART 3 EXECUTION

3.1 POWER SYSTEM GROUNDING

- A. Install NEC sized ground conductor, #12 AWG minimum, in all branch circuit and equipment conduits.
- B. Bonding Jumpers: Provide green insulated wire, size correlated with over-current device protecting the wire. Connect to neutral only at service neutral bar.
- C. Bonding Wires: Install bonding wire in flexible conduit connected at each end to a grounding bushing.
- D. No strap type grounding clamps shall be used. All connections shall be made only after surfaces have been cleaned or ground to exposed metal.

- E. The building structural steel shall be grounded as follows:
1. All locations noted on the plans or if not shown, at approximately 75 foot intervals where structural columns are located.
 2. All grounding locations are to be made with 1/0 bare copper wire with exothermic welds or Burndy "HyGround" to the column, to in-footing rebar, and to a 3/4" x 8' copper ground rod. Include "Eupher" grounds at all locations shown with grounding symbol.
- F. Provide one 1-1/0 bare copper ground wire from the electrical service, and from nearest branch panel, grounding electrode, in 1 1/4" conduit, to the location of each telephone terminal board and Data Room. Provide "Intersystem Bonding Termination" bars at these locations and at the electrical meter where applicable. Termination bars in data or telephone rooms are to be equal to Chatsworth Products, Inc; Model 40153-020. Ground all equipment and metal parts using #6 bare copper ground from this terminal bar.
- G. Bond the neutral (grounded conductor) to ground at one location only once per building at the building's main service disconnect. Bond per NEC Article 250.
- H. Ground cable trays per N.E.C.

END OF SECTION

SECTION 26 05 29

SUPPORTING DEVICES

PART 1 GENERAL

1.1 WORK INCLUDED

- A. Conduit supports.

PART 2 PRODUCTS

2.1 CONDUIT SUPPORTS

- A. Single Runs: Galvanized conduit straps or ring bolt type hangers with specialty spring clips. All "Caddy" and "B-Line" hangers are approved.
- B. Multiple conduits running horizontally at the same grade and elevation may be supported by trapezes of channels suspended on rods. All support components shall be adequate size for loaded weights being supported. Provide conduit racks with 25% spare capacity.
- C. Perforated strap iron or wire shall not be used for supporting conduits or equipment.
- D. Where large conduits are supported beneath bar joist, hanger rods shall be secured to angle irons of adequate size. Each angle shall span two or more joist to distribute the weight properly.
- E. Supports shall be installed within three (3) feet of each coupling or connector.
- F. Vertical Runs: Channel support with conduit fittings, clamp type supports where conduits penetrate floors.

2.2 ANCHOR METHODS

- A. Hollow Masonry: Toggle bolts or spider type expansion anchors.
- B. Solid Masonry: Lead expansion anchors or preset inserts.
- C. Metal Surfaces: Machine screws, bolts or welded studs.
- D. Wood Surfaces: Wood screws.
- E. Concrete Surfaces: Self drilling anchors or power driven studs.

2.3 METAL FRAMING SYSTEMS

- A. Provide metal framing systems for electrical equipment and conduits as required for proper support spacing and approved for the purpose. Powerstrut, Unistrut, Kindorf or equal.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Layout to maintain headroom, neat mechanical appearance, and to support equipment loads required.
- B. Install horizontal supports at eight feet (8') on centers, at fittings and corners, and as required for proper support.
- C. Provide a complete installation with all channels, accessories, screws, nuts, washers, inserts, springs, clamps, hangers, clips, fittings, brackets framing fittings, post bases and brackets to provide a structural rigid support or mounting system.
- D. On the roof, provide B-Line DB series roof top support bases. Provide two supports per 10' length of conduit. Conduit to be 24" off the roof, minimum. Provide 1/2" rubber pads under the B-Line support blocks. Coordinate to be higher than other trades' piping on the roof. Install conduit in the ceiling space below where possible.

END OF SECTION

SECTION 26 05 34

CONDUIT

PART 1 GENERAL

1.1 WORK INCLUDED

- A. Conduit and couplings.
- B. Flexible conduit.

1.2 RELATED WORK

- A. Section 26 05 53: Identification.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Conduit/Elbows: Rigid steel threaded ANSI C80.1; electrical metallic tubing ANSI C80.3, Schedule 40 PVC.
- B. Couplings/Connectors: Threaded; liquid-tight; compression gland. Set screw type products are not allowed.
- C. Flexible Conduit: Aluminum or steel armor, plastic jacketed type with liquid-tight connectors used only at motor/equipment terminations. Connectors are to be metal.
- D. Metal Clad Cable: Type "MC" cable may be used where allowed by local codes for fixture whips only.
- E. PVC or High Density Polyethylene Conduit: HDPE or PVC conduit is acceptable for underground and innerduct applications.

2.2 TYPE

- A. Utilize rigid steel conduit (3/4" minimum) in the following locations:
 - 1. In concrete.
 - 2. In exterior locations.
 - 3. Areas subject mechanical abuse.
- B. Utilize electrical metallic tubing in other locations, 3/4" minimum. Only E.M.T. is allowed in walls. E.M.T. may be Steel or Aluminum.

- C. Make connections to motors and equipment with PVC jacketed flexible conduit and liquid-tight connectors. Minimum size 1/2" for motor connections. Use 3/8" Greenfield flexible conduit only for fixture wiring. Provide sufficient length of flexible conduit to avoid transmission of vibration. Install straps per NEC.
- D. PVC conduit may be used for underground service entrance conduits and all low voltage under-slab applications. It is not to be installed exposed. Elbows for service conduits and panel feeders are to be galvanized rigid.
- E. Flexible conduit is not allowed within walls.
- F. Conduit on the roof is rigid aluminum.

2.3 MARKING

- A. All empty conduit shall be left with a pull string for future use, and shall be permanently marked on each end with like numbers.
- B. Mark the conduits and boxes mentioned in this Section paragraph 2.2F as to circuits included and on the record drawings.

PART 3 EXECUTION

3.1 INSTALLATION

- A. All wiring systems shall be installed in raceways consisting of galvanized steel tubing, PVC conduit, HDPE conduit, rigid galvanized steel, flexible steel conduit or neoprene covered flexible steel conduit.
- B. Water tight junction boxes, fittings, expansion joints, compression fittings (for use with all electrical tubing), conduit hubs, etc., shall be provided, for all electrical systems wherever construction dictates, including, but not limited to, outdoor locations.
- C. Flexible conduit used in outdoor locations or indoor locations where exposed to continuous or intermittent moisture shall be liquid tight, neoprene covered and UL listed. All fittings for such applications shall be liquid tight, nylon insulated throat type as manufactured by Thomas and Betts, Series 5331, or approved equal.
- D. Sufficient slack shall be provided in all flexible conduit connections to reduce the effects of vibration.
- E. Insulated bushings shall be used where rigid conduit is installed in any enclosure or junction box. In addition, insulated bushings shall be used on all conduits 1 1/4-inch and larger.

- F. All conduit bends shall have a radius greater than or equal to that stipulated by the NEC.
- G. Install conduit concealed in all areas excluding mechanical and electrical rooms and conduit to fixtures in rooms without ceilings.
- H. For exposed runs, attach surface mounted conduit with clamps.
- I. Coordinate installation of conduit in masonry work.
- J. Install conduit free from dents and bruises. Plug ends to prevent entry of dirt or moisture.
- K. All conduit systems shall be installed complete and shall be cleaned out before installation of conductors.
- L. Alter conduit routing to avoid structural obstructions, minimizing crossovers.
- M. Seal conduit with glass fiber where conduits leave heated area and enter unheated area.
- N. Provide flashing and pitch pockets making watertight joints where conduits pass through roof or waterproofing membranes. Provide pourable sealant as approved by the Roofing Contractor.
- O. Install UL approved expansion fittings complete with grounding jumpers where conduits cross building expansion joints (review architectural and structural drawings and coordinate with General Contractor to determine expansion joint locations). Provide bends or offsets in conduit adjacent to building expansion joints where conduit is installed above suspended ceilings.
- P. Avoid routing conduit through public spaces with exposed structure where possible.
- Q. Route all exposed conduits parallel or perpendicular to building lines. Coordinate all exposed conduit locations with the Architect prior to rough-in.
- R. In exposed ceiling areas stub conduits feeding devices in walls out of the wall as high as possible at bottom of structure or bond beam, whichever is higher.
- S. Allow minimum of 6-inch clearance at flues, steam pipes and heat sources. Allow 12-inch clearance at telephone conduits. Where possible, install horizontal raceway runs above water and steam piping.
- T. Install conduit system from cabinets to boxes, boxes to outlet and outlet to outlet in such a manner as to be electrically continuous throughout.

- U. Make bends or offsets with approved bender or hickey.
- V. Where conduits are stubbed up for low voltage cabling or future use, do so neatly; furnish with nylon pull string, conduit caps and labeling on each end.
- W. Securely support conduits from the structure using approved type clamps, hangers and assemblies. Space supports according to manufacturer's recommendations and accepted practice. Do not support conduits from ceiling suspension system. In no case exceed support spacing per NEC maximum.
- X. Avoid installing conduit on the roof. Where necessary, support conduits via B-Line type DB supports and the appropriate strut straps. Support twice per 10' length of conduit. Use supports which hold conduit 24 inches above roof. Conduit on the roof is rigid aluminum. Provide 1/2" rubber pads under the conduit supports.
- Y. Leave a nylon pull string in all empty conduits. Terminate empty conduit stubouts with bushing manufactured for that purpose.
- Z. Install properly sized grounding conductor in all conduit.
- AA. Elbows for service and panel feeders are to be galvanized rigid conduit.
- BB. No conduit may be installed in slab. Conduit for stub-ups and panel feeders are to be installed with the top of the conduit at a minimum of four inches under the slab. Bed with one-half inch washed rock. Conduit for floor boxes is to be installed coming out of the bottom of the floor box and installed under slab.
- CC. Provide conduit for all low voltage cable installed in areas which have no ceiling or hard ceilings.
- DD. All data/telephone conduits are to be "home-run" to an area above an accessible ceiling. No "Daisy Chaining" allowed.
- EE. No "Daisy Chaining" of fixtures is allowed.
- FF. Seal conduits where they transition from underground distribution system to the interior of a building or structure, refer to N.E.C. 225.27.

END OF SECTION

SECTION 26 05 37

OUTLET AND PULL BOXES

PART 1 GENERAL

1.1 WORK INCLUDED

- A. Outlet boxes.
- B. Pull and junction boxes.

1.2 RELATED WORK

- A. Section 26 05 53: Identification.
- B. Section 26 27 26: Wall Switches, Receptacles and Plate Covers.
- C. Section 27 10 05: Conduit for Telephone/Data and TV Raceway System.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Boxes: Hot dip galvanized, 1.25 oz/sq.ft. or cadmium plated, conforming to UL requirements.
- B. Interior Boxes: Pressed sheet steel blanked for conduit.
- C. Exterior Boxes: Corrosion-resistant cast, deep type, with face plate gasket and corrosion-resistant fasteners.
- D. For Ceiling: 4" square boxes for receiving three or less 3/4" conduits.
- E. For Flush Mounting in Walls: 4" square boxes with matching plaster cover for single or two gang outlets. For larger boxes, use solid type or special units, with flush plates.
- F. Surface Mounted: 4" square.
- G. Pull Boxes and Junction Boxes: Metal construction, conforming to National Electrical Code, with screw-on or hinged cover.
- H. Flush Mounted Pull Boxes: Provide overlapping covers with flush head cover retaining screws, prime coated.
- I. For floor boxes, refer to the electrical legend on the plans.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Mount outlet boxes flush in areas other than mechanical rooms, electrical rooms, above removable ceilings, and on exposed structure in rooms without ceilings.
- B. Do not install boxes back-to-back in same wall, allow 6" minimum horizontal spacing between boxes.
- C. Do not use sectional or handy boxes unless specifically requested.
- D. For boxes mounted in exterior walls, make sure that there is insulation behind outlet boxes to prevent condensation in boxes.
- E. For outlets mounted above counters, benches and splashbacks, coordinate location and mounting heights with built-in units. Adjust outlet mounting height to agree with required location for equipment served.
- F. Securely mount each outlet box to metal studs with outlet box mounting supports. Secure to at least two studs or install box stabilizers as manufactured by "B-Line" and "Caddy".
- G. Do not install more than three 3/4" conduits into one 4" outlet box. Do not use more than one extension ring on a box.
- H. For heights of outlets above the finished floor in permanent partitions, use the following unless otherwise noted: To Center of Device:
 - 1. Convenience Receptacles: 18" or as directed.
 - 2. Brackets: As directed.
 - 3. Switches: 46" or as directed.
 - 4. Telephone Outlets: 18" or as directed.
 - 5. Other Outlets: As directed or indicated.
 - 6. Over Counters: 6" above countertop, horizontal at windows or where indicated.
 - 7. Fire Alarm Pull stations: Minimum 42" and Max 48" measured vertically, from the floor level to activating handle or lever.
 - 8. Fire Alarm Audio Visual Device: 80" to top of box

- I. Locate pull boxes and junction boxes above removable ceiling or in electrical rooms, utility rooms or storage areas.
- J. Install pull boxes of the proper size and depth to accommodate the required conduits and wires.
- K. When installing outlet boxes in fire rated walls, provide fire blocking material on the back side of the boxes.
- L. Coordinate box mounting height with brick courses, where applicable.
- M. Study all devices and light fixtures, providing and installing applicable outlet and back boxes as necessary.
- N. Boxes for fire alarm systems are to be painted red.

END OF SECTION

SECTION 26 05 53

IDENTIFICATION

PART 1 GENERAL

1.1 WORK INCLUDED

- A. Provide and install identification markers.

1.2 RELATED WORK

- A. Section 26 05 19: Wires and Cables.
- B. Section 26 05 34: Conduit.
- C. Section 26 05 37: Outlet and Pull Boxes.
- D. Section 26 24 16: Panelboards.
- E. Section 26 28 18: Motor and Circuit Disconnects.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Provide nameplates of laminated phenolic plastic with engraved letters 3/16" high at push-button stations, thermal overload switches, receptacles, wall switches and similar devices where the nameplate is attached to the device plate. At all other locations, make lettering 1/4" high, unless otherwise detailed on the drawings. Securely fasten nameplates to the equipment. Motor nameplates may be non-ferrous metal not less than 0.03" thick, die stamped.
- B. Pre-marked, self adhesive, wrap around type markers, manufacturers: Brady, T&B, E-Z Code.

PART 3 EXECUTION

3.1 INSTALLATION

- A. General: Equip the following items with nameplates:
 - 1. All motors, motor starters, motor control center, push-button stations, control panels, time switches.
 - 2. Disconnect switches, fused or unfused, switchboards and panelboards, circuit breakers, contactors or relays in separate enclosure.

3. Power receptacles where the nominal voltage between any pair of contacts is greater than 150 volts.
 4. Wall switches controlling outlets for lighting fixtures or equipment where the outlets are not located within sight of the controlling switch.
 5. Special electrical systems at junction and pull boxes terminal cabinets and equipment racks.
- B. Adequately describe the function of or use of the particular equipment involved. Where nameplates are detailed on the drawings, use inscription and size of letters as shown. Include on nameplates for panelboards and switchboards the panel designation, voltage and phase of the supply. The name of the machine or the motor nameplates for a particular machine must be the same as the one used on all motor starter, disconnect and push button station nameplates for that machine.
- C. The Contractor shall provide typed panel schedules for all electrical panels. Schedules shall reflect actual wiring incorporating all field changes. Copies of Panel Schedules from the construction drawings are not acceptable.
1. Panel Schedules shall reflect room numbers as depicted by the Owner as well as construction numbers.
- D. Label all junction boxes with a black permanent marker indicating circuit number and distribution panel or motor control center feeding the circuits contained therein.
- E. At each panel, provide a phenolic plastic plate with 1/4-inch high engraved letters, stating the voltages in the panel, the color code of the wires in the panel, power supply origination, the arc flash hazard, and the date of the installation. Attach to the panel cover with stainless steel bolts, locknuts and nuts or locking nuts. At the main disconnect, provide a label noting the available fault current and date of installation.
- F. All breakers within each panel are to be labeled.
- G. All underground conduits are to be labeled as to each end.

END OF SECTION

SECTION 26 05 73

OVERCURRENT PROTECTIVE DEVICES

PART 1 GENERAL

1.1 WORK INCLUDED

- A. Fuses.
- B. Molded-case circuit breakers.

1.2 RELATED WORK

- A. Section 26 24 16: Panelboards.
- B. Section 26 28 18: Motor and Circuit Disconnects.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Fuses:
 - 1. Bussman.
 - 2. Littlefuse.
- B. Breakers and Relays:
 - 1. Eaton.
 - 2. General Electric.
 - 3. Siemens.
 - 4. Square D.

2.2 CIRCUIT BREAKERS

- A. General: Except as otherwise indicated, provide circuit breakers and ancillary components, of types, sizes, ratings and electrical characteristics indicated, which comply with manufacturer's standard design, materials, components and construction in accordance with published product information and as required for a complete installation.
- B. Molded-Case Circuit Breakers: Provide factory assembled molded-case circuit breakers of frame assembled molded-case circuit breakers of frame size voltage and

interrupting ratings as indicated on the drawings. Provide breakers with permanent thermal and instantaneous magnetic trips in each pole and ampere ratings and indicated. Construct with overcenter, trip-free, toggle type operating mechanisms with quick-make, quick break action and positive handle indication. Construct breakers for mounting and operating in any physical position and operating in an ambient temperature of 40 Deg. C. Provide breakers with mechanical screw type removable connector lugs, AL/CU rated.

- C. Any overcurrent protection device rated 1200A or higher shall be furnished with an energy-reducing maintenance switching feature with local status indication. This feature shall be furnished with the overcurrent device by the manufacturer.
- D. Tandem circuit breakers are not acceptable.

2.3 FUSES

- A. General: Except as otherwise indicated, provide fuses of types, sizes, ratings and average time-current and peak let through current characteristics indicated, which comply with manufacturers' standard design, materials and construction in accordance with published product information and with industry standards and configurations.
- B. Class RK1 and Class J Current Limiting Fuses: Provide UL Class RK1 and Class J current limiting fuses rated 200,000 RMS symmetrical interrupting current for protecting motors and equipment, equal to Buss LPN-RK or LPS-RK.

PART 3 EXECUTION

3.1 INSTALLATION OF OVERCURRENT PROTECTIVE DEVICES

- A. Install overcurrent protective devices as indicated in accordance with the manufacturer's written instructions and with recognized industry practices to insure that protective devices comply with requirements. Comply with NEC and NEMA standards for installation of overcurrent protective devices.
- B. Coordinate with other work, including electrical wiring work as necessary to interface installation of overcurrent protective devices.
- C. Fasten circuit breakers without mechanical stresses, twisting or misalignment being exerted by clamps, supports or cabling.

3.2 FIELD QUALITY CONTROL

- A. Prior to energization of overcurrent protective devices, test devices for continuity of circuitry and for short circuits. Correct malfunctioning units and then demonstrate compliance with requirements.

END OF SECTION

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SECTION 26 21 02

UNDERGROUND DISTRIBUTION

PART 1 GENERAL

1.1 DESCRIPTION

- A. Work in contract: As indicated on plans.
- B. Work not in contract:
 - 1. Service transformer(s): Provided by serving utility.
 - 2. Primary conductors: Provided by serving utility.

1.2 SUBMITTALS

- A. Shop drawings:
 - 1. Pull Boxes.
- B. Product data:
 - 1. Specification comparison.
 - 2. Duct bank conduit separation.
- C. Project information:
 - 1. Test reports.

1.3 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Store conduit to avoid warping or deterioration.
- B. Store plastic conduit on flat surface protected from direct rays of sun.

1.4 JOB CONDITIONS

- A. Protect existing utilities and structures as indicated in Section 26 00 10.
- B. Avoid overloading. Keep surcharge sufficient distance back from edge of excavation to prevent slides or caving. Maintain and trim excavated materials in such a manner to be as little inconvenience as possible to public and adjoining property owners.

- C. Provide full access to public and private premises, to fire hydrants, at street crossings, sidewalks and other points as designated by Engineer to prevent serious interruption of travel.

PART 2 PRODUCTS

2.1 DUCT SYSTEM

- A. Primary duct system: Multiple (or single) 4-inch single, round-bore PVC conduits, coordinate with the local utility company.
 - 1. Rigid PVC conduit: As specified in Section 26 05 34.
 - 2. Separators: Concrete, plastic or other non-metallic, non-decaying material.
- B. Pull wire: 1/4-inch heavy nylon cord or 1/4-inch pull tape, free of kinks and splices.

2.2 PULL BOXES

- A. Conduit pull boxes equal to Quazite # PC1324 BB12/00, cover # PC1324CA-17. Modify size to match quantity of conduits used. Space per NEC.
- B. Provide gravel bed with drainage and install per manufacturer's instructions.

2.3 BACKFILL MATERIAL

- A. Backfill material:
 - 1. 1/2 inch washed rock.

PART 3 EXECUTION

3.1 EXCAVATING AND TRENCHING - GENERAL

- A. Remove and dispose of materials determined by Civil Engineer to be unsuitable.
- B. Trench, backfill and compact for all underground utilities.

3.2 TRENCH EXCAVATION

- A. Excavate trenches by open cut method to depth necessary to accommodate the work.
 - 1. Permission may be granted for tunnel work for crossing under crosswalks, driveways or existing utility lines.
- B. Open no more than 300 LF of trench at one time, or less, as required by Engineer. Failure to comply may necessitate shutdown of entire project until backfilling is performed.

- C. Carry rock excavations minimum of 12 inches below indicated grades.
- D. Avoid over-excavating below indicated grades unless required to remove unsuitable material.
- E. Back-fill over-excavations with 1/2 inch rock.
- F. Trench size: Excavate only sufficient width to accommodate free working space.
 - 1. Cut trench walls vertically from bottom of trench to top of conduit.
- G. Keep trenches free of water.

3.3 EXISTING UTILITIES

- A. Protect all existing utilities.
- B. Pay fees for all new services.

3.4 INSTALLATION OF PRIMARY AND SECONDARY DUCT SYSTEM

- A. Install duct lines so that top of conduit is not less than 30 inches for secondary ducts and 48 inches for primary ducts below finished grade or finished paving at any point.
- B. Accomplish changes in direction of runs exceeding total of 10 degrees, either vertical or horizontal, by long sweep elbows.
 - 1. Manufactured bends: Minimum radius of 48 inches for primary ducts of 4 inches in diameter and larger, 24 inches for secondary ducts.
- C. Thoroughly clean conduit before using or laying.
- D. Lay no conduit in water or in unsuitable weather or trench conditions.
- E. During construction and after duct line is completed, plug ends of conduits to prevent water washing into conduit or manholes.
 - 1. Take particular care to keep conduits clear of concrete, dirt, and any other substance during course of construction.
- F. After duct line has been completed, pull standard flexible mandrel not less than 12 inches long, with diameter approximately 1/4 inch less than inside diameter of conduit, through each conduit. Then pull brush with stiff bristles through each conduit to make certain that no particles of earth, sand, or gravel have been left in line.
- G. Pneumatic rodding may be used.

- H. Install nylon pull string in all unused new ducts.
 - 1. Extend minimum of 3 feet into each manhole or above pads beyond ends of ducts.
- I. Provide uniform spacing between conduits: Not less than 3.5 inches.
 - 1. Place separators on maximum 4 feet centers.
 - 2. Securely anchor ducts to prevent movement during placement of concrete.
- J. Make conduit joints in accordance with manufacturer's recommendations for conduit and coupling selected.
 - 1. Make plastic conduit joints by brushing plastic solvent cement on inside of plastic coupling fitting and outside of conduit ends.
 - 2. Slip conduit and fitting together with quick one-quarter-turn twist to set joint tightly.
- K. Coordinate service conduits entering the building with the Structural Engineer.

3.5 BACKFILLING

- A. Do not backfill until all tests are performed on system, and system complies with specified requirements.
- B. Hand or pneumatic tamp backfill around and over pipe in lifts not exceeding 8 inches loose thickness.
- C. Compact to density specified, so pipe will not be injured.
- D. Exercise care in backfilling operations to avoid displacing pipe joints either horizontally or vertically and to avoid breaking pipe.
- E. Do not water flush for consolidation.

3.6 COMPACTION

- A. Compact all trench backfill in areas under paved roads, parking areas, sidewalks and other structures as directed by Civil Engineer to at least 95 percent of maximum dry density.
- B. In locations where trench will not be under paved areas, compact backfill to minimum 90 percent of maximum dry density.
- C. Remove materials which cannot be compacted as specified.

D. Backfill with 1/2 inch washed rock.

END OF SECTION

26 21 02 - 5

SECTION 26 24 16

PANELBOARDS

PART 1 GENERAL

1.1 WORK INCLUDED

- A. Branch circuit panelboards.

