PROJECT MANUAL:

McCLENDON BAPTIST CHURCH
SANCTUARY RENOVATION

206 DOWNING PINES RD - WEST MONROE, LA. 71292

Architect's Project Number 25-WM0058

Date AUGUST 2026

TBA

Exhibit E
PROJECT MANUAL

McCLENDON BAPTIST CHURCH
SANCTUARY RENOVATION
206 Downing Pines Road – West Monroe, LA. 71292

TBA Studio West Monroe

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AIA® Document A101™ – 2017

Standard Form of Agreement Between Owner and Contractor *where the basis of payment is a Stipulated Sum*

AGREEMENT made as of the day of in the year
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address and other information)

and the Contractor:
(Name, legal status, address and other information)

for the following Project:
(Name, location and detailed description)

.

The Architect:
(Name, legal status, address and other information)

The Owner and Contractor agree as follows.

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

The parties should complete A101™–2017, Exhibit A, Insurance and Bonds, contemporaneously with this Agreement. AIA Document A201™–2017, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

Init.
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ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be:
(Check one of the following boxes.)

[ ] The date of this Agreement.

[ ] A date set forth in a notice to proceed issued by the Owner.

[ ] Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 3.2 The Contract Time shall be measured from the date of commencement of the Work.

§ 3.3 Substantial Completion

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:
(Check one of the following boxes and complete the necessary information.)

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[ ] Not later than ( ) calendar days from the date of commencement of the Work.

[ ] By the following date:

§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

Portion of Work	Substantial Completion Date

§ 3.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 3.3, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be ($), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 Alternates

§ 4.2.1 Alternates, if any, included in the Contract Sum:

Item	Price

§ 4.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement.
(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

Item	Price	Conditions for Acceptance

§ 4.3 Allowances, if any, included in the Contract Sum:
(Identify each allowance.)

Item	Price

§ 4.4 Unit prices, if any:
(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit ($0.00)

§ 4.5 Liquidated damages, if any:
(Insert terms and conditions for liquidated damages, if any.)

§ 4.6 Other:
(Insert provisions for bonus or other incentives, if any, that might result in a change to the Contract Sum.)

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ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the day of the month. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than ( ) days after the Architect receives the Application for Payment.
(Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 In accordance with AIA Document A201™–2017, General Conditions of the Contract for Construction, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.6.1 The amount of each progress payment shall first include:

.1 That portion of the Contract Sum properly allocable to completed Work;

.2 That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and

.3 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

§ 5.1.6.2 The amount of each progress payment shall then be reduced by:

.1 The aggregate of any amounts previously paid by the Owner;

.2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A201–2017;

.3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;

.4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A201–2017; and

.5 Retainage withheld pursuant to Section 5.1.7.

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold the following amount, as retainage, from the payment otherwise due:
(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

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§ 5.1.7.1.1 The following items are not subject to retainage:
(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows:
(If the retainage established in Section 5.1.7.1 is to be modified prior to Substantial Completion of the entire Work, including modifications for Substantial Completion of portions of the Work as provided in Section 3.3.2, insert provisions for such modifications.)

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, upon Substantial Completion of the Work, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted at Substantial Completion shall not include retainage as follows:
(Insert any other conditions for release of retainage upon Substantial Completion.)

§ 5.1.8 If final completion of the Work is materially delayed through no fault of the Contractor, the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A201–2017.

§ 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 Final Payment

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A201–2017, and to satisfy other requirements, if any, which extend beyond final payment; and

.2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

§ 5.3 Interest

Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.
(Insert rate of interest agreed upon, if any.)

%

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of AIA Document A201–2017, unless the parties appoint below another individual, not a party to this Agreement, to serve as the Initial Decision Maker.
(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

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§ 6.2 Binding Dispute Resolution
For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A201–2017, the method of binding dispute resolution shall be as follows:
(Check the appropriate box.)

[ ] Arbitration pursuant to Section 15.4 of AIA Document A201–2017

[ ] Litigation in a court of competent jurisdiction

[ ] Other *(Specify)*

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2017.

§ 7.1.1 If the Contract is terminated for the Owner's convenience in accordance with Article 14 of AIA Document A201–2017, then the Owner shall pay the Contractor a termination fee as follows:
(Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner's convenience.)

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2017.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2017 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 The Owner's representative:
(Name, address, email address, and other information)

§ 8.3 The Contractor's representative:
(Name, address, email address, and other information)

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§ 8.4 Neither the Owner's nor the Contractor's representative shall be changed without ten days' prior notice to the other party.

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, Exhibit A, Insurance and Bonds, and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A101™–2017 Exhibit A, and elsewhere in the Contract Documents.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A201–2017, may be given in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:
(If other than in accordance with AIA Document E203–2013, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

§ 8.7 Other provisions:

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

.1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor

.2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds

.3 AIA Document A201™–2017, General Conditions of the Contract for Construction

.4 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:
(Insert the date of the E203-2013 incorporated into this Agreement.)

.5 Drawings

Number	Title	Date

.6 Specifications

Section	Title	Date	Pages

.7 Addenda, if any:

Number	Date	Pages

Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are also enumerated in this Article 9.

.8 Other Exhibits:
(Check all boxes that apply and include appropriate information identifying the exhibit where required.)

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[ ] AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below:
(Insert the date of the E204-2017 incorporated into this Agreement.)