1.2 REGULATORY REQUIREMENTS

- A. Construct panelboards to UL standards and provide UL labels.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Eaton.
- B. General Electric.
- C. Siemens.
- D. Square D.

2.2 ENCLOSURES

- A. Panels: Surface (or flush) mounted complete with hinged trim with outer door lock and metal directory frame.
- B. Panel Can: Galvanized, painted to match trim.
- C. Keys: Provide two keys for each panel. Make keys interchangeable for panels on this project.

2.3 120/208 AND 277/480 VOLT PANELBOARDS

- A. Panelboards: Single phase, 3-wire, solid neutral design with sequence style bussing, full capacity neutral and bare uninsulated grounding bar bolted to enclosure, composed of an assembly of bolt-in-place molded case automatic air circuit breakers with thermal and magnetic trip and trip free position separate from either "ON" or "OFF".
- B. Furnish and install power and distribution panelboards, equipped with thermal magnetic molded case circuit breakers of frame, trip ratings and interrupting capacities, as shown on the panelboard schedule, manufactured in accordance with the

latest NEMA standards, listed by Underwriters' Laboratories, Inc. and bearing the UL label.

- C. Panelboard Main Bus, Main Lugs and/or Main Breaker: Copper only with current ratings as shown on the panelboard schedule. Current density in accordance with Underwriters' Laboratories requirements. Bus mounting for circuit breakers of the bolted connection type and accommodating any combination of circuit breaker units without further modification, wiring lugs suitable for copper conductors.
- D. Circuit Breakers: Quick make and quick break trip free on overload or short circuit; multi-pole breakers with common trip, wiring terminals suitable for the type conductor specified, bolt-on connections to the bus.
- E. Steel Box: As specified by Underwriters' Laboratories standards, end walls removable, size of wiring gutters in accordance with Underwriters' Laboratories standards, trim of code-gauge steel with primer and durable enamel finish, trim doors equipped with spring latch and cylinder lock keyed alike. Each individual circuit to be clearly numbered on the face of the panelboard and a directory for circuit identification provided.
- F. Where noted on the plans, provide "SPD" units.
 - 1. On main service equipment provide units equal or better than 125 kA per mode, minimum.
 - 2. On sub panels provide units equal to 80 kA per mode, where called for.
 - 3. All units to be built in to the panels called for. Provide with phase indicating lights and disconnecting means.
- G. The panelboard wholesale supplier shall have an office and a stocking warehouse within 100 miles of the project site. The distributor/manufacturer's representative shall have an office within 100 miles of the project site, and shall have on staff a full time designer as well as personnel who are available to service the project after completion.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Provide mounting brackets, busbar drillings and filler pieces for unused spaces.
- B. Prepare and affix typewritten directory to inside cover of panelboard indicating loads controlled by each circuit. Label with construction and permanent room numbers.

- C. Provide 4-inch housekeeping concrete pads for all floor mounted units which are located inside the building or outdoors.
- D. At each panel, provide a phenolic plastic plate with 1/4-inch high engraved letters, stating the voltages in the panel and the color code of the wires in the panel and the available fault current and date of installation. Attach to the panel cover with stainless steel bolts, locknuts and nuts or locking nuts.

END OF SECTION

SECTION 26 27 26

WALL SWITCHES, RECEPTACLES, AND PLATE COVERS

PART 1 GENERAL

1.1 WORK INCLUDED

- A. Wall switches.
- B. Receptacles.
- C. Plate covers.

1.2 RELATED WORK

- A. Section 26 05 26: Grounding.
- B. Section 26 05 37: Outlet and Pull Boxes.
- C. Section 26 05 53: Identification.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Arrow Hart.
- B. Bryant.
- C. Eagle.
- D. General Electric.
- E. Hubbell.
- F. Leviton.
- G. P&S.
- H. Substitutions: See Section 26 00 10 - General Electrical Provisions.

2.2 WALL SWITCHES

- A. Acceptable Devices
 - 1. Single Pole Switch: Type 1221, or equal.
 - 2. Double Pole Switch: Type 1222, or equal.

3. Three-way Switch: Type 1223, or equal.
4. Four-way Switch: Type 1224, or equal.
5. Dimmers: Lutron "NOVA" Series or equal; size as required per the circuit wattage, 600 watt minimum. Provide type for the fixtures being dimmed.
6. Two-pole switches used to control two loads, like lights and exhaust fans in restrooms, must be "rated" for that duty.
7. Keyed Switches: Provide four keys per switch.

B. Materials

1. 120/277 Volt Switches: Quite slow make, slow break design, toggle handle with totally enclosed case, rated 20 ampere, specification grade. Provide matching two pole, three-way and four-way switches.
2. Color: Coordinate with the Architect.
3. Dimmers: Electronic switching type with toroid filter coil to eliminate RF interference.
4. Two-pole switches used to control two loads, like lights and exhaust fans in restrooms, must be "rated" for that duty.
5. Provide metal barrier between gangs in boxes, where adjacent switches have a potential in excess of 300V between conductors.

2.3 RECEPTACLES

A. Device: Receptacles In General Use Areas of Project: All receptacles shall be commercial grade and shall be "Tamper Resistant."

1. Duplex Receptacle: Type BR20TR, or equal.
2. Duplex Receptacle, GFCI: Type GFTR20, or equal.
3. Single Receptacle: Type 5361, or equal.
4. Special Outlets: See Plans.
5. Isolated Ground Receptacle: Type 5362IG, or equal.

B. Devices

1. Standard Duplex Receptacle: Nema 5-20R. Full gang size, polarized, duplex, parallel blade, U grounding slot, rated at 20 amperes, 125 volts, designed for split feed service.
2. Nameplates: Provide engraved or embossed plastic for receptacles other than standard duplex and standard single receptacles indicating voltage, phase and amperes.
3. Isolated ground outlets to be orange, emergency circuit devices to be red, all other device colors to be coordinated with the Architect.
4. Exterior receptacles are to be "GFI" and rated as "weather resistant".

2.4 PLATE COVERS

A. Materials

1. Stainless Steel: Type 302 or 304, No. 4 finish, 0.040 inches thick, accurately die cut, protected with release paper.
2. Cast Metal: Die cast profile, ribbed or strength, flash removed, primed with grey enamel, furnished complete with four mounting screws.
3. Gaskets: Resilient rubber or closed cell foam urethane.
4. Nylon: High-performance, molded nylon.
5. Stamped Metal: For use on 4" square boxes.

B. Device

1. Flush Mounting Plates: Beveled type with smooth rolled outer edge.
2. Surface Box Plates: Beveled, steel, pressure formed for smooth edge to fit box.
3. Weatherproof Plates: CAST METAL, gasketed; for receptacles, provide the weatherproof "while in use" type.
4. Where two-gang boxes are required for single gang devices, provide special plates with device opening in one gang and second gang blank.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Coordinate switch mounting location with architectural detail and heights as noted on plans.

- B. Run separate neutral for each lighting circuit.
- C. Install switches at 46" to center above finished floor, coordinate with brick layers where applicable.
- D. Mount receptacles at mounting heights specified on the plans, 18" to center of the box unless noted otherwise.
- E. Connect all devices using pigtails. Do not through-wire on device terminals.
- F. Mount outlets for electric water coolers and other similar permanently installed plug connected equipment behind equipment according to approved installation drawing, coordinate with the equipment installer.
- G. Install coverplates on wiring devices level and with all four edges in contact with finished surface.
- H. Use nylon plates, color to match devices as specified by the Architect, in all interior areas unless noted. Use steel plates in mechanical and utility type areas.

END OF SECTION

SECTION 26 28 18

MOTOR AND CIRCUIT DISCONNECTS

PART 1 GENERAL

1.1 WORK INCLUDED

- A. Provide and install motor and circuit disconnects.

1.2 REGULATORY REQUIREMENTS

- A. Conform to National Electrical Code and to applicable inspection authority.

1.3 REFERENCES

- A. Underwriters' Labs, Inc. Annual Product Directories.
- B. Classification of Standard Types of Non-ventilated Enclosures for Electric Controllers, National Electrical Manufacturers Association.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Eaton.
- B. General Electric.
- C. Hubbell.
- D. Leviton.
- E. Square D.

2.2 EQUIPMENT

- A. Provide motor and circuit disconnects with UL label.
- B. Single Phase 120 Volt Disconnect Switches: Double pole toggle switch, Leviton MS302.
- C. Provide with lockable covers.
- D. Three-Phase Motor Disconnect Switches and Single Phase 240 Volt Disconnect Switches: 2 or 3 pole heavy duty fusible or non-fusible as shown, 250 or 480 volt as required in NEMA Type 1 or 3 enclosures. Provide with lugs for suitable wire range,

with ground lug, copper current carrying parts, silver-tungsten contacts, reinforced fuse clips for type R rejection fuses.

- E. Provide NEMA "4/4X" type disconnects within the kitchen area.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install motor and circuit disconnect as recommended by manufacturer and as required by Code.
- B. Where required by local authorities, install disconnects for all roof mounted equipment separate from that equipment. Furnish (galvanized) "Unistrut" or angle iron mounting stands with B-Line DB series roof top support base. Coordinate with the equipment supplier and Roofing Contractor.

END OF SECTION

SECTION 26 51 00

INTERIOR BUILDING LIGHTING

PART 1 GENERAL

1.1 WORK INCLUDED

- A. Installation of luminaires, supports and accessories.
- B. Emergency lighting units.
- C. Exit signs.
- D. Lamps.
- E. Ballasts, drivers, and accessories.

1.2 RELATED WORK

- A. Section 26 05 19: Wires and Cables.
- B. Section 26 05 29: Supporting Devices.

1.3 REFERENCES

- A. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.4 SUBMITTALS

- A. Submit shop drawings and product data in accordance with General Conditions including pertinent physical characteristics and complete photometric data reports from independent testing laboratory.
- B. Shop Drawings: Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
- C. Product Data: Provide dimensions, ratings, and performance data.
- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Quality Assurance. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

- E. Operation and Maintenance Data: Instructions for each product. Installation manuals are required.

1.5 COORDINATION

- A. Confirm compatibility and interface of other materials with luminaire and ceiling system. Report discrepancies to the Engineer/Architect and defer ordering until clarified.
- B. Supply plaster frames, trim rings and backboxes to other trades.
- C. Coordinate with Division 23 to avoid conflicts between luminaires, supports, fittings and mechanical equipment.
- D. Conform to requirements of NFPA 70.
- E. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years experience.
- F. Products: Listed and classified by Underwriters Laboratories, Inc. or testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.
- G. The lighting wholesale supplier shall have an office and a stocking warehouse within 100 miles of the project site. The distributor/manufacturer's representative shall have an office within 100 miles of the project site, and shall have on staff a full time lighting designer as well as personnel who are available to service the project after completion.
- H. Any substitutions to the light fixture schedule shall be proven, by the manufacturer at the discretion of the Engineer, to be of equal or superior quality, material, and performance than the specified light fixtures. All requests for substitutions shall be submitted along with fixture specification sheets, photometric calculations and electronic ies files 10 days prior to bid opening date for review. Substitutions shall be requested in writing only, accompanied by the above listed electronic ies files.
Substitutions will not be considered if they are indicated or implied in shop drawing submission without previous formal request. Substitutions will not be considered if they require substantial revision of the contract documents. The Contractor shall be responsible for any and all additional costs required by modifications to architectural, structural, mechanical or electrical facilities, devices, systems, etc. resulting from the approved substitution.
- I. Light fixtures and ballasts are to comply with the fixture schedule and the Specifications.

PART 2 PRODUCTS

2.1 LUMINAIRES

A. Acceptable Manufacturers

1. Provide products of manufacturers as listed in the lighting fixture schedule or equal, subject to compliance with requirements.
2. Fixtures are to be supplied in manufacturer's standard cartons.
3. Substitutions: See Section 26 00 10 - General Electrical Provisions.

B. Lensed Luminaires

1. Pre-treat housing and finish in high reflectance baked white powder paint on exposed and reflective surfaces giving reflectance of 90% minimum average. Paint shall be applied after fabrication.
2. Reflective end plates may be 20 gauge metal.
3. Provide full 22 gauge steel housing.
4. Provide hinged frames with fully enclosed spring loaded cam latches and T-type hinges, removable for cleaning without tools. Support lay-in lenses on four sides with flip ends on short dimension.
5. Provide gasketing, stops and barriers to form light traps and prevent light leaks.
6. Design luminaire to dissipate ballast and lamp heat.
7. Use formed or ribbed backplates, endplates, reinforcing channels.
8. Provide virgin acrylic diffusers, 0.125" thick nominal, number 12 pattern, 7.8 oz. weight per square foot.
9. Furnish products as indicated in Fixture Schedule, or equal.

C. Recessed Luminaires

1. Supply recessed luminaire complete with trim type required for ceiling system installed. Before ordering, confirm ceiling construction details and architectural finish for each area. Supply with "IC" type housing or gyp board hat over the fixture, where insulation will cover.
2. Fixtures shall be delivered to the job site in factory provided individual cartons.

3. All damaged fixtures are to be replaced

2.2 LAMPS

A. Acceptable Manufacturers

1. General Electric.
2. Osram/Sylvania.
3. Philips.

B. LED Lamps

1. LED Lamps: Manufacturers must have Energy Star/DLC rating or shall offer LM-80 and TM-21 test reports to the public online.
2. LED estimated useful life: Minimum of 50,000 hours at 70% lumen maintenance, calculated based on LM-80 test data.
3. LED fixtures shall be modular and allow for separate replacement of LED lamps and drivers. User serviceable LED lamps and drivers shall be accessible and replaceable from the room side.
4. Light fixture provider shall provide all low voltage control wiring for dimmable fixture.
5. Note lamp color specifications on the fixture schedule, minimum CRI shall be 80.
6. All light fixtures shall be provided with a 5 year warranty on the LED and driver system.

2.3 BALLASTS AND DRIVERS

A. Provide ballasts that meet standards of an electrical testing laboratory and the Certified Ballasts Manufacturers' Association.

B. Acceptable Manufacturers:

1. Universal.
2. Philips/Advance.
3. Osram/Sylvania.

C. LED Drivers

1. LED drivers shall be electric-type, labeled as compliant with radio frequency interference (RFI) requirements of FCC Title 47 Part 15, and comply with NEMA SSL 1 "Electronic Drivers for LED Devices, Arrays, or System". LED drivers shall have a sound rating of "A", have a minimum efficiency of 85%, and be rated for a THD of less than 20 percent at all input voltages.
2. Dimmable LED drivers shall be 0-10V type unless otherwise noted on the schedule. Dimmable LED drivers shall be capable of dimming without LED strobing or flicker across their full dimming range.
3. Emergency LED drivers shall be manufactured by a company with a minimum of five (5) years service. They shall be factory installed and tested, to include red pilot lights. They shall be manufactured by Bodine Mfg. and be rated at 1100 lumens, minimum.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install lamps in accordance with manufacturer's instructions.
- B. Provide spare lamps in the amount of 5% of the total count, or 5 each type, whichever is the greater number.
- C. All incandescent lamps shall be replaced at the Date of Substantial Completion.
- D. Provide ballasts of compatible design to lamps specified.
- E. No "Daisy Chaining" of fixtures is allowed.
- F. Install fixtures securely, in a neat and workmanlike manner.
- G. Install suspended luminaires and exit signs using pendants supported from swivel hangers. Provide pendant length required to suspend luminaire at indicated height.
- H. Support all luminaires independent of ceiling framing, directly from building structure by rod hangers and inserts or suspension wire, two per fixture.
- I. Install surface mounted luminaires and exit signs plumb and adjust to align with building lines and with each other. Secure to prevent movement.
- J. Install recessed luminaires to permit removal from below.
- K. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.

- L. Install clips to secure recessed grid-supported luminaires in place.
- M. Install wall mounted luminaires, emergency lighting units, and exit signs at height as scheduled.
- N. Manufactured wiring systems are approved. Provide submittals per Specifications.

3.2 RECESSED LUMINAIRES

- A. Perform field inspection, testing, and adjusting in accordance with Section 26 00 10.
- B. Install recessed luminaires to permit removal from below to gain access to outlet or pre-wired fixture box.
- C. Install an accessible junction box not less than two feet away from the fixture and connect to it by not less than four feet nor more than six feet of flexible conduit, using type of fixture wire approved for this purpose.
- D. Mount in suspended ceiling with exposed tee bar grid system, support directly from the building structure by a minimum of two support wires.
- E. Hold insulation back from all fixtures by three (3) inches and clear on top.
- F. A disconnecting means is required for all ballasted luminaires with double ended lamps. Install per NEC 410.130(G).

3.3 ALIGNMENT

- A. Aim and adjust luminaires.
- B. Align luminaires, clean diffusers and replace burned out lamps prior to final acceptance.

3.4 FIRE RATED CEILINGS

- A. Where recessed fixtures will penetrate either fire-rated ceilings or fire rated gypsum board located above suspended ceilings, the fire-rated ceiling or gypsum board shall be continuous over and around the fixture housing and outlet box. Coordinate the ceiling and fixture installations to insure a continuous fire rated ceiling.

3.5 FINALLY

- A. Remove dirt and debris from enclosures.
- B. Clean photometric control surfaces as recommended by manufacturer.
- C. Clean finishes and touch up damage.

- D. Relamp luminaires that have failed lamps at Substantial Completion and all lamps that have been energized during construction for more than 500 hours.

END OF SECTION

26 51 00 - 7

SECTION 26 56 00

EXTERIOR LIGHTING

PART 1 GENERAL

1.1 WORK INCLUDED

- A. Installation of luminaires, supports and accessories.

1.2 RELATED WORK

- A. Section 26 05 19: Wires and Cables.
- B. Section 26 51 00: Interior Building Lighting.

1.3 REFERENCES

- A. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.4 SUBMITTALS

- A. Submit shop drawings and product data in accordance with General Conditions including pertinent physical characteristics and complete photometric data reports from independent testing laboratory.
- B. Shop Drawings: Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
- C. Product Data: Provide dimensions, ratings, and performance data.
- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Quality Assurance. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- E. Operation and Maintenance Data: Instructions for each product.

1.5 COORDINATION

- A. Confirm compatibility and interface of other materials with luminaire and ceiling system. Report discrepancies to the Engineer/Architect and defer ordering until clarified.

- B. Products: Listed and classified by Underwriters Laboratories, Inc. or testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Provide products of manufacturers as listed in the lighting fixture schedule, or equal.
- B. LED Lamps
 - 1. LED Lamps: manufacturers must have Energy Star/DLC rating or shall offer LM-80 and TM-21 test reports to the public online.
 - 2. LED estimated useful life: Minimum of 50,000 hours at 70% lumen maintenance, calculated based on LM-80 test data.
 - 3. LED fixtures shall be modular and allow for separate replacement of LED lamps and drivers.
 - 4. Light fixture provider shall provide all low voltage control wiring for dimmable fixture.
 - 5. All light fixtures shall be provided with a 5 year warranty on the LED and driver system.
 - 6. Note lamp color specifications on the fixture schedule, minimum CRI shall be 80.
 - 7. All exterior light fixtures shall be, at a minimum, IP64 rated.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install fixtures securely on poles and pole bases as shown on the plans.
- B. Install surface mounted luminaires plumb and adjust to align with building lines and with each other. Secure to prevent movement.
- C. Install recessed luminaires to permit removal from below.
- D. Install wall mounted luminaires and emergency lighting units at height as scheduled.

3.2 RECESSED LUMINAIRES

- A. Perform field inspection, testing, and adjusting in accordance with Section 16010.

- B. Install recessed luminaires to permit removal from below to gain access to outlet or pre-wired fixture box.
- C. Mount in suspended ceiling with exposed tee bar grid system, support directly from the building structure by a minimum of two support wires.
- D. Hold insulation back from all fixtures by three (3) inches and clear on top.

3.3 ALIGNMENT

- A. Aim and adjust luminaires.

3.4 FINALLY

- A. Remove dirt and debris from enclosures.
- B. Clean photometric control surfaces as recommended by manufacturer.
- C. Clean finishes and touch up damage.

END OF SECTION

SECTION 27 10 05

CONDUIT FOR TELEPHONE/DATA AND TV RACEWAY SYSTEM

PART 1 GENERAL

1.1 WORK INCLUDED

- A. Telephone/Data and TV raceway system.

1.2 RELATED WORK

- A. Section 26 05 19: Wires and Cable.
- B. Section 26 05 34: Conduit.
- C. Section 26 05 37: Outlet and Pull Boxes.
- D. Section 26 05 53: Identification.

1.3 SYSTEM DESCRIPTION

- A. At TV locations, provide a 4" outlet box and plaster ring with 3/4" raceway to above a drop ceiling in an accessible area. Leave a pull string in each raceway. End each stub up with a 90-degree elbow. Mount as shown on the plans.
- B. At all telephone/data locations, provide a 4" outlet box and plaster ring with 1" raceway to an accessible area above a ceiling. Leave a pull string in each raceway. End each stub-up with a 90-degree elbow.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Conduit: Refer to Section 26 05 34.
- B. Outlet and Pull Boxes: Refer to Section 26 05 37.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Provide an insulated throat connector or plastic bushing where raceways are stubbed out above the ceiling, including a 90-degree elbow on the end of the conduit.
- B. Provide a nylon blank cover plate for any outlet location which is not to be used. Allow for this quantity to be 50% of total data outlets.

- C. Provide conduit for all low voltage wiring which is installed in areas which have no ceiling or hard ceiling.
- D. All device plates are to be nylon.

END OF SECTION

SECTION 28 31 05

FIRE ALARM SYSTEM

PART 1 GENERAL

1.1 SCOPE AND RELATED DOCUMENTS

- A. The work covered by this section of the specifications includes the furnishing of all labor, equipment, materials, and performance of all operations in connection with the installation of the Fire Alarm System as shown on the drawings and as herein specified.
- B. The requirements of the conditions of the Contract, Supplementary Conditions and General Requirements, apply to the work specified in this section.
- C. The complete installation is to conform to the applicable sections of NFPA-72, Local Code Requirements and National Electrical Code with particular attention to Article 760 and all other applicable regulatory requirements.
- D. The work covered by this section of the specifications is to be coordinated with the related work as specified elsewhere under the project specifications.

1.2 REGULATORY REQUIREMENTS

- A. The system and all associated operations shall be installed in accordance with the following:
 - 1. Guidelines of the following Building Code: IBC.
 - 2. NFPA 72, National Fire Alarm Code.
 - 3. NFPA 70, National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
 - 4. Other applicable NFPA standards.
 - 5. Local Jurisdictional Adopted Codes and Standards.
 - 6. ADA Accessibility Guidelines.
- B. Equipment: All devices, combinations of devices, notification appliances, and equipment, shall be listed for the purpose for which they are used and shall be installed in compliance with applicable codes and standards.

- C. Type of System: The control panel shall be listed for power-limited applications per NEC 760 and for compliance with the National Fire Protection Association Standard NFPA 72 for Protected Premises, Public Reporting, and/or Supervising Station fire alarm systems.
- D. Type of Service: The control panel shall be listed for the applicable types of service.
- E. Type of Signaling: The control panel shall be listed for the applicable types of signaling methods used, i.e. Temporal Coded, Zone Coded, Non-Coded, March Time and/or Digital Alarm Communicator (DACT) Signaling.

1.3 SYSTEM DESCRIPTION

A. Fire Alarm System:

- 1. Provide a complete, supervised, power-limited, fire detection and evacuation system.
 - a. All equipment herein specified is that of and depicts the type and quality of the equipment to be furnished.

B. System Supervision:

- 1. The fire alarm system shall be an electrically supervised system, which shall monitor the integrity of circuit conductors and power supplies. Performance of fire alarm system circuits shall be in accordance with Class B (Style B) operation for Initiating Device Circuits, and Class B (Style Y) operation for Notification Appliance Circuits.
- 2. Remote annunciator LEDs and associated wiring and remote emergency control wiring shall be supervised such that an open condition in the circuit shall cause a trouble indication at the control panel.

C. LED Indicators:

- 1. The control panel shall have a red LED display that shall automatically scroll to chronologically display the IDC zone number of all alarm and supervisory conditions. Supervisory conditions shall be clearly differentiated from fire alarm conditions by using the decimal point of the display and shall also be indicated by pulsing a separate dedicated yellow LED.
- 2. The control panel shall have a yellow LED display that shall automatically scroll to chronologically display distinct trouble conditions. Manual operation of the scrolling shall be provided to control the scroll rate. The following trouble conditions shall be capable of being displayed:

- a. IDC Zones, identified by zone number.
 - b. IDC Auxiliary Output Trouble, identified by zone number.
 - c. Auxiliary Alarm Output Trouble, identified by zone number.
 - d. Low Battery Trouble.
 - e. City Circuit Trouble.
 - f. Configuration Trouble.
 - g. Depleted or Disconnected Battery Trouble.
 - h. NAC 1 Trouble.
 - i. Walk Test Enabled (System is in Walk Test "Trouble").
 - j. Program Trouble.
 - k. Power Supply Trouble.
 - l. Ground Fault Trouble.
3. Separate LED indicators shall be provided for:
- a. Indication of supervisory conditions by yellow LED.
 - b. Indication that alarm conditions have been manually silenced by yellow LED.
 - c. AC power normal indicated by illuminating a green LED.
- D. Alarm Sequence of Operation:
1. Activation of an alarm Initiating Device shall:
- a. Cause the red LED display to display the number of the zone in alarm. In the event that multiple zones are in alarm, the zone numbers shall be scrolled in chronological order.
 - b. Activate the panel tone-alert audible indicator.
 - c. Cause the audible alarm Notification Appliances to sound in a Temporal Code General Alarm pattern throughout the entire facility.
 - d. Cause the common Auxiliary Alarm output to activate.
 - e. Cause the IDC Auxiliary output to activate.

- f. Cause the Visual Notification Appliances to operate.
 - g. Cause the remote tone-alert audible signal and associated red zone LED on the remote annunciator to flash.
 - h. Cause a signal to be sent to the building elevator controls.
 - i. Release all door hold-open devices.
- E. Alarm Acknowledge:
 - 1. Activating the Acknowledge switch shall cause the local panel audible tone-alert to silence.
 - 2. Subsequent alarms shall resound the local panel tone-alert.
 - 3. Activating the Alarm Silence switch shall silence all NACs programmed for on-until-silence and shall illuminate the dedicated yellow alarm silenced LED.
- F. Alarm Reset:
 - 1. Restoring the alarm initiating devices to normal and activating the System Reset switch shall restore all alarm circuits to their normal condition.
- G. Trouble Condition Sequence of Operation:
 - 1. The occurrence of a single open or a single ground condition shall: activate an audible signal, flash a distinct indication at the yellow trouble LED display, and activate the common trouble output in accordance with the requirements of the applicable codes and standards so that all means of interconnecting equipment, devices, notification appliances and power supplies shall be monitored for the integrity of the interconnecting conductors, or equivalent.
 - 2. Actuating the Trouble Silence switch shall silence the audible trouble signal and cause the trouble LED to chronologically scroll the received trouble indicators.
- H. Supervisory Condition Sequence of Operation:
 - 1. The occurrence of a supervisory condition shall be annunciated by: flashing the dedicated yellow supervisory LED, activating the audible tone-alert, and activating the common supervisory output. The red, seven-segment fire alarm LED display shall be capable of indicating the zone number of the IDC in supervisory condition. The seven-segment display shall clearly differentiate between alarm zone numbers and supervisory zone numbers.
- I. Indicator Test:

1. The control panel shall incorporate an Indicator Test procedure for manually testing of the local audible tone device, zone alarm and supervisory display, zone trouble display, and individual operator panel LED indicators.

J. Provide one year of off-site monitoring along with a quote for two more years.

1.4 QUALIFICATIONS

- A. Manufacturer: The manufacturer shall be a nationally recognized company specializing in detection and alarm systems. The manufacturer and service organization shall have a minimum of 10 years experience in the fire detection and alarm systems industry.
- B. Installer: The installation organization shall be a company specializing in the installation of detection and alarm systems. This organization shall have a minimum of 10 years experience with installation of fire detection and alarm systems. The fire alarm system shall be installed by NICET certified installers. This organization shall employ factory trained and NICET certified technicians, and shall maintain a service organization within 100 miles of this project location. At least one employee shall be NICET level III certified or be a licensed professional engineer trained in fire detection and alarm systems.

1.5 SUBMITTALS

- A. Submit manufacturer's product data sheets for all proposed devices and equipment.
- B. Provide wiring diagrams, equipment ratings, dimensions, and finishes for all proposed devices and equipment.
- C. If submittals, upon review by the Owner and/or the Owner's Representative, are found not to conform with the performance, type and quality of products as well as all other requirements of these specifications, the Contractor shall be required to resubmit. The Contractor shall be responsible for the Owner's extra expenses for subsequent review(s) of rejected submittals. Such extra fees shall be deducted from payments by the Owner to the Contractor. Approval of the submittals by the Owner shall, in no case, relieve the Contractor of the responsibility to meet the requirements of this specification.
- D. Shop Drawings: A complete set of shop drawings shall be supplied. The shop drawings shall be reproduced electronically in digital format. This package shall include but not be limited to:
 1. Control panel wiring and interconnection schematics.

2. Complete point to point wiring diagrams.
3. Riser diagrams.
4. Complete floor plan drawing locating all system devices and 1/4" = 1'0" scale plan and elevation of all equipment in the Fire Command Station. Including showing the placement of each individual item of fire alarm, security, and access control equipment as well as raceway size and routing, junction boxes, and conductor size, quantity, and color in each raceway.
5. Include voltage drop calculations for notification and initiation appliance circuits.
 - a. Starting Supply Voltage to be calculated at lowest end of -10% voltage variance: ie 21.6V for 24V system.
 - b. Current per device to be calculated at devices minimal allowed voltage.
 - c. Distance between devices must include up/down distance from concealed ceiling to equipment mounting height.
 - d. Voltage at final device on a line shall be no less than 10% above minimum operating voltage of device. Ex: For a device with voltage range of 16-33V, the lowest allowed voltage is 17.6V at final device.
6. Include battery size calculations.

1.6 PROJECT RECORD (AS-BUILT) DRAWINGS

- A. The Contractor shall provide and maintain on the site an up-to-date record set of approved shop drawings.
- B. Record drawings shall include location of end-of-line device locations.
- C. Upon completion of the work, and final acceptance by the local authority, the Contractor shall submit record drawings to the Owner and the Engineer.

1.7 OPERATION AND MAINTENANCE DATA

- A. Submit manufacturer's data sheets for all equipment installed.
- B. Include operating, installation, and routine maintenance instructions.
- C. Include manufacturer's letter stating the date of installation on which the system is operational.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: The equipment and service described in this specification represent the base bid for the equipment.
 - 1. Subject to compliance with requirements, preapproved manufacturers are by one of the following:
 - a. Siemens Fire Safety.
 - b. EST.
 - c. Notifier.
 - d. Fire Lite.
 - e. Simplex Grinnell.
 - f. Gamewell-FCI.
 - g. Silent Knight.
- B. Being listed as an acceptable Manufacturer in no way relieves the Contractors obligation to provide all equipment and features in accordance with these specifications.

2.2 SUBSTITUTIONS

- A. Other equipment may be substituted as long as the level of quality and performance of operation is equal to, or greater than, that which is specified. The Owner and/or Owners Representative shall make the determination as to whether or not the substitute equipment is acceptable.

2.3 FIRE DETECTION AND CONTROL PANEL

- A. Where shown on the plans, provide and install a fire alarm control panel sized for this project plus projected expansion. Construction shall be modular with solid state, microprocessor based electronics. The control panel shall be addressable utilizing the latest technologies.
- B. The fire alarm control panel cabinet shall provide the following features:
 - 1. The printed circuit board assemblies of the control panel shall be mounted such that removal of a common, single piece mounting chassis shall provide access for installing the cabinet and for pulling wires into the cabinet.

2. Provisions for semi-flush mounting between standard 16-inch center stud wall construction without altering the standard construction dimensions.
 3. Cabinet color shall be red.
 4. To facilitate installation, the cabinet shall provide:
 - a. Built-in depth gauges for 1/2-inch thick drywall installation.
 - b. Built-in knockouts for nail holes and wiring conduit entrance.
 - c. A built-in trim band to allow semi-flush mounting into rough-cut wall openings.
 5. A label mounted to the inside of the cabinet door shall be clearly visible and contain information for the following:
 - a. Summarized installation instructions including location of standard, optional, and expansion modules.
 - b. Operating instructions to include a readily available list to interpret LED display indications.
 - c. Summarized programming instructions.
 6. A separate label shall be provided to allow on-site documentation of the specific location of the individual IDC zones.
- C. The Fire Alarm Control Panel shall contain:
1. Operator interface switches for status acknowledge, alarm silence, and system reset.
 2. Discrete LED indicators to annunciate the following: presence of AC power, status of alarm silenced feature, presence of supervisory conditions.
 3. A red, seven segment LED display shall be provided to annunciate the following:
 - a. The zone number of an IDC in Alarm
 - b. Multiple IDCs in Alarm shall be annunciated by scrolling the number of the zones in chronological order. Scrolling shall be automatic with manual intervention as required to hold and scroll.
 - c. The number of an IDC in a supervisory condition with the decimal point of the display illuminated as a supervisory indicator. This shall be accompanied by the illumination of the supervisory LED.

- d. Multiple IDCs in supervisory shall be annunciated by scrolling the number of the zones in chronological order.
- 4. A yellow LED display shall be provided to distinctly annunciate the trouble conditions. These conditions shall as a minimum include:
 - a. The number of an IDC in trouble.
 - b. Multiple IDCs in trouble shall be annunciated by scrolling the number of the zones in chronological order. Scrolling shall be automatic with manual intervention as required to hold and scroll.
 - c. NAC 1 trouble.
 - d. Annunciator interface module trouble.
 - e. Auxiliary alarm output trouble, indicated by zone.
 - f. Low battery.
 - g. Depleted battery.
 - h. Walk Test system test enabled.
 - i. Programming trouble.
 - j. Power supply trouble.
 - k. Ground fault trouble.
 - l. City Circuit module trouble.
- 5. The following features shall be selectable at the control panel without using any separate programming tools or equipment:
 - a. March time code, temporal code, selective code, zone code, general alarm, time limit cutout, and alarm silence inhibit, for NACs.
 - b. Agency listed smoke detector Alarm Verification on an individual zone basis, to reduce the possibility of false alarms only in areas that may be prone to periodic high ambient smoke conditions (e.g., elevator lobbies, meeting rooms, etc.).
 - c. Silence inhibit of the alarm Notification Appliances for 0, 1, 2, 3, 4, or 5 minutes to prevent accidental silencing of the alarm signals.

- d. Selectable NAC Silence cutout timer to automatically silence the Notification Appliances after 0, 10, 20, or 30 minutes after the activation of the Initiating Device.
 - e. System Walk Test operation that shall allow the system to be tested by a single person. When in the Walk Test mode, activating an Initiating Device shall report its individual resident zone with a distinct zone code pattern over the audible Notification Appliances. Upon completion of the zone identification, the control panel shall automatically reset within 4 seconds. Integrity of the installation conductors of Initiating Device and Notification Appliance Circuits shall be verified by momentarily opening any circuit. This shall cause the operational Notification Appliances to operate steady for 4 seconds. The control panel shall automatically reset upon completion of the audible test signal. Walk Test of ground fault circuit testing shall be verified by operating the Notification Appliances for 4 seconds.
- 6. Remote Supervising Station output circuits (City Connection circuits), selectable for interface to remote station reverse polarity, or local energy master box.
 - 7. An internally mounted internet dialer Digital Alarm Communication Transmitter (IP-DACT) shall be a UL 864 listed network dialer capable of operating on a VoIP system. Router used for network transmission shall have battery backup. AND Provide dual path commercial fire communicator connected to the IP_DACT capable of providing three selectable reporting paths which include: cellular only, IP only or IP primary/cellular backup.
 - 8. Provisions for interfacing to Emergency Control relays, with dry contact outputs, for control of the HVAC equipment, elevators, door controls and other fire related equipment.
 - 9. Provisions for interfacing to a remote Trouble relay for operation of remote trouble notification appliances.
 - 10. Provisions for interfacing to a remote Supervisory relay for operation of remote supervisory notification appliances.
 - 11. Selective zone disconnect operation shall be provided for each Initiating Device Circuit in the system. The panel shall provide an "Abort Enable" feature that delays the activation of alarm outputs if a zone is re-enabled in the alarm state. This shall allow the operator to "Abort the Enable" prior to unwanted activation of the notification appliances, off-premise reporting, and emergency control relays.

- D. The power supply shall provide up to 4 amps of power to serve detectors, alarm notification appliances, remote annunciators, door holders, smoke dampers, relays, and other auxiliary devices as indicated on the plans and specifications. In addition to the 4 amps of power for Notification Appliances and Auxiliary equipment, the panel shall provide adequate power to serve the maximum configuration of control panel modules.
 - 1. Include a secondary emergency power supply with capacity for operating system in standby mode for 24 hours followed by alarm mode for 5 minutes. The control panel shall obtain its primary operating power from a 120 VAC, 60 Hz supply provided with a dedicated and secured disconnect switch. Locate away from any sources of heat.
- E. A "Depleted Battery" warning shall be sounded in the event that operation on battery back up exceeds the capacity requirements of the stand-by batteries. Operation shall include activation of the audible tone-alert and a unique indication shall be displayed on the operator control panel.
- F. Active Status Reminder
 - 1. Should any Alarm, Supervisory, or Trouble condition be present within the system and the audible signal silenced, the local tone alert shall resound every 8 hours (each change of work shift) to act as a reminder that the fire alarm system is not 100% operational.

2.4 MANUAL PULL STATIONS

- A. Description: Double-action type, red LEXAN or metal finished in red, with molded, raised-letter operating instructions of contrasting color. Station will mechanically latch upon operation and remain so until manually reset by opening with a key common with the control units. Provide at each exit door.

2.5 SMOKE DETECTORS

- A. General: Comply with UL 268, "Smoke Detectors for Fire Protective Signaling Systems." Include the following features:
 - 1. Factory Nameplate: Serial number and type identification.
 - 2. Operating Voltage: 24 VDC, nominal.
 - 3. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore normal operation.

4. Plug-In Arrangement: Detector and associated electronic components are mounted in a module that connects to a fixed base with a twist-locking plug connection. Base shall provide break-off plastic tab that can be removed to engage the head/base locking mechanism. No special tools shall be required to remove head once it has been locked. Removal of the detector head shall interrupt the supervisory circuit of the fire alarm detection loop and cause a trouble signal at the control unit.
 5. Environmental Compensation: The detector shall provide a software filtering process that automatically compensates for environmental factors and component aging that affect detector operation.
 6. Each detector head shall contain an LED that will flash each time it is scanned by the Control Unit (once every 4 seconds). In alarm condition, the detector head LED shall be on steady.
 7. Each detector base shall contain a magnetically actuated test switch to provide for easy alarm testing at the detector location and for accessing detector status information. Off-normal conditions shall be indicated by specific identifiable detector LED pulse patterns.
- B. Smoke Detectors: A maintenance and testing service providing the following shall be included with the base bid:
1. Biannual sensitivity reading and logging for each smoke sensor.
 2. Scheduled biannual threshold adjustments to maintain proper sensitivity for each smoke sensor.
 3. Threshold adjustment to any smoke sensor that has alarmed the system without the presence of particles of combustion.
 4. Scheduled biannual cleaning or replacement of each smoke detector or sensor within the system.
 5. Semi-annual functional testing of each smoke detector or sensor using the manufacturer's calibrated test tool.
 6. Written documentation of all testing, cleaning, replacing, threshold adjustment, and sensitivity reading for each smoke detector or sensor device within the system.
 7. The initial service included in the bid price shall provide the above listed procedures for a period of one year after owner acceptance of the system.

- C. Type: Smoke detectors shall be of the photoelectric type. Where acceptable per manufacturer specifications, ionization type detectors may be used.
- D. Duct Smoke Detector: Photoelectric type, with sampling tube of design and dimensions as recommended by the manufacturer for the specific duct size and installation conditions where applied. Provide at each location called for by code regulations.
 - 1. The detector shall provide on-board sensitivity drift compensation and dirt accumulation tracking.
 - 2. A magnetic test function shall initiate an alarm and provide detailed diagnostic information using the detector status LED.
 - 3. The detector shall provide a multi-function status LED indicator that indicates off-normal conditions by specific identifiable detector LED pulse patterns.
 - 4. The duct housing shall provide a supervised relay driver circuit for driving up to 15 relays with a single "Form C" contact rated at 7A@ 28VDC or 10A@ 120VAC or an auxiliary alarm relay with two "Form C" contacts rated at 1A@ 28VDC or ½A@ 120 VAC resistive. This auxiliary relay operates when the detector reaches its alarm threshold. Relay shall be mounted within 3 feet of HVAC control circuit.
 - 5. Duct housing shall provide a relay control trouble indicator yellow LED.
 - 6. Compact duct housing shall have a transparent cover to monitor for the presence of smoke. Cover shall secure to housing by means of four (4) captive fastening screws.
 - 7. Duct housing shall provide two (2) test ports for measuring airflow and for testing. These ports will allow aerosol injection in order to test the activation of the duct smoke detector.
 - 8. For maintenance purposes, it shall be possible to clean the duct housing sampling tubes by accessing them through the duct housing front cover.
 - 9. Each duct detector shall have a Remote Test Station with an alarm LED and test switch.
- E. Smoke Detector/Carbon Monoxide (CO) Detector
 - 1. Smoke Detector/Carbon Monoxide Detector shall be listed to UL 268 and UL 2075 for Carbon Monoxide Gas Detection.

2. The Detector shall be photoelectric smoke sensing and electrochemical CO sensing and equipped with a sounder capable of Temp 3 and Temp 4 audible signals.
3. The Detector shall have nominal sensitivity of 2.5% per foot as measured in the UL smoke box.
4. The Detector shall be capable of automatically adjusting its sensitivity by means of drift compensation and smoothing algorithms.
5. The Detector's base shall be able to mount to a single-gang electrical box or direct (surface mount) to the wall or ceiling.
6. The Detector shall provide LED indication that blinks to indicate normal standby, smoke alarm, smoke maintenance, CO alarm, CO trouble/end-of-life. When the detector is in CO trouble condition, it shall send a trouble signal to the panel.
7. The Detector shall provide a means to test CO gas entry into the CO sensing cell. The detector shall provide this with a test mode that accepts CO gas from a test agent and alarms immediately upon sensing CO entry. The 2-wire model shall include a maintenance signal to indicate the need for maintenance at the alarm control panel and shall provide a loop testing capability to verify the circuit without testing each detector individually.
8. The Detector shall have a replaceable CO cell that can be replaced at end of cell life.

2.6 HEAT DETECTORS

- A. Thermal Detector: Combination fixed-temperature and rate-of-rise unit with plug-in base and alarm indication lamp; 135-deg F fixed-temperature setting except as indicated.
- B. Thermal detector shall be of the epoxy encapsulated electronic design. It shall be thermistor-based, rate-compensated, self-restoring and shall not be affected by thermal lag.

2.7 MAGNETIC DOOR HOLDERS

- A. Description: Units shall be listed to UL 228. Units are equipped for wall, chain or arm mounting as necessary and are complete with matching door plate. Unit shall operate from a 120VAC, a 24VAC or a 24VDC source, and develops a minimum of 25 lbs. holding force.
- B. Material and Finish: Match door hardware and structural conditions.

- C. Provide at all fire wall doors. Coordinate with the Architectural Life Safety Plan.
- D. Provide type as appropriate for door style and location.

2.8 STANDARD ALARM NOTIFICATION APPLIANCES

- A. Horn: Piezoelectric type horn shall be listed to UL 464. The horn shall have a minimum sound pressure level of 85 dBA @ 24VDC. The horn shall mount directly to a standard single gang, double gang or 4" square electrical box, without the use of special adapter or trim rings.
- B. Visible/Only: Strobe shall be listed to UL 1971. The V/O shall consist of a xenon flash tube and associated lens/reflector system. The V/O enclosure shall mount directly to standard single gang, double gang or 4" square electrical box, without the use of special adapters or trim rings. V/O appliances shall be provided with different minimum flash intensities of 15cd, 75cd and 110cd. Provide a label inside the strobe lens to indicate the listed candela rating of the specific Visible/Only appliance.
- C. Audible/Visible: Combination Audible/Visible (A/V) Notification Appliances shall be listed to UL 1971 and UL 464. The strobe light shall consist of a xenon flash tube and associated lens/reflector system. Provide a label inside the strobe lens to indicate the listed candela rating of the specific strobe. The horn shall have a minimum sound pressure level of 85 dBA @ 24VDC. The audible/visible enclosure shall mount directly to standard single gang, double gang or 4" square electrical box, without the use of special adapters or trim rings.
- D. Notification Appliance Circuit provides synchronization of strobes at a rate of 1Hz and operates horns with a Temporal Code Pattern operation. The circuit shall provide the capability to silence the audible signals, while the strobes continue to flash, over a single pair of wires. The capability to synchronize multiple notification appliance circuits shall be provided.
- E. Accessories: The contractor shall furnish the necessary accessories.
- F. Provide ceiling mounted devices where indicated on the plans.
- G. Visual devices shall have field selectable candela ratings of 15, 30, 75, 95, 115, 150, and 177.

2.9 SYSTEM PRINTER (CAPABILITY ONLY)

- A. Provide capability for system printer. Printer information below included for reference only.

1. The system printer shall be operated from a Printer Modules (PIM-1 which mounts inside the enclosure and PIM-2, which outside the enclosure.
2. The logging printer shall be "UL" listed with the system. This parallel printer shall be supervised for: On/Off line, out of paper, paper jam, power off, and connection the system. The printer shall be a; high speed, 24 dot matrix, wide carriage, and capable of using tractor or friction fed paper. Supervised network connection shall be either Style 4 or 7 as required by local requirements. The printer shall contain diagnostic LED's for ease in maintenance.

2.10 FIRE ALARM WIRE AND CABLE

- A. All wire and cable shall be in strict compliance with local codes and the provisions of NEC Article 760 for Power-limited Fire Alarm Circuits. If required, the installation and control panel may be reclassified as Non Power-limited, per the provisions in NEC 760, providing all the requirements of NEC 760 Circuit Markings and Wiring Methods are met, and all identification of power-limited circuits are removed from the control panel.

PART 3 EXECUTION

3.1 INSTALLATION, GENERAL

- A. Install system components and all associated devices in accordance with applicable NFPA Standards and manufacturer's recommendations.
- B. Installation personnel shall be supervised by persons who are qualified and experienced in the installation, inspection, and testing of fire alarm systems. Examples of qualified personnel shall include, but not be limited to, the following:
 1. Factory trained and certified personnel.
 2. National Institute of Certification in Engineering Technologies (NICET) fire alarm level III certified personnel.
 3. Personnel licensed or certified by state or local authority.

3.2 EQUIPMENT INSTALLATION

- A. Furnish and install a complete Fire Alarm System as described herein and as shown on the plans. Include sufficient control unit(s), annunciator(s), manual stations, automatic fire detectors, smoke detectors, audible and visible notification appliances, wiring, terminations, electrical boxes, and all other necessary material for a complete operating system.

- B. Device Location-Indicating Lights: Locate in the public space immediately adjacent to the device they monitor.
- C. All necessary devices and wiring which are necessary for a complete, acceptable system shall be supplied regardless whether shown on the plans or not.
- D. Provide wire guards to protect all devices installed in gymnasiums and areas subject to physical abuse.

3.3 WIRING INSTALLATION

- A. System Wiring: Wire and cable shall be a type listed for its intended use by an approval agency acceptable to the Authority Having Jurisdiction (AHJ) and shall be installed in accordance with the appropriate articles from the current approved edition of NFPA 70: National Electric Code (NEC).
- B. Contractor shall obtain from the Fire Alarm System Manufacturer written instruction regarding the appropriate wire/cable to be used for this installation. No deviation from the written instruction shall be made by the Contractor without the prior written approval of the Fire Alarm System Manufacturer.
- C. Color Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color code for alarm initiating device circuits wiring and a different color code for supervisory circuits. Color-code notification appliance circuits differently from alarm-initiating circuits. Paint fire alarm system conduits, junction boxes and covers red.
- D. Wire installed in open ceiling areas shall be installed in conduit.

3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Services: Provide services of a factory-authorized service representative to supervise the field assembly and connection of components and the pretesting, testing, and adjustment of the system.
- B. Service personnel shall be qualified and experienced in the inspection, testing, and maintenance of fire alarm systems. Examples of qualified personnel shall be permitted to include, but shall not be limited to, individuals with the following qualifications:
 - 1. Factory trained and certified.
 - 2. National Institute for Certification in Engineering Technologies (NICET) fire alarm certified, NICET level III minimum.

3. Certified by a state or local authority.
 4. Trained and qualified personnel employed by an organization listed by a national testing laboratory for the servicing of fire alarm systems.
- C. Pretesting: Determine, through pretesting, the conformance of the system to the requirements of the Drawings and Specifications. Correct deficiencies observed in pretesting. Replace malfunctioning or damaged items with new and retest until satisfactory performance and conditions are achieved.
 - D. Final Test Notice: Provide a 10-day minimum notice in writing when the system is ready for final acceptance testing.
 - E. Minimum System Tests: Test the system according to the procedures outlined in NFPA 72.
 - F. Retesting: Correct deficiencies indicated by tests and completely retest work affected by such deficiencies. Verify by the system test that the total system meets the Specifications and complies with applicable standards.
 - G. Report of Tests and Inspections: Provide a written record of inspections, tests, and detailed test results in the form of a test log.
 - H. Final Test, Certificate of Completion, and Certificate of Occupancy:
 1. Test the system as required by the Authority Having Jurisdiction in order to obtain a certificate of occupancy.

3.5 CLEANING AND ADJUSTING

- A. Cleaning: Remove paint splatters and other spots, dirt, and debris. Clean unit internally using methods and materials recommended by manufacturer.
- B. Occupancy Adjustments: When requested within one year of date of Substantial Completion, provide on-site assistance in adjusting sound levels and adjusting controls and sensitivities to suit actual occupied conditions. Provide up to three visits to the site for this purpose.

3.6 TRAINING

- A. Provide the services of a factory-authorized service representative to demonstrate the system and train Owner's maintenance personnel as specified below.
 1. Train Owner's maintenance personnel in the procedures and schedules involved in operating, troubleshooting, servicing, and preventive maintaining of the system. Provide a minimum of four hours training.

2. Schedule training with the Owner at least seven days in advance.

3.7 FINALLY

- A. Prior to the start of the installation of the fire alarm system, the Fire Alarm Contractor shall submit proposed drawings depicting device locations and system description to the local Authority Having Jurisdiction.
- B. Final system design shall include all changes or variations necessary to comply with national, state and local authorities, to include all calculations necessary.
- C. No additional costs, other than the bid price, shall be allowed.
- D. The Fire Alarm Contractor shall be capable of certifying and signing the final plans as required by the Authority Having Jurisdiction.
- E. Provide a plan box to be permanently mounted near the fire control panel for the storage of as-built drawings and system documentation, to include fire prevention drawings.

END OF SECTION

SECTION 31 11 00

SITE PREPARATION & CLEARING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Removal of miscellaneous existing site appurtenances.
2. Protection and/or removal of trees and other vegetation.
3. Topsoil stripping
4. Clearing, grubbing and mowing

1.2 RELATED REQUIREMENTS

Construction Drawings

1.3 PROTECTION

- A. Provide protection necessary to prevent damage to existing improvements, trees, or vegetation light poles, power poles, fire hydrants, etc., indicated on the Contract Documents are to remain.
- B. Protect improvements on adjoining properties and on Owner's property.
- C. Restore damaged improvements to original condition as acceptable to parties having jurisdiction.
- D. Conduct site clearing operations to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close or obstruct streets, walks, or other occupied or used facilities without permission from authorities having jurisdiction. Streets and roadways shall be thoroughly cleaned and/or swept on a daily basis or more frequently as required by the governing authority.
- E. Provide traffic control as required, in accordance with the U.S. Department of Transportation "Manual of Uniform Traffic Control Devices" and the state highway department requirements.
- F. Unknown Utility Lines: All known utilities have been shown according to the information available. Contractor is responsible for coordinating with local utility companies and owner to locate and confirm all buried utilities in the construction area. Contractor is to notify Architect immediately if unknown lines, pipes, or other underground objects are encountered.
- G. Mow and remove weeds and small undergrowth vegetation in the construction area as defined on the drawings.

31 11 00-1

PART 2 PRODUCTS

This part not used.

PART 3 EXECUTION

3.1 GENERAL PROCEDURE

- A. Unless otherwise indicated on the drawings, remove trees, shrubs, grass, other vegetation, improvements, or obstructions interfering with installation of new construction. Removal includes digging out stumps and roots. Dispose of off-site. Do not remove items elsewhere on site or premises unless specifically indicated. Notify Architect prior to clearing if any item called for as "removed by Owner" remains upon issuance of Notice to Proceed.
- B. Strip topsoil to whatever depths encountered to prevent intermingling with underlying subsoil or other objectionable material. Cut heavy growths of grass from areas before stripping. Topsoil shall consist of sandy clay surficial soil found in depth of not less than 6". Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones and other objects over 2" in diameter, weeds, roots, and other objectionable material.
- C. Stockpile topsoil in storage piles where directed by Construction Manager. Construct storage piles to freely drain surface water. Cover storage piles if required to prevent windblown dust. Dispose of unsuitable or excess topsoil same as specified for waste material, unless otherwise specified by owner. Contractor to stockpile plus or minus 5,200 cubic yards of topsoil on site where shown on civil drawings. Quantity to be verified prior to project completion and reported to architect as a part of the site certification.
- D. Completely remove stumps, roots, and other debris below proposed subgrade elevation. Fill depressions caused by clearing and grubbing operations with satisfactory soil material as per requirements of Section 31 23 00 unless further excavation or earthwork is required.
- E. Remove existing above grade and below grade improvements and abandoned underground piping or conduit necessary to permit construction and other work.
- F. Retain boxing and protection for items to remain in construction until finish grade is completed. Repair any damage that occurs to these items without expense to the Owner.

END OF SECTION

31 11 00-2

SECTION 31 22 00

SITE GRADING

PART 1 GENERAL

1.1 RELATED SECTIONS

- A. Section 31 23 00, Excavation and Backfill.

PART 2 PRODUCTS NOT USED

PART 3 EXECUTION

3.1 GENERAL

- A. Do all cutting, filling, compacting, and finish grading required to bring entire project area within the limits of construction shown to indicated grades.
- B. Subgrades should be consistent with finish grades shown, allowing for an uniform layer of topsoil, properly graded to drain away from the building. Provide smooth ditches or swales as shown to carry water away from the project area without standing.
- C. Contractor shall be responsible for setting all grades and slope stakes.
- D. Control grading operations to prevent water from running into excavated areas.

3.2 ENVIRONMENTAL REQUIREMENTS

- A. Construct temporary erosion control systems as shown on Construction Drawings or as directed by “Storm Water Pollution Prevention Plan” (SWPPP) to protect adjacent properties and water resources from erosion and sedimentation.
- B. In event that site work on this project will disturb 5 or more acres, Contractor shall not begin construction without posting on site the “National Pollution Discharge Elimination System” (NPDES) permit governing discharge of storm water from site for entire construction period. NPDES permit requires SWPPP to be in place during construction.
- C. Contractor shall be totally responsible for conducting storm water management practices in accordance with NPDES permit and for enforcement action taken or imposed by Federal or State agencies, including cost of fines, construction delays, and remedial actions resulting from Contractor’s failure to comply with provisions of NPDES permit.

31 22 00-1

- D. All grading operations are operations that are to be in strict compliance with the provisions of the Arkansas Water and Air Pollution Control Act (Act 472 of 1949 as amended, AR Ann. 8-4-101 et seq.), and the Federal Clean Water Act 33 U.S.C. 1251 et. seq. Contractor shall be responsible for submitting application to state authority and obtaining permits.
- E. It shall be the Contractor's responsibility to comply with current OSHA and other local, state, and federal requirements for all excavation and fill operations, and other areas of the work.
- F. Contractor to keep dust on site to a minimum the entire duration of construction by means of regular watering. This will include dust created by grading operations, vehicular traffic, and wind.

END OF SECTION

SECTION 31 23 00

EXCAVATION AND BACKFILL

PART 1 GENERAL

1.1 SUMMARY

- A. Furnish labor and materials for all work under this section.

1.2 RELATED SECTIONS

- A. Construction Manager's Manual – Proposal for Lump Sum Contract: Unit Prices
- B. Section 01 22 13 – Measurement & Payment
- C. Section 01 40 00 – Quality Control: Required Special Inspections
- D. Section 02 32 00 – Earthwork
- E. Section 03 30 00 – Cast-In-Place Concrete
- F. Section 31 11 00 - Site Preparation
- G. Section 31 22 00 - Site Grading
- H. Section 32 11 16 - Crushed Stone Base Course
- I. Section 32 92 19 – Seeding
- J. Section 32 92 20 – Hydroseeding
- K. Section 32 92 23 – Sodding

1.3 SOILS VERIFICATION

- A. The **Contractor** shall be responsible for having, Data Testing, Inc., 1334 Country Club Avenue, Fort Smith, AR, 72903, the registered soils engineer, present on site to examine and conduct tests of soils preparation and construction per IBC required special inspections including filling and grading. The soils engineer shall inspect excavations for foundations, footings, and paving areas perform bearing testing, and will submit a report to general contractor with a copy to the Architect stating conditions observed meet or exceed the limits found in the specifications and are consistent with acceptable construction practices. Construction shall not begin before report is received by the Architect. **Contractor** shall be responsible for any costs for meeting these requirements. **Contractor** shall coordinate inspections, testing, and observation with soils engineer.

31 23 00-1

1.4 GRADING PARAMETERS

- A. Perform grading of entire site to mass grading sub-grade elevations.
- B. Grades as shown on grading plan are drawn to finish grade elevation, and do not provide exact elevations for such items as walks, equipment screen pads, etc. Grading to sub-grade elevations for these items will be performed under the building phase of the project.
- C. For reference only - Thickness of paving, concrete slabs, topsoil, etc., which are to be provided in building construction phase are as follows:
 - 1. Topsoil: 4" for seeded areas, 12" for planter areas.
 - 2. Light Duty Asphalt Paving Areas: 4" of asphalt and 6" gravel base
 - 4. Sidewalks: 4" concrete
 - 5. Heavy Duty Concrete Paving: 6" and 6" gravel base.
- D. Building pad elevation will be uniform at 8" below finish floor elevation. Contractor will be responsible for excavating to required elevations for such areas as building footings, thickened slab, etc., as shown on drawings. Bottom of all footings to bear on minimum 12" of engineered fill.
- E. Grading and preparation of building pad, to be sub-grade elevations and extend minimum 5'-0" beyond building perimeters or further, depending on fill requirements for footings extending out laterally to meet ratio per specifications.
- F. Provide temporary means of draining water from paving areas until asphalt paving can be installed in building phase. Coordinate with Architect.
- G. Fill all stump holes where stumps are removed with engineered fill and compact per this specification.
- H. Cut/fill operations and grading for paving to be sub-grade elevations, 2'-0" behind line of paving or curb. Unless noted otherwise all islands in parking lots and drives to be same sub-grade elevation as surrounding paving area.

PART 2 PRODUCTS NOT USED

PART 3 EXECUTION

3.1 TOPSOIL AND UNSUITABLE SOILS EXCAVATION

- A. Strip off topsoil and unsuitable fill material (refer to soils report), at new building, paving, drives, equipment pads and future expansion areas. Remove all vegetation, rocks, and any soft soils. Haul away and dispose of unsuitable fill material and excess excavated topsoil material off site. Excavate to minimum thicknesses as follows:
 - 1. Building Pad: 3'-0"
 - 2. Paving Areas: 1'-6"

31 23 00-2

3. Equipment Pads: 1'-6"

At footings, excavate as required to provide 12 inches of engineered fill beneath footings.

- B. After stripping unsuitable soils as described in soils report to required depth (refer to "Preparation Of Original Earth" section), the entire building area, drives, walks, and all areas to be paved shall be proof-rolled with a loaded rubber-tired tandem-axle dump truck or scraper weighing at least 25 tons, and any soft soils are to be undercut and replaced with properly compacted fill. Soils engineer shall be present when proof rolling is being performed.
- C. After proofrolling, scarify to a depth of at least 6" adjusting the moisture content to within 2 percent of optimum moisture content, then compacted to specified density.
- D. Retain sufficient topsoil on site to accomplish final grading.
- E. Use no topsoil for compacted fill inside building perimeter.
- F. Use no on-site excavated material for fill inside building perimeter or below footings.
- G. If insufficient topsoil on site, furnish good topsoil, approved by Architect, for finish grading and planting areas.

3.2 EARTH EXCAVATION

- A. Excavation for walks, pavements, curbs, gutters, roof drainage, conductors, retaining walls, building volume below grade, underfill below slabs on grade, foundation walls, footings and other items indicated by drawings or otherwise necessary for construction.
- B. Excavate to elevations and dimensions indicated, plus minimum, yet sufficient, space to permit erection of forms, shoring, drain tile waterproofing, masonry and the inspection of foundations.
- C. Dress earth banks and bottoms for footings forms. Bear footings on engineered fill at elevations shown on drawings.
- D. Ensure all exterior footing excavations are below frost line at a minimum of 24" below final finish grade.
- E. If footings occur in poor materials at footing depths indicated (as determined by the Geotechnical Engineer), over excavate as required and compact with approved fill compacted to 95% of standard Proctor density (ASTM D-698).
- F. Remove any existing foundations, footings, piers, and other construction found in the area of new construction.

- G. Material to be excavated is assumed to be earth and other materials that can be removed with a Caterpillar D-8 Dozer with single tooth ripper (mass grading), a Caterpillar 330B tracked excavator equipped with rock teeth (utility trenches) or equipment of similar power and capability. If unanticipated rock is encountered within limits of excavation, contractor shall immediately notify Architect and not proceed further until instructions are given and measurements made for purpose of establishing volume of rock excavation. Rock is defined as any stone or boulders that cannot be removed with the use of a Caterpillar D-8 Dozer with single tooth ripper (mass grading), a Caterpillar 330B tracked excavator equipped with rock teeth (utility trenches) or equipment of similar power and capability.
- H. Only as a last resort, should explosives be used. Should explosives be necessary, work shall be done by experienced powder men using small charges and in strict accordance with all regulations governing this work. Contractor secure permits required for such work and correct any damage to foundations and/or property caused by improper use of explosives at his expense. Architect to be notified and approval granted before explosives are allowed.
- I. Specifically notify Architect to inspect excavations, and receive the Architect's approval before placing concrete.
- J. Provide unit price for rock excavation on Bid Form. Rock shall be measured per cubic yard for rock in place. This shall include associated costs for quantity verification by soils engineer.
- K. Provide unit prices for engineered fill/placement/compaction and existing earth excavation/removal/haul-off in spaces provided on Bid Form. This shall include associated costs for quantity verification by the Geotechnical Engineer. These unit prices are for Owner's information only. Provide all fill and cut in contract as required to meet requirements shown on drawings and specifications.

3.3 PREPARATION OF ORIGINAL EARTH

- A. Floor slab areas should be stripped of all surface vegetation, topsoil and unsuitable soil to depths as called for in paragraph 3.1. Any soft or unstable materials should be removed and replaced with engineered fill. The subgrade, exposed after stripping and completing any cuts, should be scarified to a minimum depth of 8 inches and moisture conditioned to level within 2 percent of the materials' optimum moisture content. The subgrade should then be compacted to at least 98 percent of the material's maximum laboratory dry density determined in accordance with ASTM Specification D-698, the Standard Proctor procedure.
- B. Remove all topsoil below areas to receive sidewalks. Bear concrete sidewalks on natural earth or minimum 12" engineered fill as required to meet elevations as shown on grading plan.

3.4 FILL MATERIAL AND GRADING

- A. Place imported engineered fill material beneath the slab to a minimum depth of 3.0 feet below the desired finished floor elevations, extending a minimum of 5.0 feet beyond the building's footprint. Thickness as required to meet subgrade elevations is in addition to granular under slab fill.
- B. Remove 1.5 feet of material below proposed finished pavement elevations, extending 3 feet beyond perimeter. Place imported engineered fill to levels indicated on site plan. Compact as specified.
- C. Bear concrete sidewalks on natural earth or minimum 12" engineered fill as required to meet elevations as shown on grading plan. Thickness as required to meet subgrade elevations is in addition to 4" granular under slab fill.
- D. Footings to bear on minimum 1'-0" thick engineered fill. The over excavation of existing low strength materials should extend a sufficient distance beyond the edge of the building such that the engineered fill placed beneath footings will extend laterally beyond the edge of the footing at least 8 inches for each 12 inches of engineered fill placed beneath the footing.
- E. At Contractor's option, the on-site soils could be modified with lime to reduce their plasticity. The actual percentage required is to be determined in the field by a qualified soils engineer as the amount necessary to reduce the plasticity index(PI) of the lean to fat clay soils to less than 18 percent. Refer to proposal form for unit pricing. This is for owner's use only in determining any additional soil modification. If soil modification is selected by contractor as option, it will be priced inclusive in project.
- F. Excavations resulting from the removal of existing site features should be cleaned of loose material and properly back filled as recommended in this report.
- G. If soils engineer determines less fill material or more is required, it shall be provided or deducted from contract. Refer to proposal form for unit pricing.
- H. In general, place no interior or exterior fills less than 3 days after concrete forms for structure have been removed, and then only when approval is received from Architect.
- I. Place fill in layers not exceeding 8" in loose thickness, thoroughly compacting with powered tamp. Moisture content of fill material is to be controlled to between 2 percent below and 3 percent above optimum as determined by ASTM D698. Compact fill material to a minimum of 98 percent of the maximum Standard Proctor dry density, ASTM Specification D-698.
- J. All imported engineered fill shall consist of approved low-plasticity sand, gravel, or clayey materials ($LL \leq 50$, $PI \leq 24$ for clayey types) free from vegetation, topsoil, and deleterious materials with organic content less than 3 percent unless approved by the Geotechnical Engineer. High-plasticity clays ($LL \leq 50$, $PI \leq 25$) and silts are restricted to

non-structural areas. Locally available on-site materials to be assessed. No rock greater than 6" shall be allowed in fill material. Submit test results of fill material from borrow pit proposed for use to Architect for approval prior to procurement.

- K. Final fill under concrete floor slabs shall consist of 4 inches of granular sub-base material immediately below the concrete floor slab. Refer to Section 32 11 16 for base requirements below paving areas. The sub-base material shall be clean, washed, crushed limestone conforming to ASTM C33, Size 57, or equal spread level to allow for minimum required concrete thickness. The upper portion (approximately 2 inches) to be "choked" off with limestone fines or sand. Tamp tightly into place, prior to placement of termite treatment and vapor barrier.
- L. Backfill around foundations, grade beams, and retaining walls with debris-free earth having no stones larger than 3" and no frozen materials. Take precautions not to damage waterproofing membrane. Repair any damage to same.
- M. Roll, tamp and otherwise compact other site fill.
- N. Cut and fill with debris-free earth to bring lawn areas affected by this construction to approximately 4" below finish grades. Grade uniformly between elevations give and "round-out" any abrupt changes in slope during final grading operations.
- O. Haul in additional earth required. Place excess excavated material in the on-site stockpile area as shown on the drawings.
- P. Haul away and dispose of any surface rubble and debris.
- Q. Remove any groundwater accumulated in excavations prior to placement of concrete. Soils Engineer to verify conditions are acceptable and bearing capacity is at or exceeds specified bearing pressure

3.5 TOPSOIL

- A. After rough grading is completed and approved, scarify subsoil in areas to be lawns to a depth of 3" and place a layer of topsoil there over, providing additional topsoil required to give thickness specified.
- B. Topsoil material: Fertile, natural topsoil, typical of locality, free from stones, debris, clay and weeds.
- C. Topsoil minimum thicknesses: 4" seeded and sodded areas, 12" landscaped areas. (Adjust final cut and fill depth as required to accommodate lawn type.)
- D. Fill to finish grade indicated, eliminate water pockets and irregularities, ready to receive seed or sod.

- E. Finish site grading to be smooth throughout contours. Abrupt changes, uneven, or undulating grading will not be accepted unless shown as such on grading plan.

3.6 EXTENT OF FINISH GRADING

- A. Cut, fill and grade to extent of contours and elevations indicated by drawings.
- B. At building perimeter, keep finish grades generally 6" below finish floor elevation with exception of areas at drives and walks.

3.7 QUANTITY VERIFICATION

- A. Contractor to be responsible for costs incurred by Surveyor Geotechnical Engineer, or other qualified individuals to verify quantity of rock or additional unsuitable soil removed. This shall be included in the unit price costs.

3.8 OBSERVATION AND SPECIAL INSPECTIONS

- A. Soils cut and fill operations shall be observed periodically by the Architect/Engineer prior to placing of concrete footings and slabs, and paving. Inspection of soils bearing pressure, verification of soils, and cut/fill operations for conformance to the construction documents and IBC shall be performed by the designated third party Special Inspector.

3.9 TEST REQUIRED:

Contractor shall coordinate compaction tests on the building and paving areas from a recognized testing laboratory, approved by the Architect, at the following intervals. Contractor is to pay for compaction testing. **Location of each test shall be noted on report.**

- A. Minimum three tests per each layer of fill placed, one per each 2,500 sq. ft. of building area.
- B. Minimum three tests per each layer of fill placed, one per each 5,000 square feet of pavement area.
- C. Density testing of any gravel or crushed stone base course with fines or any over-excavated footing is to be compacted to a minimum of 95 percent of the maximum Standard Proctor dry density, ASTM Specification D-698.
- D. If any test results fall below required minimum, the testing company is required to contact Contractor and Architect immediately.

END OF SECTION

31 23 00-7

SECTION 31 23 16

ROCK REMOVAL

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Removal of identified and discovered rock during excavation.
- B. Use of explosives to assist rock removal.
- C. Incorporating removed rock into fills and embankments.

1.2 RELATED SECTIONS

- A. Section 00 42 13 – Unit Prices
- B. Section 02 32 00 – Earthwork
- C. Section 31 23 33 - Excavation, Backfill, and Compaction for Utilities
- D. Geotechnical Report for boring locations and findings of subsurface materials and conditions.
- E. Construction Drawings

1.3 REFERENCE STANDARDS

- A. National Fire Protection Association (NFPA) latest edition
495 Code For Explosive Materials

1.4 ENVIRONMENTAL REQUIREMENTS

- A. Determine environmental effects associated with proposed work and safeguard those concerns as regulated by law and local governing authorities by reasonable and practical methods.

1.5 PROJECT CONDITIONS

- A. Discrepancy with Construction Drawings and Specifications regarding amount and type of rock to be removed shall immediately be brought to attention of the Owner or his designated representative. Revised removal plan and schedule shall subsequently be provided and followed.

1.6 QUALIFICATIONS

- A. Submit records of documented experience to the Owner or his designated representative prior to removal of rock by blasting.

1.7 QUANTITY VERIFICATION

- A. Contractor to be responsible for costs incurred for surveyor Geotechnical Engineer, or other qualified individuals to verify quantity of rock removed. This shall be included in the Unit Price cost.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Explosives, detonator/delay device, blast mat materials and accessories shall be as recommended by explosive supplier and shall comply with requirements of applicable governing authorities.

PART 3 EXECUTION

3.1 PREPARATION

- A. Verify site conditions and note subsurface conditions affecting work of this section.
- B. Establish required lines, grades, and elevations that will determine extent of proposed rock removals.

3.2 ROCK EXCAVATION

- A. Rock excavation is defined as igneous, metamorphic, or sedimentary rock that cannot be removed by rippers or other mechanical methods and, therefore requires drilling and blasting. Cut rock to form level bearing at bottom of footing and trench excavations. In utility trenches excavate rock to 6-in. below invert elevation of pipe. Remove shaled layers to provide sound and unshattered base for footings or foundations.
- B. Comply with laws, rules, and regulations of Federal, State, and local authorities and insurer which govern storage, use, manufacture, sale, handling, transportation, licensing, or other disposition of explosives. Take special precautions for proper use of explosives to prevent harm to human life and damage to surface structures, utility lines, or other subsurface structures. Do not conduct blasting operations until persons in vicinity have had ample notice and have reached positions of safety.

- C. Contractor shall save harmless the Owner or his designated representative, Architect, and Engineer from claims growing out of use of such explosives. Removal of materials of any nature by blasting shall be done in such manner and at such time as to avoid damage affecting integrity of design and to avoid damage to new or existing structures included in or adjacent to work. It shall be Contractor's responsibility to determine method of operation to ensure desired results and integrity of completed work.
- D. Use Controlled Low Strength Material (CLSM) / Flowable Fill or other acceptable materials to replace rock over blast or over excavation in building area to facilitate placement of utilities and future footings.

END OF SECTION

SECTION 31 23 23

PIPELAYING

PART 1 GENERAL

1.1 SCOPE

- A. Section includes the Work necessary to install water, sewer, and storm drainage piping and appurtenances.

1.2 RELATED WORK

- A. Trenching, backfill and compacting is specified in Section 31 23 33.

1.3 QUALITY ASSURANCE

- A. Provide workmen with skill to ensure embedment of pipe.
- B. Methods of Testing
 - 1. The moisture density relations of materials shall be determined in the laboratory in accordance with AASHTO T-99 or T-180, as specified.
 - 2. Field density of backfill shall be determined in accordance with ASTM D2922.

1.4 PUBLIC WORK

- A. Comply with the City of Ozark, Arkansas, standard water and sewer specifications for public water and sewer lines. If conflict should be found between this section and city standards for Public Utilities, city standards shall be the priority. It shall be the Contractor's responsibility to obtain city standard water and sewer specifications and comply with the minimum requirements.

PART 2 PRODUCTS

2.1 EMBEDMENT

- A. Class I material consists of manufactured angular, granular material, 1/4 to 1-1/2 inches (6 to 40 mm) in size.
- B. Class II material consists of coarse sands and gravel with maximum particle size of 1-1/2 inches (40 mm), including variously graded sands and gravels containing small percentage of fines, generally granular and non-cohesive, either wet or dry. Soil types GW, GP, SW, and SP are included in this class.

GW-Well graded gravels and gravel-sand mixtures, little or no fines, 50 percent or more retained on a No.4 sieve, more than 95 percent retained on a No. 200 sieve.

GP-Poorly graded gravels and gravel-sand mixtures, little or no fines. 50 percent or more retained on a No. 4 sieve. More than 95 percent retained on a No. 200 sieve. Clean.

SW-Well-graded sands and gravelly sands, little or no fines. More than 50 percent passes a No.4 sieve. More than 95 percent retained on a No. 200 sieve. Clean.

SP-Poorly graded sands and gravelly sands, little or no fines. More than 50 percent passes a No.4 sieve. More than 95 percent retained on a No.4 sieve. Clean.

2.2 BACKFILL

- A. Select materials are defined as good earth, sand, or gravel and shall be free from rocks larger than 1-1/2 inches in diameter or hard lumpy materials. Select materials require hand placement and consolidation.
- B. Protection cover shall be defined as backfill from the top of the pipe to a point 12 inches above the top of the pipe and shall consist of select material as defined in paragraph 2.1A.
- C. Backfill over the protection cover shall be free from cinders, ashes, refuse, vegetable, or organic material, boulders, rocks or stones having dimension greater than 6 inches, frozen soil, or other material that in the opinion of the Engineer is unsuitable.

PART 3 EXECUTION

- A. Examine the pipe and appurtenances for compliance with specifications.
- B. Reject pipe and appurtenances not in compliance with specifications.
- C. Remove foreign matter from pipe and appurtenances before lowering into excavated area.
- D. Pipe bedding
 - 1. For PVC pipe and fittings, place 6-inch minimum of Class I or Class II material between excavated trench bottom or stabilized trench bottom and bottom of pipe or fitting as embedment. Embedment material shall be tamped by hand or approved mechanical methods so as to provide a uniform and continuous bearing support for the pipe at every point along the pipe barrel. Class I material shall be used for haunching to the spring line of the pipe, and to 6 inches over the top of the pipe. Embedment shall be compacted to a standard proctor density of 85 percent as defined in AASHTO T-99.
 - 2. For iron pipe and appurtenances, place 4 inches minimum of Class I or Class II material between excavated trench bottom or stabilized trench bottom and bottom of pipe or appurtenance. Embedment material shall be tamped by hand or approved mechanical methods so as to provide a uniform and continuous bearing support for the pipe at every point along the pipe barrel. Class I material shall be used for haunching to the spring line of the pipe, and to 6 inches over the top of the pipe. Embedment shall be compacted to a standard proctor density of 85 percent as defined in AASHTO T-99.

- E. Place pipe and appurtenance to planned line and elevation.
 - 1. Place gravity wastewater pipe from low end to high end with pipe bells facing upstream.
 - 2. Place potable water pipe with bells facing the direction of laying.
 - 3. Cover open end of laid pipe to prevent rodents and debris from entering pipe.
- F. For iron pipe, place Class I material 6-inch maximum layers, compacted to 85 percent maximum density standard proctor, to top of pipe. Ensure that Class I material is compacted against haunch area of pipe.
- G. Pipe Covering: Place protection material to a minimum 12-inch depth over top of pipe and fittings. Place in 6-inch maximum layers, compacted to 85 percent standard proctor density.
- H. See Section 31 23 33 for remainder of backfill requirements.
- I. Existing Utility Crossing: Expose all utilities located between two manholes a minimum of 24 hours before the downstream manhole is constructed. Wherever possible, sewer will be adjusted to provide necessary clearance.

END OF SECTION

SECTION 31 23 33

EXCAVATING, BACKFILLING, AND COMPACTING FOR UTILITIES

PART 1 GENERAL

1.1 SUMMARY

- A. This section includes the excavation, bedding, and backfilling of utilities necessary to perform work indicated on Drawings and Contract Documents.
- B. Comply with the City of Ozark, Arkansas, standard water and sewer specifications for public water and sewer lines. If conflict should be found between this section and city standards for Public Utilities, city standards shall be the priority. It shall be the Contractor's responsibility to obtain city standard water and sewer specifications and comply with the minimum requirements.

1.2 RELATED REQUIREMENTS

- A. Construction Drawings
- B. Section 31 11 00 - SITE PREPARATION & CLEARING
- C. Section 31 23 23 - PIPELAYING
- C. Section 02 32 00 – GEOTECHNICAL SOILS REPORT

1.3 LOCAL REQUIREMENTS

- A. Contractor to verify with city officials that this specification meets or exceeds local requirements. Local requirements shall supercede requirements of this specification unless noted otherwise.

1.4 SUBMITTALS

- A. Shop Drawings or details pertaining to Site Utilities are not required unless use of materials, methods, equipment, or procedures contrary to Drawings or these specifications are proposed. Do not perform work until required shop drawings have been accepted by Owner.
- B. The Contractor shall contact all utility companies and determine if additional easements will be required to complete the project. Contractor shall provide written confirmation of the status of all easements to the Architect at the time of the preconstruction conference.

PART 2 PRODUCTS

2.1 BEDDING MATERIAL

- A. Processed sand and gravel free from clay lumps, organic, or other deleterious material, and complying with following gradation requirements:

U.S. Sieve Size	Percent Passing (by weight)
1 Inch	100
3/4 Inch	90-100
3/8 Inch	20-55
No. 4	0-10
No. 8	0-5

- B. Steel Casing Pipe: Comply with AWWA C-201 or C-202, minimum grade B, size and wall thickness as indicated on Drawings.

2.2 DETECTION TAPE

- A. Provide metallic detection tape located approximately 12" above pipe or conduit, where in ground utility lines are buried outside building footprint. Tape shall be continuous and be marked, indicating utility type (i.e. water, sewer, gas electric, etc.)

PART 3 EXECUTION

3.1 SUMMARY

- A. Set all lines, elevations, and grades for utility and drainage system work and control system for duration of work, including careful maintenance of bench marks, property corners, monuments, or other reference points.
- B. Maintain in operating condition existing utilities, active utilities, and drainage systems encountered in utility installation. Repair any surface or subsurface improvements shown on Drawings.
- C. Verify location, size, elevation, and other pertinent data required to make connections to existing utilities and drainage systems as indicated on Drawings. Contractor shall comply with local codes and regulations.

3.2 EXCAVATION, TRENCHING, AND BACKFILLING

- A. Perform excavation as indicated for specified depths. During excavation, pile materials suitable for backfilling in orderly manner far enough from bank of trench to avoid overloading, slides, or cave-ins.

- B. Remove excavated materials not required or not suitable for backfill or embankments and waste as specified. Any structures discovered during excavation(s) shall be disposed of as specified.
- C. Prevent surface water from flowing into trenches or other excavations by temporary grading or other methods, as required. Remove accumulated water in trenches or other excavations by pumping or other acceptable methods.
- D. Open cut excavation with trenching machine or backhoe. Where machines other than ladder or wheel-type trenching machines are used, do not use clods for backfill. Dispose of unsuitable material and provide other suitable material at no additional cost to Owner.

3.3 TRENCH EXCAVATION

- A. The local utility companies shall be contacted before excavation shall begin. Dig trench at proper width and depth for laying pipe, conduit, or cable. Cut trench banks as nearly vertical as practical and remove stones as necessary to avoid point-bearing. Over excavate wet or unstable soil, if encountered, from trench bottom as necessary to provide suitable base for continuous and uniform bedding.
- B. All trench excavation side walls greater than 5 feet in depth shall be sloped, shored, sheeted, braced or otherwise supported by means of the sufficient strength to protect the workmen within them in accordance with the applicable rules and regulations established for construction by the Department of Labor, Occupational Safety and Health Administration (OSHA), and by local ordinances. Lateral travel distance to an exit ladder or steps shall not be greater than 25 feet in trenches 4 feet or deeper.
- C. Accurately grade trench bottom to provide uniform bearing and support for each section of pipe on bedding material at every point along entire length, except where necessary to excavate for bell holes, proper sealing of pipe joints, or other required connections. Dig bell holes and depressions for joints after trench bottom has been graded. Dig no deeper, longer, or wider than needed to make joint connection properly.
- D. Trench width requirements below the top of the pipe shall not be less than 12" nor more than 18" wider than outside surface of any pipe or conduit that is to be installed to designated elevations and grades. All other trench width requirements for pipe, conduit, or cable shall be least practical width that will allow for proper compaction of trench backfill.
- E. Trench depth requirements measured from finished grade or paved surface shall meet the following requirements or applicable codes and ordinances:
 - 1. Water Mains: 36" to top of pipe barrel or 6" below the frost line (established by the local building official), whichever is deeper.
 - 2. Sanitary Sewer: Depths, elevations, and grades as indicated on Drawings.
 - 3. Storm Sewer: Depths, elevations, and grades as shown on Drawings.
 - 4. Electrical Conduits: 24" minimum to top of conduit or as required by NEC 300-5, NEC 710-36, codes, or the local utility company requirements, whichever is deeper.

5. TV Conduits: 18" minimum to top of conduit or as required by the local utility company, whichever is deeper.
6. Telephone Conduits: 18" minimum to top of conduit, or as required by the local utility company, whichever is deeper.
7. Gas Mains and Service: 30" minimum to top of pipe, or as required by the local utility company, whichever is deeper.

F. Please note that the trench depths listed above are minimum depths. Verify with local authority having jurisdiction for minimum trench depth requirements.

3.4 SHEETING AND BRACING

- A. Provide sheeting and bracing, when necessary, in trenches and other excavations where protection of workmen required. Sheeting may be removed after excavation has been backfilled sufficiently to protect against damaging or injurious caving.

3.5 PIPE BEDDING

- A. Accurately cut trenches for pipe or conduit that is installed to designated elevations and grades to line and grade 4" below bottom of pipe and to width as specified. Place 4" of bedding material, compact in bottom of trench, and accurately shape to conform to lower portion of pipe barrel. After pipe installation, place select backfill and compact in maximum 8" layers, measured loose, to the top of the trench.

3.6 TRENCH BACKFILLING

- A. Criteria: Trenches shall not be backfilled until required tests are performed and the utility systems comply with and are accepted by applicable governing authorities. Backfill trenches as specified. If improperly backfilled, reopen to depth required to obtain proper compaction. Backfill and compact as specified, to properly correct condition in an acceptable manner.
- B. Backfilling: After pipe or conduit has been installed, bedded, and tested as specified, backfill trench or structure excavation with specified material placed in lifts or layers not exceeding 8" of loose material. Compact to minimum density of 95% of optimum density in accordance with ASTM D 698 (or 92% of optimum density in accordance with ASTM D 1557).
- C. Compaction: Exercise proper caution when compacting immediately over top of pipes or conduits. Water jetting or flooding is not permitted as method of compaction.
- D. Compaction Testing: Independent testing laboratory shall perform test at intervals not exceeding 200'-0" of trench for each 8" of compacted trench backfill and furnish copies of test results as specified. Contractor is to pay for compaction testing.

- E. Finished Surface: After compaction and testing are complete, cap the trench with an assembly that is flush with and matches the existing construction in materials and method of application.

END OF SECTION

SECTION 31 25 00

STORM WATER POLLUTION PREVENTION PLAN

PART 1 GENERAL

1.1 SCOPE

- A. **PURPOSE OF SWPPP:** This SWPPP covers the storm water management practices that the Construction Manager shall employ in accordance with the NPDES permit governing storm water discharges during construction, and in accordance with erosion control practices specified in other sections.
- B. The Construction Manager will be responsible for securing and maintaining the SWPPP Plan.

PART 2 PRODUCTS Not Used

PART 3 EXECUTION Not Used

END OF SECTION

SECTION 31 31 16

TERMITE CONTROL

PART 1 GENERAL

1.1 WORK INCLUDED

- A. Soil treatment below slabs on grade for subterranean insects.
- B. Soil treatment at foundation perimeter, for subterranean insects.

1.2 REFERENCES

- A. Environmental Protection Agency (EPA)
 - 1. EPA - Federal Insecticide, Fungicide and Rodenticide Act.

1.3 QUALITY ASSURANCE

- A. Materials: Provide certification that toxicants conform to requirements of authority having jurisdiction.
- B. Material Packaging: Manufacturer's labels and seals identifying content.

1.4 REGULATORY REQUIREMENTS

- A. Conform to applicable requirements for application licensing and authority to use toxicant chemicals.

1.5 SUBMITTALS

- A. Product Data: Submit through General Contractor to Architect.
 - 1. Indicate toxicants to be used, composition by percentage, dilution schedule, and intended application rate.
 - 2. Submit manufacturer's application instructions.

1.6 PROJECT RECORD DOCUMENTS:

- A. Accurately record moisture content of soil before treatment, date and rate of application, areas of application, diary of meter readings and corresponding soil coverage.

1.7 WARRANTY

- A. Provide five year warranty for material and installation. Cost for the five year warranty period will be included with the warranty.

- B. Warranty: Cover against invasion or propagation of subterranean termites, damage to building or building contents caused by termites; repairs to building or building contents so caused.
- C. Inspect work annually and report in writing to Architect.
- D. Owner reserves right to renew warranty for an additional five years.
- E. Warranty period will not begin until date of Substantial Completion.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Toxicant Chemical: Water based emulsion, uniform composition, synthetic dye to permit visual identification of treated soil.
- B. Approved chemicals.
 - 1. Bifenthrin - Trade name Baseline, 1% emulsion.
 - 2. Cypermethrin - Pyrethroid, trade name Demon TC, 1%.
 - 3. Imidacloprid - Trade name Premise 75, .05% to .1%.
 - 4. Cyano - Trade name Tirbute, .5% to 1%.
 - 5. Other chemicals may be used as approved by appropriate regulatory agencies.
- C. All instructions on the manufacturers label shall be closely followed and all state and federal laws strictly obeyed.

2.2 MIX DILUTION

- A. Dilute and mix toxicant chemical to manufacturer's instructions.

PART 3 EXECUTION

3.1 INSPECTION

- A. Verify the soil surfaces are unfrozen, sufficiently dry to absorb toxicant, ready to receive treatment.
- B. Beginning of application means acceptance of soil condition.

3.2 APPLICATION

- A. Apply toxicant within 12 hours before installation of vapor barrier under slab-on-grade or finish grading outside foundation walls. If rain occurs after initial treatment and before installation of vapor barrier, re-application of termite treatment will be required.

- B. Apply toxicant to soil at the following rates, using metered applicator:
 - 1. Under floor slabs-on-grade: One gallon per 10 sq. ft.
 - 2. Both sides of exterior foundation wall: Note-Treat exterior side of foundation walls and/or turn-down slab edges prior to topsoil placement.
 - a. Concrete: Four gallons per 10 lineal feet, to depth of one foot.
 - b. Masonry: Four gallons per 10 lineal feet for each foot of foundation depth.
 - 3. Two gallons per lineal foot at foundation penetrations.
- C. Apply as a coarse spray to ensure uniform distribution.
- D. Coordinate soil treatment at foundation perimeter with finish grading and landscaping work to avoid disturbance of treated soil. Retreat disturbed treated soil.

3.3 RE-TREATMENT

- A. If inspection identifies the presence of termites, retreat soil and retest.
- F. Use same toxicant as for original treatment.

3.4 TREATMENT CONFORMATION

- A. Colored Dye to be added to treatment mix for visual inspection.
- B. Keep application tickets on site for Architect's review. If long distance observation is made by Architect by viewing photos sent by email, forward treatment tickets to Architect for confirmation.

END OF SECTION

SECTION 31 35 00

SLOPE PROTECTION AND EROSION CONTROL

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Installation of temporary and permanent erosion control systems.
- B. Installation of temporary and permanent slope protection systems.
- C. Contractor Responsibilities.

1.2 RELATED SECTIONS

- A. Section 31 11 00 - Site Preparation
- B. Section 02 32 00 – Earthwork
- C. Section 32 92 19 – Seeding
- D. Storm Water Pollution Prevention Plan
- E. Construction Drawings

1.3 ENVIRONMENTAL REQUIREMENTS

- A. Protect adjacent properties and water resources from erosion and sediment damage throughout life of contract.

1.4 CONTRACTOR RESPONSIBILITIES

- A. **The Owner (through the Civil Engineer) will submit the Notice of Intent to the Arkansas Department of Environmental Quality (ADEQ) and obtain the NPDES Permit prior to beginning construction.** The Contractor will be responsible for implementing and maintaining all requirements under the Storm Water Pollution Prevention Plan (SWPPP). This includes, but is not limited to, installing best management practices (BMP), maintaining/replacing of BMPs when needed, stabilizing all disturbed areas on the project, completing inspection report forms at the frequency specified in the permit, and maintaining the SWPPP, all required postings, and rain gauge on the site. If the City of Ozark, Arkansas issued a citation or fine for any storm water infractions or deficiencies by ADEQ Environmental Protection Agency (EPA), or any other Entity having jurisdiction over storm water quality, because of negligence by the Contractor in maintenance of the SWPPP, the Contractor will be responsible for payment of the fines or citation fees. The amount of the fines shall be withheld out of the amount due to the Contractor. The BMPs shown in the erosion control plans are minimum

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measures and additional or different BMPs may be necessary in the field. The contractor shall add or modify BMPs as necessary and document these changes in the SWPPP as required.

- B. A copy of the permit and SWPPP will be furnished to the Contractor at the Pre-construction meeting.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Quick growing grasses such as wheat, rye, or oats in accordance with Section 32 92 19.
- B. Stone check dams as specified on Construction Drawings.
- C. Fencing for siltation control as specified on Construction Drawings.
- D. Acceptable Filter/Drainage Fabrics:
 - 1. Mirafi 140 N
 - 2. Dupont Typar HR
 - 3. Approved alternate
- E. Curlex blankets by American Excelsior Company or approved alternate.
- F. Temporary mulches such as loose hay, straw, netting, wood cellulose, or agricultural silage.
- G. Fence stakes shall be minimum of 5-ft in length and be either metal stakes or 2-in. x 2-in. hardwood stakes driven 1'-6" into ground.
- H. Rip-Rap in accordance with Section 31 37 16.

PART 3 EXECUTION

3.1 PREPARATION

- A. Review Construction Drawings and Storm Water Pollution Prevention Plan.
- B. Deficiencies or changes on Construction Drawings or Storm Water Pollution Prevention Plan as it is applied to current conditions will be brought to the attention of the Owner or his designated representative for remedial action.

3.2 EROSION CONTROL AND SLOPE PROTECTION IMPLEMENTATION

- A. Place erosion control systems in accordance with Construction Drawings and Storm Water Pollution Prevention Plan.

- B. The Owner or his designated representative has authority to limit surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow, and embankment operations and to direct Contractor to provide immediate permanent or temporary pollution control measures. Contractor will be required to incorporate permanent erosion control features into project at earliest practical time to minimize need for temporary controls. Cut slopes shall be permanently seeded and mulched when finish grades are achieved as excavation proceeds to extent considered desirable and practical.
- C. Temporary erosion control systems installed by Contractor shall be constantly maintained to control siltation during life of contract. Contractor must respond to maintenance or additional work as required by the Owner or his designated representative within 48 hours.
- D. Additional material and work required and authorized by the Owner or his designated representative which is beyond extent of Construction Drawings and Storm Water Pollution Prevention Plan shall be paid for by Owner.
- E. Contractor is totally responsible to protect all slopes when erosion begins by whatever methods necessary.

END OF SECTION

SECTION 31 37 16

RIPRAP

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Material specifications for riprap used on project.
- B. Placement of riprap and related accessories.

1.2 RELATED SECTIONS

- A. Section 31 23 00 – Excavation and Backfill
- B. Section 32 11 16 – Crushed Stone Base Course
- C. Section 33 41 00 – Storm Sewer Systems
- D. Erosion Control Plan

PART 2 PRODUCTS

2.1 MATERIALS

- A. Stone for riprap shall consist of field stone or rough unhewn quarry stone as nearly uniform in section as is practical. Stones shall be dense, resistant to action of air and water, and suitable for purpose intended. Unless otherwise specified, stones used as riprap shall weigh between 50 lb and 150 lb each, and at least 60 percent of stones shall weigh more than 100 lb each.
- B. Filter Fabric: The filter fabric shall be a woven or unwoven synthetic fiber geotextile conforming to the requirements of ASShTO M 288. Filter fabric shall be similar to Mirafi 140 N or Dupont Typar Style 3601, or approved alternate.

2.2 EQUIPMENT

- A. Off-site materials shall be transported to project using well-maintained and operating vehicles. Once on site, transporting vehicles shall stay on designated haul roads and shall at no time endanger improvements by rutting, overloading, or pumping.

PART 3 EXECUTION

3.1 PREPARATION

- A. Identify required lines, levels, contours, and datum.

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- B. Locate and identify existing utilities that are to remain and protect from damage.
- C. Notify utility companies to remove or relocate utilities that are in conflict with proposed improvements.
- D. Protect plant life, lawns, fences, existing structures, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
- E. Protect benchmarks, property corners, and other survey monuments from damage or displacement. If marker needs to be removed it shall be referenced by licensed land surveyor and replaced, as necessary, by same.
- F. Prior to placing fill in low areas, such as previously existing creeks, ponds, or lakes, perform following procedures:
 - 1. Drain water out by gravity with ditch having flow line lower than lowest elevation in low area. If drainage cannot be performed by gravity ditch, use adequate pump to obtain same results.
 - 2. After drainage of low area is complete, remove mulch, mud, debris, and other unsuitable material by using acceptable equipment and methods that will keep natural soils underlying low area dry and undisturbed.

3.2 PLACEMENT

- A. Filter fabric shall be placed directly on the prepared surface. Fabric sections may be placed vertically or horizontally on the slope. Adjacent fabric sections shall be joined by overlapping a minimum of 2" at the edges and pinning the overlapped strip with U-shaped wire pins or similar fasteners. Fasteners shall be inserted through both strips of overlapped fabric at increments approximately 4' along the overlap. Additional pins shall be installed as necessary to prevent displacement of the fabric. Fabric shall be overlapped in the direction of water flow. The fabric shall be turned down and buried approximately 12" at the exterior limits. No construction equipment will be permitted directly on the fabric.
- B. Place riprap in areas where indicated on Construction Drawings.
- C. Slopes and other areas to be protected shall be dressed to line and grade shown on Construction Drawings prior to placing of riprap. Undercut areas to receive riprap to elevation equal to final elevation less average diameter of stones before placing riprap.
- D. Filter fabric and bedding stone shall be installed prior to placement of stones if so indicated on Construction Drawings. Bedding stone shall be quarried and crushed angular limestone in accordance with Section 32 11 16 and shall be 6-inches in depth. Filter fabric shall be as specified and detailed on Construction Drawings.

- E. Stones shall be placed so that greater portion of weight is carried by earth and not by adjacent stones. Stones shall be placed in single layer with close joints. Upright areas of stone shall make angle of approximately 90 degree with embankment slope. Courses shall be placed from bottom of embankment upward, with larger stones being placed in lower courses. Open joints shall be filled with spalls. Stones shall be embedded in embankment as necessary to present uniform top surface such that variation between tops of adjacent stones shall not exceed 3 inches.
- F. Where called for on construction drawings or required by city or county, riprap shall be grouted in place with grout conforming to the governing requirements.

END OF SECTION

SECTION 32 11 16

CRUSHED STONE BASE COURSE

PART 1 GENERAL

1.1 SCOPE

- A. This Section covers the materials for crushed stone base course to be used as a base material for asphaltic and concrete paving.
- B. This material may also be used for embedment for water and sewer utility lines.

1.2 RELATED WORK

- A. Section 31 23 00: Excavation and backfill-filling and site preparation for streets and parking areas.
- B. Section 32 12 16: Asphaltic Concrete Paving
- C. Section 32 13 13: Portland Cement Concrete paving
- D. Standard Specification for Highway Construction, AHTD, Edition 2014

1.3 QUALITY ASSURANCE

- A. The moisture density relations of material shall be determined in the laboratory in accordance with AASHTO T-180.
- B. Compacted base shall be tested for depth and any deficiencies corrected by scarifying, placing additional material, mixing, reshaping, and re-compacting to the specified density, as directed.

1.4 PUBLIC WORK

- A. Comply with the City of Ozark, Arkansas, standard specifications for Public Street Construction. If conflict should be found between this section and the City Standards for Public Street Construction, City Standards shall be the priority.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Crushed stone base course shall consist of crusher run stone or a mixture of crushed stone and natural fines uniformly mixed and so proportioned as to meet all the requirements hereinafter specified, with the further provision that a mixture of

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crushed stone and natural fines shall contain not less than 95 percent crusher produced material.

- B. Stone shall be hard and durable with a percent of wear by the Los Angeles Test (AASHTO T96) not greater than 45.
- C. Shale and slate shall not be used for crushed stone base course.
- D. The material furnished shall not contain more than 5 percent by weight of shale, slate and other deleterious matter.
- E. Crushed stone base course shall conform to the following grading (AASHTO T 11 and T 27) and crushing (AHTD Specification Section 303) requirements.

Size of Sieve	Percent Passing by Weight
	Class 7
1-1/2"	100
1"	
3/4"	50-90
3/8"	
#4	25-55
#10	
#40	10-30
#200	3-12

1. The fraction passing the No. 200 sieve shall not be greater than three quarters the fraction passing the No. 40 sieve. The fraction passing the No. 40 sieve shall have a liquid limit not greater than 25 and a plasticity index not greater than 6.
2. When it is necessary to blend two or more materials, each material shall be proportioned separately by weight through mechanical feeders to ensure uniform production. Pre-mixing or blending in the pit to avoid separate feeding will not be permitted.
3. The specific type of crushed stone for different applications shall be as specified or shown on Drawings.

PART 3 - EXECUTION

3.1 BASE COURSE

- A. The base course material shall be placed on the completed and approved subgrade, that has been bladed to substantially conform to the grade and cross section shown on the Drawings.
- B. The sub-grade shall be prepared as specified and shall be free from an excess or deficiency of moisture at the time of placing the base course.

- C. The subgrade shall also comply, where applicable, with the requirements of other items that may be contained in the contract that provide for the construction, reconstruction or shaping of the subgrade or the reconstruction of the existing base course.
- D. Base course material shall not be placed on a frozen subgrade.
- E. The crushed stone shall be placed on the subgrade or previous base course layer in lifts not to exceed 4" and spread uniformly to such depth and lines that when compacted it will have the thickness as follows:
 - 1. Heavy Duty Paving Areas: 6" base course
 - 2. Parking Areas: 6" base course.
- F. The spreading shall be done the same day that the material is hauled, and shall be performed in such a manner that no segregation of coarse and fine particles nor nests or hard areas caused by dumping the crushed stone on the subgrade will exist.
- G. To insure proper mixing, the crushed stone shall be bladed across the roadbed before being spread. Care must be taken to prevent mixing of subgrade or shoulder material with the base course material in the blading and spreading operation
- H. The crushed stone shall be substantially maintained at optimum moisture during the mixing, spreading, and compacting operations, water being added or the material aerated as may be necessary.
- I. The specified grade and section shall be maintained by blading throughout the compaction operation.
- J. The material in each course shall be compacted to a density, as determined by AASHTO T 238, Method B, of not less than 95% of the maximum laboratory density determined in the laboratory by AASHTO T 180, Method D. The aggregate shall be compacted across the full width of application.
- K. The crushed stone shall be compacted across the full width of application.
- L. The compacted base course shall be tested for depth and any deficiencies corrected by scarifying, placing additional material, mixing, reshaping, and re-compacting to the specified density, as required by the Architect.
- M. Compaction testing shall be as specified in Section 31 23 00

END OF SECTION

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SECTION 32 12 16

ASPHALTIC CONCRETE PAVING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Placement of asphaltic paving, including prime coat materials and installation, and hot mix asphalt binder and surface course.

1.2 RELATED SECTIONS

- A. General quality control requirements and the division of responsibilities for laboratory and field testing are specified in the General Requirements.
- B. Site preparation is specified in Section 31 23 00.
- C. Pavement Markings: Section 32 17 23.
- D. Sub-grade preparation and base course construction are specified Section 32 11 16.
- E. Standard Specification for Highway Construction, AHTD, Edition 2014

1.3 REFERENCES

- A. AASHTO
 - 1. M 17, "Mineral Filler for Bituminous Paving Mixtures"
 - 2. M 81, "Cut-Back Asphalt (Rapid-Curing Type)"
 - 3. M 140, "Emulsified Asphalt"
 - 4. M 145, "The Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes"
 - 5. M 208, "Cationic Emulsified Asphalt"
 - 6. M 226, "Viscosity Graded Asphalt Cement"
 - 7. T 30, "Mechanical Analysis of Extracted Mixture"
 - 8. T 44, "Solubility of Bituminous Materials in Organic Solvents"
 - 9. T 48, "Flash and Fire Points by Cleveland Open Cup"
 - 10. T 49, "Penetration of Bituminous Materials"
 - 11. T 51, "Ductility of Bituminous Materials"
 - 12. T 78, "Distillation of Cut-Back Asphaltic (Bituminous) Products"
 - 13. T 96, "Resistance to Abrasion of Small Size Coarse Aggregate by Use of the Los Angeles Machine"
 - 14. T 102, "Spot Test of Asphaltic Materials"
 - 15. T 104, "Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate"
 - 16. T 166, "Bulk Specific Gravity of Compacted Bituminous Mixtures"

B. AHTD

1. Standard Specifications for Highway Construction, 1996 Edition, referencing the following specific sections:
 - a. 401, Prime and Tack Coats and Emulsified Asphalt in Base Course
 - b. 403, Materials and Equipment for Prime, Tack, and Asphalt Surface Treatment
 - c. 404, Design and Quality Control of Asphalt Mixtures
 - d. 406, Asphalt Concrete Hot Mix Binder Course
 - e. 407, Asphalt Concrete Hot Mix Surface Course
 - f. 409, Materials and Equipment for Asphalt Hot Mix Binder and Surface Courses
 - g. 410, Construction Requirements for Asphalt Hot Mix Binder and Surface Courses
2. AHTD Test Method 449/449A
3. AHTD Test Method 450
4. AHTD Test Method 460

C. ASTM standards may be substituted for the listed AASHTO standard when the standards are essentially the same.

1.4 SUBMITTALS

- A. Submit product information on prime coat and tack coat products, and on asphalt cement when requested by Owner or his designated representative.
- B. Submit mix design information in accordance with paragraph 2.4.
- C. Submit source quality control information when requested by Owner or his designated representative in accordance with Paragraph 2.5.

1.5 QUALITY ASSURANCE

- A. Testing for materials and construction performance shall be at the option of Owner, or as specified herein. Owner has the authority to require any test needed, in their opinion, to demonstrate that the quality of the construction materials or workmanship meet the specified requirements.
- B. Site tests shall be made in the presence of Owner or his designated representative. Required tests must demonstrate compliance with the specifications before the paving work will be accepted.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. HMAC mixtures shall be transported from mixing plant to the Work in vehicles with clean, tight beds.

- B. When mixtures are hauled more than 15 miles, or when mixtures are being placed between November 1 and April 1, cover beds of vehicles with canvas or other suitable material to retard loss of heat. Cover shall extend over the sides and ends of truck bed and shall be securely fastened. Store cover on truck at all times regardless of haul distance or time of year.
- C. Utilize sufficient number of vehicles to provide a continuous operation on the roadway.
- D. Use only non-petroleum release agents.

PART 2 PRODUCTS

2.1 SOURCES

- A. Obtain aggregate from a permanently established quarry regularly engaged in supplying mineral aggregates for asphaltic concrete mixtures. Quarry shall have an established quality control program.
- B. Obtain asphalt cement from sources that have executed a certification agreement with AHTD.
- C. Obtain asphaltic concrete mixtures from a permanently established mixing plant regularly engaged in supplying paving materials conforming to AHTD specifications. Applicable provisions of AHTD 409.03 shall apply, except that Owner or his designated representative will not be inspecting or monitoring operations of the plant.
- D. **ABSOLUTELY NO RECYCLED ASPHALT WILL BE USED ON THIS PROJECT FOR ASPHALT PAVING.**

2.2 PRIME AND TACK COATS

- A. Prime coat shall be emulsified petroleum resin, EPR-1, manufactured by Blackridge, or equal.
- B. Bituminous tack coat shall be rapidly curing cutback asphalt conforming to AASHTO M 81, or an emulsified asphalt conforming to AASHTO M 140 or M 208. Cationic emulsified asphalt shall have a minimum Saybolt Furol Viscosity at 122 degrees F at the point of manufacture of 200 seconds, and a maximum Saybolt Furol Viscosity of 500 seconds.

2.3 ASPHALTIC CONCRETE

- A. Mineral Aggregates
 - 1. Mineral aggregates for asphaltic concrete binder course and surface course shall consist of combinations of coarse aggregate, fine aggregate, and mineral filler proportioned as provided for in the specifics mix designs.

2. Coarse aggregate is that fraction retained on the #10 sieve and shall consist of crushed gravel, crushed stone, or slag.
 3. Fine aggregate is that fraction passing the #10 sieve, and shall consist of clean, hard, durable particles of natural or manufactured sand or combinations of the two. Natural sand shall meet the requirements of AASHTO M 145 except that a maximum of 10 percent may pass the #200 sieve. Fine aggregate may contain a maximum of 2 percent coal and lignite by weight of the fine aggregate.
 4. Crushed stone shall consist of clean, hard, durable fragments of rock of uniform quality, free from an excess of soft particles. The stone shall have a percent of wear, measured by AASHTO T 96, not greater than 40, and when subject to 5 cycles of the Sodium Sulfate Soundness test, AASHTO T 104, the loss shall not exceed 12 percent.
 5. Crushed gravel shall consist of clean, hard, durable aggregate free from an excess of soft particles in which at least 98 percent of the particles retained on the #10 sieve have been produced from larger particles by crushing operations. Gravel shall have a percent of wear, measured by AASHTO T 96, not greater than 40.
 6. Mineral aggregates shall be clean and free of deleterious material and adherent films of clay that will prevent thorough coating with asphalt materials. The fraction passing the #40 sieve shall have a plasticity index not greater than 4. For asphaltic concrete mixes, a minimum of 65 percent of total aggregate shall be produced by crushing larger particles.
 7. Mineral filler shall comply with the requirements of AASHTO M 17.
 8. Gradation of aggregates shall comply with the design mix, within the master ranges given in paragraphs 2.03 C and 2.03D.
- B. Asphalt cement shall conform to AASHTO M 226. Physical requirements are per Table II of AASHTO M 226, with the further provision that ductility for all grades of asphalt cement shall be a minimum of 100 cm and all grades shall have a negative spot as determined by the Spot Test. The grade to be used will be determined by the mix design.
- C. Binder course shall be hot mix asphaltic concrete composed of mineral aggregate, asphalt cement, and any required additives proportioned to meet ATHD Type 1 binder course, in accordance with the following:

Mineral Aggregate: Sieve Size	Type 1 Asphaltic Concrete Percent Passing	Maximum Tolerance Percent
1 1/2 inch	- - -	
1 1/4 inch	100	
1 inch	92-100	
3/4 inch	75-97	± 7

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½ inch	55-85	± 7
#4 sieve	35-60	± 7
#10 sieve	20-45	± 5
#20 sieve	14-35	± 4
#40 sieve	10-30	± 4
#80 sieve	6-20	± 4
Asphalt Cement	3.7 - 7.0	±0.4
Fines to Asphalt Ratio	0.6 - 1.4	
Design Test Requirements		
Number of Blows	75	
Minimum Marshall Stability	1750lbs.	
Marshall Flow, 1/100 inch	7-16	
Air Voids	3.0 - 6.0 percent	
Min. Voids in Mineral Aggregate	13 percent	
Min. Water Sensitivity Ratio	75 percent	
Percent Anti-Strip	As required	

Fines to asphalt ratio is defined as the weight of the aggregate passing the #200 sieve, expressed as a percentage of the total mix weight divided by the present asphalt cement content.

Exact quantities of mineral filler and anti-strip additive incorporated into the mix will be as determined by the laboratory mix design.

- D. Surface course shall be composed of mineral aggregates, asphalt cement, and any required additives proportioned to meet the requirements for AHTD Type II or III surface course.
- E. Surface course shall contain not more than 60 percent limestone aggregate in the coarse mineral aggregate fraction. When limestone is the primary coarse mineral aggregate, crushed sandstone, crushed siliceous gravel, syenite, novaculite, or crushed slag shall be used as the remaining coarse mineral fraction.

2.4 MIX DESIGN

- A. A special mix design prepared specifically for this project will not be required. Submit for review the mix design in use at the mixing plant for its regular supply of the mixes specified.
- B. Mix designs shall be prepared by laboratory analysis in accordance with the requirements of the specifications. Mix design preparation shall comply with applicable provisions of AHTD 404.01.

2.5 SOURCE QUALITY CONTROL

- A. Contractor is responsible for quality control testing of the HMAC mixtures to be incorporated in the work prior to their placement in the work, in accordance with the General Requirements.
- B. Tests shall be conducted by the mixing plant, as part of a regular quality control program. Such tests shall be of the type and at the frequency required to demonstrate that the mixing plant is producing mixtures in conformance with required design mixes.
- C. If required by Owner or his designated representative, submit a copy of standing quality control program in use at the mixing plant.
- D. If required by Owner or his designated representative, submit copies of testing records of tests conducted at the mixing plant on the HMAC products delivered for this project. Such tests will be ordered if Owner or his designated representative has reason to believe the HMAC mixtures supplied are not in compliance with the specifications, or if the mixtures appear to result in overly difficult placement or compaction such that specified results are not obtained. Such testing, if ordered, may include: extraction tests (AHTD 450) and sieve analysis (AASHTO T 30) of the extracted aggregate; nuclear asphalt content gauge (AHTD 449/449A) and sieve analysis (AASHTO T 30) of the aggregate sample obtained by AHTD Test Method 460. Additional tests required for further evaluation of the mixture will be as needed to prove the adequacy of the mixture.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine the areas and conditions under which work will be performed. Conditions detrimental to timely and proper execution of this work shall be corrected. No work shall be done until unsatisfactory conditions are corrected.

3.2 PREPARATION

- A. Before application of each course or surface coat, prepare the existing course to receive the new course. Such preparation may include filling sags and depressions with asphalt binder or surface course mixtures. Accomplish this work by hand, blade grader, or mechanical spreader methods. Featheredge to a smooth and even surface around the edges of these areas. Prime coat or tack coat as applicable before placing this material. Examine base course to verify that the lines and grades conform to the requirements of the Drawings and Specifications.
- B. Clean loose and foreign materials.
- C. Paint contact surfaces of curbing, gutters, manholes, and other structures with a thin coating of rapid curing cutback asphalt or emulsified asphalt.

3.3 INSTALLATION

A. Prime Coat

1. Clean surface to be treated with prime coat of dust, dirt, and loose or foreign material by sweeping with mechanical brooms immediately preceding application of prime coat. Take care to clean but not loosen or dislodge embedded aggregate in base course. Remove patches of asphalt, dirt, or other material which does not form an integral part of the surface to be treated.
2. Perform cleaning only far enough in advance of the application to ensure the surface being properly prepared at the time of application.
3. Spray prime coat material uniformly over surface by means of mechanical pressure distributor at the rate of 0.25 gallons per square yard, or as recommended by the manufacturer for project conditions. Remove surplus material that collects in surface depressions.
4. Allow prime coat to cure per manufacture's recommendations before application of asphalt material. NO material for a succeeding course shall be placed on a primed base course until the prime coat has cured sufficiently to prevent damage by hauling operations.
5. Do not apply when air temperature is below 45 degrees F.
6. Observe special precautions to ensure uniform distribution of prime coat material. Adjust and operate distributor so as to evenly distribute material. Remove excess quantities on the road surface caused by stopping or starting the distributor, by overflow, leakage, or otherwise.
7. Apply prime coat material only at temperatures within manufacturer's recommendations.
8. Repair prime coat that becomes damaged.

- B. Apply tack coat in a manner similar to that described in paragraph 3.3.A for prime coat. Apply at the rate of 0.02 to 0.03 gallons per square yard. Apply tack coat sufficiently in advance of asphalt course to allow proper curing of the tack coat material but not so far in advance as to lose its adhesives as a result of being covered with dust or foreign material. If tack coat becomes damaged or covered with foreign material, clean and re-treat with tack coat as required.

- C. Binder Course construction is covered in general in AHTD Sections 406 and 410. Preparing HMAC mixture is covered in general in AHTD Section 409. Binder course shall be constructed to the following standards:

Minimum Density, percent of theoretical 92.0

Maximum Moisture, percent (Roadway) 0.75

1. Place mixture on prepared surface, spread, and strike off to line, grade, and elevation required. Place mixture only on a base that shows no evidence of free moisture and when weather conditions rare suitable. Engineer may permit work of this character to continue when overtaken by sudden rains to utilize materials that may be in transit from the mixing plant to the site.

2. Mixture shall be delivered to the paver within recommended compaction temperature range according to the design mix. Do not place binder course on roadway at a temperature lower than 250 degrees F.
 3. Hand spreading is permitted only in areas inaccessible to paver.
 4. Paver shall uniformly distribute and compact mixture in from of the screed for full width being paved. Finished surface shall be smooth and of uniform texture.
 5. Screed or strike-off assembly shall effectively produce a finished surface of required evenness and texture without tearing, shoving, or gouging mixture.
 6. Operate paver at forward speeds consistent with satisfactory laying of mixture. Match speed of paver with mixing plant production rate and number of hauling units.
 7. Establish edge of binder course by string or chalk line for at least 500 feet ahead of spreading operation.
 8. Thoroughly compact mixture after spreading by rolling as soon as it will bear weight of rollers without undue displacement.
 9. Establish an optimum rolling pattern at beginning of placement of each mix design.
 10. The number, weight, and type of rollers, and the optimum rolling pattern shall be such that the specified density and surface requirements are consistently attained while mixture is in a workable condition. Rollers which produce excessive crushing of aggregate particles will not be permitted. Compact asphalt to 92 percent of theoretical density as determined by ASSHTO T-275.
 11. Following the breakdown rolling operation and as soon as the mat will support the roller without displacement, pass pneumatic roller over binder course a sufficient number of times to knead and seal entire mat being place.
 12. Exercise due care when using vibratory rollers to prevent any deterioration of material caused by excessive rolling or vibration. Operate vibratory rollers in such a manner that overlap of adjacent passes shall be held to a minimum.
 13. Start rolling longitudinally at the low edge and proceed toward the higher portion of the mat. When paving abutting a previously placed lane, longitudinal joint shall be rolled first followed by regular rolling procedure. Terminate alternate passes of roller 3 feet from any preceding stop. Do not set rollers perpendicular to centerline of traveled way.
 14. Restrict speed of roller to avoid displacement of hot mixture, and do not exceed 3 mph. Operate roller in such a manner that no displacement of the mat will occur. Rolling shall proceed continuously until all roller marks are eliminated and required density attained. Keep rollers moist for full width of roller to prevent adhesion of asphalt mixture to roller. Excess water will not be permitted.
 15. Do not pass rollers over unprotected end of a freshly laid mixture. Form transverse joints by cutting back on previous run to expose full depth of the course. Use a brush coat of asphalt material on contact surfaces of transverse joints just before additional mixture is placed against previously placed material.
 16. Upon completion of rolling operations, surface shall be smooth and of uniform texture.
- D. Surface Course construction is covered in general AHTD Sections 407 and 410. Preparing HMAC mixture is covered in general in AHTD Section 409. Surface course shall be constructed to the following standards.
- Minimum Density, percent of theoretical 92.0

Maximum Moisture, percent (Roadway) 0.75

Surface course construction shall comply with the requirements of Paragraph 3.3.C, and with the following additional requirements:

1. Offset longitudinal joint in one layer by approximately 6-inches from the layer below. However, joint in top layer of non-parking lot paving shall be at the centerline of pavement or at lane lines. General casting back of material or hand raking material onto surface will not be permitted.
2. Establish edge of surface course at least 500 feet ahead of spreading operation.
3. Finished surface, when checked with a 10-foot straight edge parallel to the centerline, shall show no variation more than 1/8-inch for surface course.

3.4 PAVING THICKNESS

- A. After the base course has been primed, the asphaltic concrete wearing course shall be applied in thickness as follows:
 1. Light Duty Paving (drives): 2" thick hot mix binder course with 2" thick surface course.

3.5 FIELD QUALITY CONTROL

- A. Owner will be responsible for quality control testing of the completed pavement, in accordance with the General Requirements. Tests to be taken and their frequency will be determined by Owner or his designated representative. Tests may include coring for depth and laboratory density, in-place density, and straight edge for smoothness. Density of compacted mixtures shall be in accordance with AASHTO T 166.
- B. If testing shows deficiencies, correct deficiencies by means satisfactory to Owner or his designated representative prior to beginning additional work. If deficiencies appear to be the result of variation from approved mix design, an inadequate mix design, or materials (as opposed to workmanship), operation will be stopped until corrections can be made at the mixture source. If deficiencies are a result of workmanship, adjust operations and equipment to achieve the specified results. If deficiencies of failing areas are discovered after paving is complete, core samples will be taken of failed area and surrounding area at contractor's expense. In deficient or failed areas, Asphaltic concrete and base course material will be removed, subgrade re-compacted and tested for proper compaction. Install base course, compact, and pave, meeting specifications and minimum thickness. Finished grades shall not be altered from original finished elevations.

3.6 CLEANING

- A. Clean surface of pavement as required of debris and loose material after compaction and before final acceptance.
- B. Clean ACHM splatter or excess material from curbs, gutters, drainage structures, and other places where it has been placed and exceeds the limits of paving indicated on the Drawings.

END SECTION

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SECTION 32 16 00

WALKS & CURBS

PART 1 GENERAL

1.1 SCOPE:

- A. Provide all materials, labor, equipment and related items necessary to complete the concrete walks and curbs as shown on the drawings.
- B. Accessible ramp tactile warning system

1.2 RELATED SECTIONS

- A. Section 32 11 16: Crushed Stone Base Course.
- B. Section 32 12 16: Asphalt Paving
- C. Section 32 13 13: Portland Cement Concrete Paving
- D. Section 03 11 00: Concrete Form Work
- E. Section 03 21 00: Concrete Reinforcement
- F. Section 03 30 00: Cast-in-Place Concrete
- G. Section 07 92 00: Sealants

1.3 PUBLIC WORKS

- A. Comply with the City of Ozark, Arkansas, standard specifications for Public Street Construction. If conflict should be found between this section and the City Standards for Public Street Construction, City Standards shall be the priority.

PART 2 PRODUCTS/ MATERIALS

2.1 WALKS & CURBS:

- A. 3,000 psi at 28 days in accordance with ACI and CRSI Standards, 3,500 for curbs. Materials, testing, and placing shall be specified in Division 3. Concrete to be air entrained per Section 03 30 00. No fly ash is permitted in walks or curbs.

2.2 EXPANSION JOINTS

- A. Expansion joint material shall be 1/2" pre-molded filler especially made for such use - not INSULATION or SHEATHING BOARD for all curbs and non-exposed aggregate walks and pavement.

2.3 TACTILE WARNING SYSTEM

- A. Provide raised truncated dome tactile warning at all ramps to meet ADAAG guideline requirements from either of the following two systems:
 - 1. "Armor-Tile" pre-manufactured cast-in-place or surface-applied tactile system (size as required to fill ramp area-including flared sides), manufactured by Engineered Plastics Inc., Williamsville, NY (800) 682-2525,.
 - a. Architect to select color from minimum 5 color selections.
 - b. Provide manufacturer's 5-year warranty.
 - 2. Other approved manufacturers:
 - a. Truncated dome system, manufactured by Vanguard ADA Systems of America, Snohomish, WA (360) 668-5700.
 - b. Detectable warning plates, manufactured by Neenah foundry Company, Neenah, Wisconsin, (800) 558-5075.
 - c. Cast-In-Place Detectable Warning Surface, manufactured by ADA Solutions, Inc., 800-372-0519.
 - d. Approved alternate product and manufacturer

PART 3 EXECUTION

3.1 CONCRETE WALKS

- A. Concrete walks shall be of one course construction 4 inches thick, and of widths shown on the drawings. Provide 1/8" per foot crown or cross slope in the direction of drainage. All steps are to drain freely. Provide tooled joints as shown on drawings.
- B. Expansion joints: Provide 1/2" transverse expansion joints, at walk junctions and intersections, at top and bottom of steps, and where walks abut curb returns, buildings, platforms or other fixed structures, or terminate at curbs. Expansion joints shall be at right angles to the slab and extend the full depth thereof. Pre-molded filler where called for shall extend to within 1/2" of the surface. Fill remaining void with sealant as specified in Section 07 92 00. Locate expansion joints in walks as shown on plans and nearly as practicable opposite those in abutting curbs, approximately 20' on center.
- C. Control Joints: Provide troweled joints 1/4 of slab depth where indicated on plans.
- D. Protection. Remove no forms for 24 hours after pouring concrete. Protect concrete walks and courtyards from pedestrian traffic for a period of three days after pouring.

3.2 WALKS AND CURB FINISH

A. Finish Types shall be the following:

1. Light Broom Finish

B. Light Broom Finish:

1. After placing concrete paving, do not work the surface further until ready for floating.
2. Begin floating when the surface water has disappeared and when the concrete has stiffened sufficiently to permit operation of a power- driven float, or both.
3. Consolidate the surface with power-driven floats, or by hand-floating if the area is small or inaccessible to power units.
4. Check and level the surface plane to a tolerance not exceeding 6mm in 3 m (1/4" in 10'-0") when tested with a 3 m (10'-0") straightedge placed on the surface at not less than two different angles.
5. Cut down high spots and fill low spots.
6. Uniformly slope surfaces to drains where required.
7. Immediately after leveling, re-float the surface to a uniform, smooth, granular texture as approved by the Architect.
8. At this point, apply a light broom finish in one direction. Make sweeps uniform and continuous, keeping bristles clean after each sweep. Provide a small sample area for approval by Architect prior to finishing entire surface.

3.3 CONCRETE CURBS

A. All machine poured curbs to be shape and profile shown on Drawings.

B. Construct hand formed concrete curbs in small workable sections. Size and depth of curbs shall be generally 6" wide x 18" deep with sloped face, unless noted otherwise on Drawings.

C. Provide 1/2 inch expansion joints, with pre-molded filler cut to shape of cross section at ends of all returns at 40 foot intervals, maximum. Align with sidewalk expansion joints where curb abuts sidewalk. Fill top 1/2" of joint with sealant as specified in section 07 92 00. Provide sawn control joints at 20' o.c., max. Fill with sealant.

D. Tamp and screed concrete as soon as placed. Remove division plates and face forms as soon as practicable; fill any honeycombed places with 1:2 mortar and give exposed surfaces same finish as specified for concrete walks.

E. Remove no forms, except face forms, for 24 hours after placing concrete. Protect against pedestrian traffic for three (3) days and against vehicular traffic for 14 days. Compact thoroughly and backfill behind curb. Place and compact fill behind curb as soon as practical.

3.4 CURB CUTS

A. At streets, where indicated on Drawings, construct curbs to conform to shape and dimension as shown on the Drawings.

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- B. Contractor is responsible for obtaining permit to cut curbs on highways and paying any fees associated with the same.

3.5 TACTILE WARNINGS

- A. Provide at all handicapped accessible ramps fronting any drive, road or parking area. Tactile warning system to extend full width and length of ramp.
- B. Install per manufacturer's instruction. Clean prior to substantial completion.

END OF SECTION

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SECTION 32 17 23

PAVEMENT MARKINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. General painted pavement markings.
- B. Fire Lane Marking
- C. Handicapped symbol painting.

1.2 RELATED SECTIONS

- A. Construction Drawings
- B. Section 32 12 16 - Asphaltic Paving
- C. Section 32 13 13 - Portland Cement Concrete Paving

1.3 PROJECT CONDITIONS

- A. Maintain access for vehicular and pedestrian traffic as required for other construction activities. Utilize flagmen, barricades, warning signs and warning lights as required.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Paint Type: Federal Highway Administration approved. Paint shall be Promar alkyd traffic marking paint, manufactured by Sherwin Williams, factory mixed, quick-drying, non-bleeding, or approved equal.
- B. The following items are to be painted with the colors noted below:
 - Letters, Arrows & Lane Striping: White
 - Handicap Symbols: Blue & White (Refer to detail on drawings)
 - Guard posts/Bollards: Color as selected.
 - Parking Stall Striping: White
 - Curb @ Fire lane: Red with 3" high white block letters "No Parking Fire Lane" every 30 feet of curb. Paint entire curb, or if there is no curb, paint 4" wide stripe with 3" high letters on edge of pavement.

PART 3 EXECUTION

3.1 PREPARATION

- A. Sweep and clean surface to eliminate loose material and dust.

3.2 APPLICATION

- A. Apply two (2) coats of paint at manufacturer's recommended rate with total maximum of 320 lineal feet per gallon per coat with 4" wide stripe. Apply with mechanical equipment to produce uniform straight edges. At sidewalk curbs, use a straightedge to ensure a uniform, clean, and straight stripe.
- B. Do not apply pavement marking paint until layout, colors and placement have been verified with Architect. Allow paving to age for minimum 20 days prior to pavement markings. Sweep and clean surfaces to eliminate loose materials and dust.
- C. Pavement markings to be applied in suitable weather conditions.

END OF SECTION

SECTION 32 92 19

SEEDING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Preparation of subsoil.
- B. Placing topsoil.
- C. Seeding, mulching and fertilizing.
- D. Maintenance.

1.2 RELATED SECTIONS

- A. Section 31 23 00 – Excavation and Backfill: Topsoil material.
- B. Section 31 35 00 – Slope Protection and Erosion Control

1.3 REFERENCES

- A. FS O-F-241 - Fertilizers, Mixed, Commercial.

1.4 DEFINITIONS

- A. Weeds: Include Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

1.5 SUBMITTALS AT PROJECT CLOSEOUT

- A. Section 01 77 00 - Contract Closeout: Procedures for submittals.
- B. Maintenance Data: Include maintenance instructions, cutting method and maximum grass height; types, application frequency, and recommended coverage of fertilizer.

1.6 QUALITY ASSURANCE

- A. Provide seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.

1.7 REGULATORY REQUIREMENTS

- A. Comply with regulatory agencies for fertilizer, herbicide, and pesticide composition and application.

1.8 DELIVERY, STORAGE, AND PROTECTION

- A. Section 01 60 00 - Material and Equipment: Transport, handle, store, and protect products.
- B. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable.
- C. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

1.9 MAINTENANCE SERVICE

- A. Section 01 77 00 - Contract Closeout.
- B. Contractor to maintain seeded areas immediately after placement until grass is well established and exhibits a vigorous growing condition for one cutting. This shall include watering fertilizing, and weed control at regular intervals. Architect to determine if grass is well established and exhibits vigorous growth condition.

PART 2 PRODUCTS

2.1 SEED MIXTURE

- A. Seed Mixture as indicated below, unless noted otherwise on Civil drawings.
 - 1. Turf Type Fescue Grass: 8 pounds per 1000 square feet.
 - 2. Quick-Cover Annual Rye Grass: 3 - 4 pounds per 1000 square feet.
 - 3. During certain periods of the year, Annual Rye Grass may be deleted upon approval of a local A.N.L. A. certified nursery and Architect.

2.2 SOIL MATERIALS

- A. Topsoil: Fertile, agricultural soil, typical for locality, capable of sustaining vigorous plant growth, taken from drained site; free of subsoil, clay or impurities, plants, weeds.

2.3 ACCESSORIES

- A. Mulching Material: Oat or wheat straw, free from weeds, foreign matter detrimental to plant life, and dry. Hay or chopped cornstalks are not acceptable.

- B. Fertilizer: FS O-F-241; as recommended for grass, with fifty percent of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil to the following proportions: Nitrogen 13 percent, phosphoric acid 13 percent, soluble potash 13 percent.
- C. Water: Clean, fresh and free of substances or matter which could inhibit vigorous growth of grass.
- D. Herbicide: Type as recommended by local county agent.
- E. Erosion Fabric: Curlex Blankets, manufactured by American Excelsior Company or approved alternate.
- F. Stakes: Softwood lumber, chisel pointed.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that prepared soil base is ready to receive the work of this section.

3.2 PREPARATION OF SUBSOIL

- A. Prepare subsoil to eliminate uneven areas and low spots. Maintain lines, levels, profiles and contours. Make changes in grade gradual. Blend slopes into level areas.
- B. Remove foreign materials, weeds and undesirable plants and their roots. Remove contaminated subsoil.
- C. Scarify subsoil to a depth of 4 inches where topsoil is to be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted sub-soil.

3.3 PLACING TOPSOIL

- A. Spread topsoil to a minimum depth of 4 inches over area to be seeded. Rake until smooth.
- B. Place topsoil during dry weather and on dry unfrozen subgrade.
- C. Remove vegetable matter and foreign nonorganic material from topsoil while spreading.
- D. Grade topsoil to eliminate rough, low or soft areas, and to ensure positive drainage.

3.4 FERTILIZING

- A. Apply fertilizer in accordance with manufacturer's instructions.

- B. Apply after smooth raking of topsoil and prior to roller compaction.
- C. Do not apply fertilizer at same time or with same machine as will be used to apply seed.
- D. Mix thoroughly into upper 2 inches of topsoil.
- E. Lightly water to aid the dissipation of fertilizer.

3.5 SEEDING

- A. Apply seed at a rate described in specifications or on drawings. Apply evenly in two intersecting directions. Rake in lightly.
- B. Do not seed areas in excess of that which can be mulched on same day.
- C. Planting Season: Verify with a local A.N.L.A. certified nursery.
- D. Do not sow immediately following rain, or when ground is too dry, or during windy periods.
- E. Roll seeded area with roller not exceeding 112 lbs.
- F. Immediately following seeding and compacting, apply mulch to a thickness of 1/8 inches. Maintain clear of shrubs and trees.
- G. Apply water with a fine spray immediately after each area has been mulched. Saturate soil to a depth of 4 inches.

3.7 SEED PROTECTION

- A. Cover seeded slopes where grade is 3:1 or greater with erosion fabric. Roll fabric onto slopes without stretching or pulling.
- B. Lay fabric smoothly on surface, bury top end of each section in 6 inch deep excavated topsoil trench. Provide 12 inch overlap of adjacent rolls. Backfill trench and rake smooth, level with adjacent soil.
- C. Secure outside edges and overlaps at 36 inch intervals with stakes.
- D. Lightly dress slopes with topsoil to ensure close contact between fabric and soil.
- E. At sides of ditches, lay fabric laps in direction of water flow. Lap ends and edges minimum 6 inches.

3.8 MAINTENANCE

- A. Mow grass at regular intervals to maintain at a maximum height of 2-1/2 inches. Do not cut more than 1/3 of grass blade at any one mowing.
- B. Neatly trim edges and hand clip where necessary.
- C. Immediately remove clippings after mowing and trimming.
- D. Water to prevent grass and soil from drying out.
- E. Roll surface to remove minor depressions or irregularities.
- F. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.
- G. Immediately reseed areas which show bare spots.
- H. Protect seeded areas with warning signs during maintenance period.

3.9 EROSION

- A. If topsoil begins to erode before grass is established, redress to finish grades and re-seed.

3.10 SCHEDULE

- A. As indicated on drawings, where disturbed by construction, at perimeter of building and paved areas unless sod is called for in areas shown on drawings.

END OF SECTION

SECTION 32 92 23

SODDING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Preparation of subsoil.
- B. Fertilizing.
- C. Sod installation.
- D. Maintenance.

1.2 RELATED SECTIONS

- A. Section 31 23 00 – Excavation and Backfill: Topsoil material.
- B. Section 32 92 19 - Seeding.
- C. Section 32 93 00 - Trees, Plants, and Ground Cover.

1.3 SODDING TO BE INCLUDED IN LANDSCAPE ALLOWANCE

- A. Sodded Areas: By the square yard. Includes preparation of topsoil, sodding, watering and maintenance to specified time limit.

1.4 REFERENCES

- A. ASPA (American Sod Producers Association) - Guideline Specifications to Sodding.
- B. FS O-F-241 - Fertilizers, Mixed, Commercial.

1.5 DEFINITIONS

- A. Weeds: Includes Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

1.6 SUBMITTALS AT PROJECT CLOSEOUT

- A. Section 01 77 00 - Contract Closeout: Procedures for submittals.
- B. Operation Data: Submit for continuing Owner maintenance.

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- C. Maintenance Data: Include maintenance instructions, cutting method and maximum grass height; types, application frequency, and recommended coverage of fertilizer.

1.7 QUALITY ASSURANCE

- A. Sod: Minimum age of 18 months, with root development that will support its own weight without tearing, when suspended vertically by holding the upper two corners.
- B. Submit sod certification for grass species and location of sod source.
- C. Sod Producer: Company specializing in sod production and harvesting with minimum five years experience.
- D. Installer: Company approved by the sod producer.

1.8 REGULATORY REQUIREMENTS

- A. Comply with regulatory agencies for fertilizer and herbicide composition.

1.9 DELIVERY, STORAGE, AND PROTECTION

- A. Section 01 60 00 - Material and Equipment: Transport, handle, store, and protect products.
- B. Deliver sod on pallet or in rolls. Protect exposed roots from dehydration.
- C. Do not deliver more sod than can be laid within 24 hours.

1.10 PROJECT CONDITIONS

- A. Section 01 31 00 - Coordination and Meetings.
- B. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.
- C. Coordinate with installation of underground sprinkler system piping and watering heads.
- D. Sod Installation Season: Verify with a local A.N.L. A. certified nursery or county agent.

1.11 MAINTENANCE SERVICE

- A. Contractor to provide service and maintenance of sodded areas for three months from Date of Substantial Completion or until grass is well established and exhibits a vigorous growing condition for two cuttings, whichever is the longer period. Architect to determine if sod is well established and exhibits vigorous growth condition.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Sod: ASPA Approved Field grown; cultivated grass sod; as noted on Civil drawings with strong fibrous root system, free of stones, burned or bare spots; containing no more than 10 weeds per 1000 sq ft.
- B. Topsoil: As specified in Section 31 23 00.
- C. Fertilizer: 13-13-13 Time release.
- D. Water: Clean, fresh and free of substances or matter which could inhibit vigorous growth of grass.

2.2 ACCESSORIES

- A. Wood Pegs: Softwood, sufficient size and length to ensure anchorage of sod on slope.
- B. Wire Mesh: Interwoven hexagonal plastic mesh of 2 inch size.

2.3 HARVESTING SOD

- A. Machine cut sod and load on pallets in accordance with ASPA Guidelines.
- B. Cut sod in area not exceeding 1 sq yd, with minimum 1/2 inch and maximum 1 inch topsoil base.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that prepared soil base is ready to receive the work of this section.

3.2 PREPARATION OF SUBSOIL

- A. Prepare subsoil and eliminate uneven areas and low spots.
- B. Maintain lines, levels, profiles and contours. Make changes in grade gradual. Blend slopes into level areas.
- C. Remove foreign materials and undesirable plants and their roots. Do not bury foreign material beneath areas to be sodded.
- D. Remove contaminated subsoil.
- E. Scarify subsoil to a depth of 4 inches where topsoil is to be placed.

- F. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted subsoil.

3.3 FERTILIZING

- A. Apply fertilizer in accordance with manufacturer's instructions.
- B. Apply after smooth raking of topsoil and prior to installation of sod.
- C. Apply fertilizer no more than 48 hours before laying sod.
- D. Mix thoroughly into upper 2 inches of topsoil.
- E. Lightly water to aid the dissipation of fertilizer.

3.4 LAYING SOD

- A. Moisten prepared surface immediately prior to laying sod.
- B. Lay sod within 24 hours after harvesting to prevent deterioration.
- C. Lay sod tight with no open joints visible, and no overlapping; stagger end joints 12 inches (300 mm) minimum. Do not stretch or overlap sod pieces.
- D. Lay smooth. Align with adjoining grass areas.
- E. Place top elevation of sod 1/2 inch below adjoining paving or curbs.
- F. On slopes 3:1 and steeper, lay sod perpendicular to slope and secure every row with wooden pegs at maximum 2 feet on center. Drive pegs flush with soil portion of sod.
- G. Water sodded areas immediately after installation. Saturate soil to a depth of 4 inches.
- H. After sod and soil have dried, roll sodded areas to ensure good bond between sod and soil and to remove minor depressions and irregularities. Roll sodded areas with roller.

3.5 MAINTENANCE

- A. Mow grass at regular intervals to maintain at a maximum height of 2-1/2 inches. Do not cut more than 1/3 of grass blade at any one mowing.
- B. Neatly trim edges and hand clip where necessary.
- C. Immediately remove clippings after mowing and trimming.
- D. Water to prevent grass and soil from drying out.

- E. Roll surface to remove minor depressions or irregularities.
- F. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.
- G. Immediately replace sod to areas which show deterioration or bare spots.
- H. Protect sodded areas with warning signs during maintenance period.

END OF SECTION

SECTION 32 93 00

TREES, PLANTS, AND GROUND COVER

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Preparation of subsoil and topsoil.
- B. Topsoil bedding.
- C. New trees, plants, and ground cover.
- D. Mulch and fertilizer.
- E. Maintenance.
- F. Tree Pruning.

1.2 RELATED SECTIONS

- A. Section 31 23 00 - Excavation and Backfill: Placement of topsoil in preparation for the work of this Section.
- B. Section 32 80 00 – Irrigation System
- C. Section 32 92 19 - Seeding
- D. Section 32 92 20 - Hydroseeding
- E. Section 32 92 23 - Sodding.

1.3 REFERENCES

- A. ANSI Z60.1 - Nursery Stock.
- B. NAA (National Arborist Association) - Pruning Standards for Shade Trees.

1.4 DEFINITIONS

- A. Weeds: Include Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

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- B. Plants: Living trees, plants, and ground cover specified in this Section, and described in ANSI Z60.1.

1.5 SUBMITTALS - PROJECT CLOSEOUT

- A. Section 01 77 00 - Contract Closeout: - Operation and Maintenance Data: Procedures for submittals.
- B. Maintenance Data: Include cutting and trimming method; types, application frequency, and recommended coverage of fertilizer.
- C. Submit list of plant life sources.

1.6 QUALITY ASSURANCE

- A. Nursery Qualifications: Company specializing in growing and cultivating the plants with three (3) years experience and licensed by State Plant Board.
- B. Installer Qualifications: Company specializing in installing and planting the plants with five (5) years experience, approved by nursery.
- C. Tree Pruner Qualifications: Company specializing in pruning trees with proof of Arborist Certification.
- D. Tree Pruning: NAA - Pruning Standards for Shade Trees.
- E. Maintenance Services: Performed by installer.

1.7 REGULATORY REQUIREMENTS

- A. Comply with regulatory agencies for fertilizer and herbicide composition.
- B. Provide certificate of compliance from authority having jurisdiction indicating approval of plants, fertilizer and herbicide mixture.
- C. Plant Materials: Certified by state department of agriculture, Described by ASTM Z60.1, free of disease or hazardous insects.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 01 60 00.
- B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.
- C. Protect and maintain plant life until planted.

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D. Deliver plant life materials immediately prior to placement. Keep plants moist.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Do not install plant life when ambient temperatures may drop below 35 degrees F or rise above 90 degrees F.

B. Do not install plant life when wind velocity exceeds 30 mph.

1.10 COORDINATION

A. Coordinate work under provisions of Section 01 31 00.

1.11 WARRANTY

A. Provide one (1) year warranty under provisions of Section 01 77 00.

B. Warranty: Include coverage for one continuous growing season; replace dead or unhealthy plants.

C. Replacements: Plants of same size and species as specified, planted in the next growing season, with a new warranty commencing on date of replacement.

D. Contractor shall notify owner to provide letter stating they will Guarantee and maintain landscaping for a period of Three (3) years from date of substantial completion.

1.12 MAINTENANCE SERVICE

A. Maintain plant life immediately after placement until plants are well established and exhibit a vigorous growing condition. Continue maintenance until termination of warranty period.

B. Maintenance to include:

1. Cultivation and weeding plant beds and tree pits.
2. Applying herbicides for weed control in accordance with manufacturer's instructions.
3. Remedy damage resulting from use of herbicides.
4. Remedy damage from use of insecticides.
5. Irrigating sufficient to saturate root system.
6. Pruning, including removal of dead or broken branches, and treatment of pruned areas or other wounds.
7. Disease control.
8. Maintaining wrapping, guys, turnbuckles, and stakes. Adjust turnbuckles to keep guy wires tight. Repair or replace accessories when required.
9. Replacement of mulch.

PART 2 PRODUCTS

2.1 TREES, PLANTS, AND GROUND COVER

- A. Trees, Plants, and Ground Cover: Species and size identifiable in plant schedule, grown in climatic conditions similar to those in locality of the Work.

2.2 SOIL MATERIALS

- A. Topsoil: Fertile, agricultural soil, typical for locality, capable of sustaining vigorous plant growth, taken from drained site; free of subsoil, clay or impurities, plants, weeds and roots; minimum pH value of 5.4 and maximum 7.0.

2.3 SOIL AMENDMENT MATERIALS

- A. Fertilizer: Containing fifty percent of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil, as indicated in analysis to the following proportions: Nitrogen 13 percent, phosphoric acid 13 percent, soluble potash 13 percent.
- B. Composted organic material; free of lumps, roots, inorganic material or acidic materials; minimum of 85 percent organic material measured by oven dry weight.
- C. Bone Meal: Raw, finely ground, commercial grade, minimum of 3 percent nitrogen and 20 percent phosphorous.
- D. Lime: Ground limestone, dolomite type, minimum 95 percent carbonates.
- E. Water: Clean, fresh, and free of substances or matter which could inhibit vigorous growth of plants.

2.4 MULCH MATERIALS

- A. Mulching Material: Cedar or cypress mulch, free of growth or germination inhibiting ingredients.

2.5 ACCESSORIES

- A. Stakes: Softwood lumber, pointed end or mild steel angle, galvanized, pointed end.
- B. Cable, Wire, Eye Bolts and Turnbuckles: Non-corrosive, of sufficient strength to withstand wind pressure and resulting movement of plant life.
- C. Plant Protectors: Rubber sleeves over cable to protect plant stems, trunks, and branches.

2.6 TOP SOIL MIX AND PLANT SOIL MIX

- A. A uniform mixture of 1 part composted organic material and 3 parts topsoil by volume.

2.7 SOURCE QUALITY CONTROL AND TESTS

- A. Provide analysis of imported and existing topsoil.
- B. Analyze to ascertain percentage of nitrogen, phosphorus, potash, soluble salt and organic matter; pH value.
- C. Submit minimum 10 oz sample of topsoil proposed. Forward sample to testing laboratory in sealed containers to prevent contamination. Testing is not required if recent tests are available for imported topsoil.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that prepared subsoil are ready to receive work.
- B. Saturate soil with water to test drainage.
- C. Verify that required underground utilities are available, in proper location, and ready for use.

3.2 PREPARATION OF SUBSOIL

- A. Prepare subsoil to eliminate uneven areas. Maintain profiles and contours. Make changes in grade gradual. Blend slopes into level areas.
- B. Remove foreign materials, weeds and undesirable plants and their roots. Remove contaminated subsoil.
- C. Scarify subsoil to a depth of 4 inches where plants are to be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted subsoil.
- D. Dig pits and beds to same depth as plant root system and twice as wide as plant root system.

3.3 PLACING TOPSOIL

- A. Spread topsoil to a minimum depth of 4 inches in seeded areas and 12" in planting beds. Rake smooth.
- B. Place topsoil during dry weather and on dry unfrozen subgrade.
- C. Remove vegetable matter and foreign non-organic material from topsoil while spreading.

- D. Grade topsoil to eliminate rough, low or soft areas, and to ensure positive drainage.

3.4 FERTILIZING

- A. Apply fertilizer in accordance with manufacturer's instructions.
- B. Apply after initial raking of topsoil.
- C. Mix thoroughly into upper 2" of topsoil.
- D. Lightly water to aid the dissipation of fertilizer.

3.5 PLANTING

- A. Place plants for best appearance for review and final orientation by Architect/Engineer.
- B. Set plants vertical.
- C. Remove non-biodegradable root containers.
- D. Set plants in pits or beds, partly filled with prepared plant mix, at a minimum depth of 6 inches (150 mm) under each plant. Remove burlap, ropes, and wires, from the root ball.
- E. Place bare root plant materials so roots lay in a natural position. Backfill soil mixture in 6 inch layers. Maintain plant life in vertical position.
- F. Saturate soil with water when the pit or bed is half full of topsoil and again when full.

3.6 INSTALLATION OF ACCESSORIES

- A. Place tree protectors.

3.7 PLANT SUPPORT

- A. Brace plants vertically with a minimum of 3 plant protector wrapped guy wires and stakes.

3.8 TREE PRUNING

- A. Prune trees remove any dead or damaged limbs.

3.9 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Assurance: Field inspection and testing.
- B. Plants will be rejected if a ball of earth surrounding roots has been disturbed or damaged prior to or during planting.

3.10 MAINTENANCE

- A. Neatly trim plants where necessary.
- B. Immediately remove clippings after trimming.
- C. Water to prevent soil from drying out.
- D. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions.
- E. Apply pesticides in accordance with manufacturers' instructions.

3.11 SCHEDULE - PLANT LIST

- A. Refer to Drawings.

END OF SECTION

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SECTION 33 39 00

STORM SEWER MANHOLE STRUCTURES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Monolithic, cast in place concrete manhole barrel and either monolithic concrete or masonry transition to lid frame.
- B. Modular precast concrete manhole barrel with tongue-and-groove joints and either precast concrete or masonry transition to lid frame.
- C. Precast polyethylene manhole assemblies.
- D. Preparation and installation of lid frame, covers, anchorage, and accessories.

1.2 RELATED SECTIONS

- A. Section 31 23 33 - Excavation, Backfill, and Compaction for Utilities
- B. Section 33 41 00 - Storm Sewer Systems
- C. Section 33 31 13 - Sanitary Sewer Systems
- D. Section 32 13 13 – Portland Cement Concrete Paving
- E. Local governing authority and code requirements
- F. Construction Drawings

1.3 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM) latest edition
 - A 48 Gray Iron Castings
 - C 55 Concrete Building Brick
 - C 478 Precast Reinforced Concrete Manhole Sections
 - C 923 Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes
 - D 1248 Polyethylene Plastics Molding and Extrusion Materials
- B. International Masonry Industry All-Weather Council (IMIAC) latest edition Recommended Practices and Guide Specification for Cold Weather Masonry Construction

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1.4 SUBMITTALS

- A. Shop Drawings: Indicate reference to Construction Drawings regarding manhole locations, elevations, piping with sizes, locations, and elevations of structure penetrations.
- B. Product Data: Provide data for manhole covers, manhole steps, component construction, features, configuration, and dimensions.

1.5 PUBLIC WORK

- A. Comply with the City of Ozark, Arkansas, standard water and sewer specifications for public water and sewer lines. If conflict should be found between this section and city standards for public utilities, city standards shall be the priority. It shall be the Contractor's responsibility to obtain city standard water and sewer specifications and comply with the minimum requirements.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Manhole Barrel: Nonreinforced cast-in-place concrete in accordance with Section 03 30 00.
 - 1. Cast-in-place manholes shall be not less than 4'-0" inside diameter and constructed of 3500 psi concrete.
 - 2. Forms shall be made of steel sheets accurately shaped and fabricated of sufficient strength to form dense watertight walls to true dimensions.
 - 3. Concrete shall be deposited in evenly distributed layers of about 18 in., with each layer vibrated to bond to preceding layer.
- B. Manhole Barrel: Reinforced precast concrete in accordance with ASTM C 478 with gaskets in accordance with ASTM C 923.

Construct manholes of precast concrete sections as required by Construction Drawings to size, shape, and depth indicated, but never less than 4'-0" inside diameter.

- C. Manhole Barrel: Precast polyethylene in accordance with ASTM D 1248. Manholes shall be manufactured with factory-molded steps. Nominal cylinder internal diameter shall be 48-in. and shall be designed to accept concrete filled polyethylene manhole lids and standard cast iron frames with lid or grate. Manholes shall have a compressive strength which meets ASTM D 2412 standards. Acceptable Manufacturers: Advanced Drainage Systems (ADS) or approved equal.
- E. Mortar and Grout: Mortar for finishing and sealing shall be Class "C". Honeycombing less than 2-in. deep shall be repaired using Class "D" mortar.

2.2 COMPONENTS

- A. Lid and Frame: Lid and frame shall comply with ASTM A 48, Class 35B heavy duty cast iron construction, machined flat bearing surface, removable lid, closed or open as indicated on Construction Drawings with sealing gasket and manufactured by Neenah Foundry Company or approved equal.
- B. Manhole Steps: Neenah Foundry Company catalog No. R-1982-F for precast manholes or catalog No. R-1980-0 for brick or cast-in-place manholes or approved equal.
- C. Base Pad: Cast-in-place concrete as specified in Section 03 30 00.

2.3 CONFIGURATION

- A. Barrel Construction: Concentric barrel with eccentric cone top section.
- B. Shape: Cylindrical
- C. Clear Inside Dimensions: 48-in. diameter or as indicated on Construction Drawings.
- D. Design Depth: As indicated on Construction Drawings.
- E. Clear Lid Opening: 22-in. diameter minimum
- F. Pipe Entry: Provide openings as indicated on Construction Drawings
- G. Main and Lateral Pipes: Neatly cut off main and lateral pipes flush with inside of manhole or inlet where they enter structure walls. Point up irregularities and rough edges with nonshrinking grout.
- H. Inverts: Shape inverts for smooth flow across structure floor as indicated on Construction Drawings. Use concrete and mortar to obtain proper grade and contour. Finish surface with fine textured wood float.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify items specified by other Sections are properly sized and located.
- B. Verify that items associated with structures are in proper location and ready for connection to other work and/or structure construction.
- C. Verify that the excavation for manholes and other structures is correct.

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3.2 PREPARATION

- A. Coordinate placement pipe connections to structure as indicated on Construction Drawings.

3.3 PLACING PRECAST MANHOLE BARREL SECTIONS

- A. Place slab foundation to proper elevation and location and trowel top surface level for placement of manhole barrel.
- B. Place manhole barrel plumb and level to correct elevations and anchor to base pad.
 - 1. After completion of slab foundation, first joint of manhole barrel shall be lowered into position, grooved end first, and set level and plumb on concrete slab. Align and adjust to proper grade prior to placing and forming invert which shall be poured immediately after setting of first section of manhole barrel.
 - 2. Prior to setting subsequent manhole barrel sections, apply primer to tongue and groove ends and allow to set in accordance with manufacturer's recommendations. Place "Ram-nek", or equivalent joint sealing material on tongue end. Lower next section into position and remove excess sealing material from interior of structure. Add additional material on exterior of joint, if necessary, for a completely watertight joint.

END OF SECTION

SECTION 33 41 00

STORM SEWER SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Site storm sewer drainage piping, fittings, accessories, and bedding.
- B. Connection of site and/or building storm water drainage system to municipal storm sewers.

1.2 RELATED REQUIREMENTS

- A. Section 31 23 33 - Excavation, Backfill, and Compaction for Utilities
- B. Section 33 44 00 – Storm Drainage Structures
- C. Local governing authority and code requirements
- D. Construction Drawings

1.3 PUBLIC WORK

- A. Comply with the City of Ozark, Arkansas, standard water and sewer specifications for public water and sewer lines. If conflict should be found between this section and city standards for public utilities, city standards shall be the priority. It shall be the Contractor's responsibility to obtain city standard water and sewer specifications and comply with the minimum requirements.

1.4 REFERENCE STANDARDS

- A. American Association of State Highway and Transportation Officials (AASHTO) latest edition
 - M 36 Metallic (Zinc or Aluminum) Coated Corrugated Steel Culverts and Underdrains
 - M 198 Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible Watertight Gaskets
 - M 252 Corrugated Polyethylene Drainage Tubing
 - M 274 Pure Aluminum Type 2 Coated Corrugated Steel Culverts and Underdrains
 - M 294 Polyvinyl Chloride (PVC) Pipe and Fittings
- B. American Society for Testing and Materials (ASTM) latest edition
 - A 760 Spiral Rib Metal Pipe (Type 1 R)
 - C 14 Concrete Sewer, Storm Drain, and Culvert Pipe
 - C 76 Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
 - C 443 Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets

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- D 2321 Underground Installation of Flexible Thermoplastic Sewer Pipe
- D 3034 Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
- F 794 Polyvinyl Chloride (PVC) Pipe and Fittings

1.5 SUBMITTALS

- A. Product Data: Provide data on pipe materials, pipe fittings, and accessories.
- B. Manufacturer's Certificate: Certify that products meet or exceed specified local requirements.

1.6 PROJECT RECORD DOCUMENTS

- A. Accurately record actual locations of pipe runs, connections, catch basins, cleanouts, and invert elevations.
- B. Identify and describe unexpected variations to subsoil conditions and location of uncharted utilities.

1.7 PROJECT CONDITIONS

- A. Coordinate work with storm sewer connections to structures and to municipal storm sewer system.

PART 2 PRODUCTS

2.1 SEWER PIPE MATERIALS AND ACCESSORIES

- A. Reinforced Concrete Pipe: Comply with requirements of ASTM C 76, Class III unless another class type is indicated on Construction Drawings, installed with flexible plastic, bitumen gaskets at joints. Gaskets shall comply with AASHTO M 198 75I, Type B, and shall be installed in strict accordance with pipe manufacturer's recommendations.
- B. Corrugated Steel Pipe: Galvanized, aluminized, or bituminous coated as specified on Construction Drawings. Only permitted when specifically indicated on Construction Drawings and shall comply with requirements of ASTM A 760; 16 gauge unless another gauge is indicated on Construction Drawings. Install with matching band connectors. Install sleeve gaskets in accordance with pipe manufacturer's recommendations. Corrugated steel pipe may be round pipe, arch pipe, or slotted drain pipe as indicated on Construction Drawings. Slotted drain pipe shall have 1.75-in. wide drain waterway openings and 6-in. minimum height drain guide.
- C. Spiral Rib Metal Pipe Type 1R: Galvanized, aluminized, or bituminous coated as specified on Construction Drawings. Only permitted when specifically indicated on Construction Drawings. Pipe ends shall be re-corrugated and installed with semi-corrugated Hugger-type bands and "O" ring gaskets in accordance with pipe manufacturer's installation requirements. Spiral Rib metal pipe must comply with ASTM A 760 Type 1R. Acceptable manufacturer:

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CONTECH, INC. "ULTRA FLO or ULTRA FLO II", Caldwell Culvert Co. "Smooth Rib", or approved alternate.

- D. Corrugated Polyvinyl Chloride smooth interior storm sewer pipe and fittings shall comply with ASTM F949-93A, meet all requirements of AASHTO M304-91 (H-20 Loading) and be marked with manufacturers name, pipe size, cell classification and ASTM F 949 classification. Pipe must be installed per manufacturers installation requirements. Acceptable manufacturer: CONTECH, INC. "D-2000" PVC storm sewer pipe or approved alternate.
- E. Corrugated Polyethylene Pipe (CPP) Smooth Interior: Only permitted when specifically indicated on Construction Drawings and shall conform with AASHTO Designation M 252 and M 294. Pipe must be installed in accordance with pipe manufacturer's installation Guidelines for Culvert Storm Drainage Applications. Acceptable manufacturers: Advanced Drainage Systems, Inc. "ADS N-12", HANCOR, INC. "Hi-Q", or approved alternate.
- F. Polyvinyl Chloride (PVC) large diameter closed profile gravity sewer pipe, UNI-B-9: Only permitted when specifically indicated on Construction Drawings. Pipe and fittings shall comply with ASTM F 794. Pipe must be installed in accordance with pipe manufacturer's installation guidelines. Acceptable manufacturer: Carlon "Vylon H.C." or approved alternate.
- G. Polyvinyl Chloride (PVC) 8-in. through 30-in. diameter, smooth interior, open profile gravity sewer pipe. Only permitted when specifically indicated on Construction Drawings. Pipe and fittings shall comply with ASTM F 794 and Uni-Bell UNI-B-9. Pipe must be installed in accordance with pipe manufacturer's installation guidelines. Acceptable manufacturer: Extrusion Technologies, Inc. "Ultra-Rib" or approved alternate.
- H. Corrugated Polyvinyl Chloride smooth interior sanitary sewer pipe and fittings shall comply with ASTM F 949-93A and be marked with manufacturers name, pipe size, cell classification and ASTM F 949 classification. Pipe must be installed per manufacturer's installation requirements. Acceptable manufacturer: CONTECH, INC. "A-2000" PVC sanitary sewer pipe or approved alternate.
- I. Polyvinyl Chloride Storm Sewer Truss Pipe and fittings shall comply with ASTM D 2680 and be marked with manufacturers name, pipe size, cell classification and ASTM D 2680 classification. Acceptable manufacturer: CONTECH, INC. "Contect PVC Storm Sewer Truss Pipe" or approved alternate.

2.2 INLETS, CATCH BASINS AND JUNCTION BOXES

- A. Lid and frame per details shown on Construction Drawings.
- B. Structure construction shall be in accordance with details shown on Construction Drawings and in accordance with Section 33 44 00.

33 41 00-3

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify items specified in other sections are properly sized and located.
- B. Verify that trench cut and excavation is ready to receive work and excavations, dimensions, and elevations are as indicated on Construction Drawings.

3.2 PREPARATION

- A. Hand trim excavations to required elevations. Correct over excavation with bedding material.
- B. Remove large stones or other hard matter which could damage piping or impede consistent backfilling or compaction.
- C. Protect benchmarks, property corners, and other survey monuments from damage or displacement. If marker needs to be removed it shall be referenced by licensed land surveyor and replaced, as necessary, by same.

3.3 BEDDING

- A. Excavate pipe trench and place bedding material in accordance with Section 31 23 33.

3.4 INSTALLATION - PIPE

- A. Install pipe, fittings, and accessories in accordance with ASTM C 14, ASTM D 2321, or manufacturer's instructions and state or local requirements.
- B. Install pipe on bedding in accordance with Section 31 23 33.
- C. Lay pipe to slope gradients noted on Construction Drawings.
- D. Refer to Section 31 23 33 for trenching requirements. Do not displace or damage pipe when backfilling and compacting.

3.5 INSTALLATION - CATCH BASINS, INLETS, AND JUNCTION BOXES

- A. Form bottom of excavation clean and smooth to correct elevation.
- B. Form and place cast-in-place concrete base pad in accordance with section 03 30 00, with provision for storm sewer pipe to be placed at proper elevation.
- C. Form and place cast-in-place concrete walls, sleeved at proper elevation to receive storm sewer pipe in accordance with section 03 30 00 and details shown on Construction Drawings.

33 41 00-4

- D. Form and place cast-in-place top of structure in accordance with details shown on Construction Drawings.

END OF SECTION

33 41 00-5

SECTION 33 44 00

STORM DRAINAGE STRUCTURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Storm drainage structures.

1.2 Related Requirements

1. Section 01 40 00 – Quality Control
2. Section 02 32 00 - Earthwork
3. Section 31 23 33 - Excavation, Backfill, and Compaction for Utilities
4. Section 31 35 00 - Slope Protection and Erosion Control

1.3 REFERENCE STANDARDS

A. American Association of State Highway and Transportation Officials (AASHTO)

1. AASHTO M198 - Joints for Circular Sewer and Culvert Pipe Using Flexible Watertight Gaskets
2. AASHTO H170 - Reinforced Concrete Culvert, Storm Drain and Sewer Pipe

B. American Society for Testing and Materials (ASTM)

1. ASTM A185 - Steel welded Wire Fabric, Plain, for Concrete Reinforcement
2. ASTM A615 - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
3. ASTM C76 - Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
4. ASTM C150 - Portland Cement
5. ASTM C206 - Finished Hydrated Lime
6. ASTM C443 - Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets

1.4 SUBMITTALS

A. Product Data: Provide data on pipe materials, pipe fittings, and accessories.

B. Manufacturer's Certificate: Certify that products meet or exceed specified local requirements.

C. Project Record Documents

1. Accurately record actual locations of pipe runs, connections, catch basins, cleanouts, and invert elevations.
2. Identify and describe unexpected variations to subsoil conditions and location of uncharted utilities.

1.5 PROJECT CONDITIONS

A. Coordinate work with termination of storm sewer connection including connection to municipal storm sewer system.

33 44 00-1

PART 2 - PRODUCTS

2.1 DRAINAGE STRUCTURES

- A. Cast-In-Place concrete for drainage structures including manholes, inlets, catch basins, collars, support blocks, headwalls and paved ditches shall conform to ACI 301.
 - 1. Compressive Strength: Unless shown otherwise on drawings, 3500 psi at 28 days.
 - 2. Reinforcement: ASTM A615, grade 40 or 60 deformed reinforcing bars, and ASTM A185 for wire fabric.
- B. Cement Mortar used for paving inverts, filling lift holes, joints, patching and anchoring castings shall consist of one part Portland cement, type I, ASTM C150, 1/4 part hydrated lime, ASTM C206 and 2-1/2 parts clean, well-graded sand and water free of suspended matter, alkali, and containing no industrial or domestic waste.
- C. If allowed by municipality, precast drainage structures may be provided, but must meet minimum requirements and design parameters of this specification and as shown on drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that trench cut and excavation is ready to receive work and excavations, dimensions, and elevations are as indicated on Drawings.

3.2 PREPARATION

- A. Hand trim excavations to required elevations. Correct over excavation with bedding material.
- B. Remove large stones or other hard matter that could damage piping or impede consistent back-filling or compaction.
- C. Protect benchmarks, property corners, and other survey monuments from damage or displacement. If marker needs to be removed it shall be referenced by licensed land surveyor and replaced, as necessary, by same.

3.3 INSTALLATION - PIPE

- A. The pipe shall be inspected for defects and cracks before being lowered into the trench, piece by piece. Any defective, damaged or unsound pipe or any pipe that has had its grade disturbed after laying shall be taken up and replaced. Open ends shall be protected with a stopper to prevent earth or other material from entering the pipe during construction. The interior of the pipe shall be free from dirt, excess water and other foreign materials as the pipe laying progresses and left clean at the completion of the installation.
- B. Excavate pipe trench and place bedding material in accordance with Section 31 23 33.
- C. Installation shall commence at the lowest point for each segment of the route. RCP shall be laid with the groove or bell end upstream.

33 44 00-2

- D. Lay pipe to the required line and slope gradients with the necessary fittings, bends, manhole, risers and other appurtenances placed at the required location as noted on Drawings.
- E. Do not displace or damage pipe when compacting.
- F. No pipe shall be laid in water or when trench conditions are unsuitable for such work.
- G. Joints:
 - 1. Joints shall be constructed as described herein and in accordance with manufacturer's installation instructions with the intent that they be made watertight.
 - 2. For RCP, the joint surface shall be cleaned and washed with water, if necessary, before the joints are made. For tongue and groove joints in smaller sizes, make joints butting the inside of the bell with a cement mortar before joining. The inside joint shall be wiped clean of excess mortar by brush or a squeegee drawn through the pipe as the laying operations progress. In the larger diameters, which permit the entry of a man, annular space between pipe sections shall be completely filled with mortar and finished off smooth with the inside surface of the pipe.

3.4 INSTALLATION – MANHOLES, CATCH BASINS, INLETS, AND JUNCTION BOXES

- A. Drainage structures shall be constructed in accordance with details shown on Drawings and in accordance with City of Carthage, MO, Water and Sewer Specifications as applicable.

Cast-In-Place sections shall be as shown on the drawings and in accordance with City of Ozark, Arkansas, Water and Sewer Specifications.

- 1. Form bottom of excavation clean and smooth to correct elevation.
 - 2. Form and place cast-in-place concrete base pad, with provision for storm sewer pipe to be placed at proper elevation.
 - 3. Form and place cast-in-place concrete walls, sleeved at proper elevation to receive storm sewer pipe in accordance with details shown on Drawings.
- B. Invert channels shall be smooth and accurately shaped to a semicircular bottom conforming to the inside of the adjacent sewer section. Invert channels and structure bottoms shall be shaped with cement mortar. Changes in size and grade of invert shall be made gradually and evenly. Changes in direction of the sewer entering branch or branches shall have a true curve of as large a radius as the manhole will permit.
- C. Frames and Covers:
 - 1. Frames and covers shall be set to the proper elevation. The frames shall be firmly embedded in mortar approximately 1 inch thick and aligned to fit the top section of the structure.
 - 2. Bricks set in mortar used to adjust the frame to finished grade shall be limited to no more than four courses.
 - 3. Adjustment rings used to make adjustments in grade shall be made with the initial ring embedded in mortar and the exterior of the rings pargeted with mortar not less than 1/2 inch thick. No adjustment made in this manner shall exceed 8 inches.

- D. Concrete cradles shall be constructed as shown on the drawings and as needed when crossing over and under sewer pipe or utility lines. Concrete shall be 3500 psi mix with a minimum thickness of 6 inches.

3.5 INSPECTION AND TESTING

A. General

1. Storm sewer systems and culverts, upon completion or at such time as directed, shall be cleaned, inspected and tested. The system or culvert shall have a true grade and line. Actual elevations shall be within 0.08 feet of the elevations given on the drawings.
2. After completion of the Work, or any part thereof, the job shall be tested and flow line elevations certified per Section 01 40 00 to determine that it has been installed in accordance with the drawings and specifications. In general, the Work shall prove to be in good condition, installed in accordance with the drawings and specifications and ready for use.

B. Cleaning and Testing

1. Visibly inspect and remove all debris and obstructions from storm pipe. Test for infiltration and exfiltration by hydrostatic testing per ASTM C969. Manholes and pipe shall conform to ASTM C969 leakage criteria.

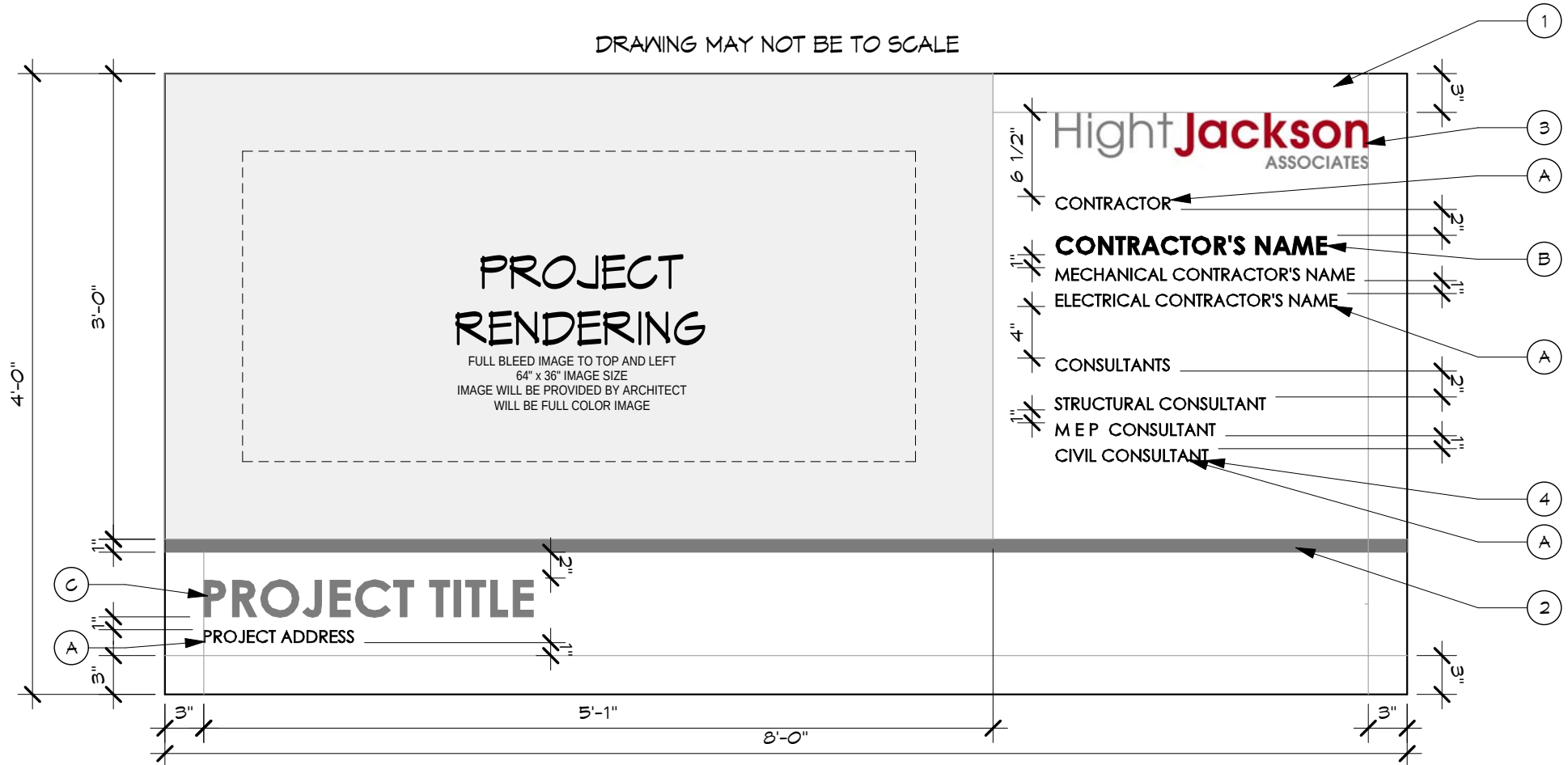
C. Alignment Test

1. After backfill has been placed and compacted to a depth not less than one foot above top of pipe, a visual inspection shall be made by flashing a light between manholes. Any displacement or misalignment of invert shall be corrected.

END OF SECTION

PROJECT IDENTIFICATION SIGN

DRAWING MAY NOT BE TO SCALE



NOTES: SIGN MATERIAL IS 4x8 SHEET OF 5/8" M.D.O. PLYWOOD OR EQUIVALENT A-C GRADE. PROVIDE DOUBLED 2x4 LEGS AT EACH END, SET INTO EARTH. ALTERNATE MOUNTING AND/OR LOCATION WILL BE DETERMINED IN THE FIELD BY THE ARCHITECT. IF A CONTRACTOR LOGO IS DESIRED CONFIRM WITH ARCHITECT FOR APPROVAL, IF APPROVED PROVIDE ADDITIONAL COLORS AS REQUIRED.

COLOR KEY

COLOR NO. ① = SHERWIN WILLIAMS 7006 "EXTRA WHITE"
 COLOR NO. ② = SHERWIN WILLIAMS 7669 "SUMMIT GRAY"
 COLOR NO. ③ = SHERWIN WILLIAMS 6866 "HEART THROB"
 COLOR NO. ④ = SHERWIN WILLIAMS 6258 "TRICORN BLACK"

TEXT KEY

TEXT NO. A = 1 INCH CENTURY GOTHIC
 TEXT NO. B = 1 1/2 INCH CENTURY GOTHIC BOLD
 TEXT NO. C = 3 INCH CENTURY GOTHIC BOLD

APPENDIX "A"