[ ] The Sustainability Plan:

Title	Date	Pages

[ ] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

.9 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201™–2017 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)

This Agreement entered into as of the day and year first written above.

OWNER *(Signature)*	**CONTRACTOR** *(Signature)*
(Printed name and title)	*(Printed name and title)*

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Additions and Deletions Report for
AIA® Document A101™ – 2017

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General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)

.

THE OWNER:
(Name, legal status and address)

THE ARCHITECT:
(Name, legal status and address)

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding or proposal requirements.

§ 1.1.2 The Contract

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants, or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 The Work

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 The Project

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by Separate Contractors.

§ 1.1.5 The Drawings

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

§ 1.1.6 The Specifications

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 Instruments of Service

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 Initial Decision Maker

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

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G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 Evidence of the Owner's Financial Arrangements

§ 2.2.1 Prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

§ 2.2.2 Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.

§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.4 Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.3.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

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§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

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§ 3.8 Allowances

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

.1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;

.2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and

.3 whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and

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upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

§ 3.13 Use of Site

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.14 Cutting and Patching

§ 3.14.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 Access to Work

The Contractor shall provide the Owner and Architect with access to the Work in preparation and progress wherever located.

§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

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§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may order minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

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When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each Separate Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, Separate Contractors, and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.

§ 6.2 Mutual Responsibility

§ 6.2.1 The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a Separate Contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a Separate Contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor as provided in Section 10.2.5.

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.1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;

.2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;

.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;

.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and

.5 Costs of supervision and field office personnel directly attributable to the change.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

ARTICLE 8 TIME

§ 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

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§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work.

§ 9.4 Certificates for Payment

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- .1 defective Work not remedied;
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- .3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;

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§ 9.7 Failure of Payment

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 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 prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and 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.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

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.1 employees on the Work and other persons who may be affected thereby;
.2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and
.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with, and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss.

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 Injury or Damage to Person or Property

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 Hazardous Materials and Substances

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will

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expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

§ 11.2.2 Failure to Purchase Required Property Insurance. If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 11.3 Waivers of Subrogation

§ 11.3.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.3.2 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

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that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

§ 13.3 Rights and Remedies

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

§ 13.3.2 No action or failure to act by the Owner, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

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§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- .1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- .2 fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- .3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- .4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- .1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- .2 Accept assignment of subcontracts pursuant to Section 5.4; and
- .3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

- .1 that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or
- .2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- .1 cease operations as directed by the Owner in the notice;

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§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data 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 construction.

§ 15.1.7 Waiver of Claims for Consequential Damages

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

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§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 Consolidation or Joinder

§ 15.4.4.1 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as those of the Owner and Contractor under this Agreement.

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_____

(Signed)

_____

(Title)

_____

(Dated)

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User Notes: (1950958384)

Name of Project
McClendon Baptist Church
Sanctuary Renovation
West Monroe, LA. Ouachita Parish

Project number
Architects 25-WM0058

ATTESTATIONS AFFIDAVIT

Before me, the undersigned notary public, duly commissioned and qualified in and for the parish and state aforesaid, personally came and appeared Affiant, who after being duly sworn, attested as follows:

LA. R.S. 38:2227 PAST CRIMINAL CONVICTIONS OF BIDDERS

A. No sole proprietor or individual partner, incorporator, director, manager, officer, organizer, or member who has a minimum of a ten percent (10%) ownership in the bidding entity named below has been convicted of, or has entered a plea of guilty or nolo contendere to any of the following state crimes or equivalent federal crimes:

(a) Public bribery (R.S. 14:118)
(b) Corrupt influencing (R.S. 14:120)
(c) Extortion (R.S. 14:66)
(d) Money laundering (R.S. 14:230)

B. Within the past five years from the project bid date, no sole proprietor or individual partner, incorporator, director, manager, officer, organizer, or member who has a minimum of a ten percent (10%) ownership in the bidding entity named below has been convicted of, or has entered a plea of guilty or nolo contendere to any of the following state crimes or equivalent federal crimes, during the solicitation or execution of a contract or bid awarded pursuant to the provisions of Chapter 10 of Title 38 of the Louisiana Revised Statutes:

(a) Theft (R.S. 14:67)
(b) Identity Theft (R.S. 14:67.16)
(c) Theft of a business record (R.S.14:67.20)
(d) False accounting (R.S. 14:70)
(e) Issuing worthless checks (R.S. 14:71)
(f) Bank fraud (R.S. 14:71.1)
(g) Forgery (R.S. 14:72)
(h) Contractors; misapplication of payments (R.S. 14:202)
(i) Malfeasance in office (R.S. 14:134)

LA. R.S. 38:2212.10 Verification of Employees

A. At the time of bidding, Appeared is registered and participates in a status verification system to verify that all new hires in the state of Louisiana are legal citizens of the United States or are legal aliens.

B. If awarded the contract, Appeared shall continue, during the term of the contract, to utilize a status verification system to verify the legal status of all new employees in the state of Louisiana.

C. If awarded the contract, Appeared shall require all subcontractors to submit to it a sworn affidavit verifying compliance with Paragraphs (A) and (B) of this Subsection.

Name of Project
McClendon Baptist Church
Sanctuary Renovation
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Architects 25-WM0058

LA. R.S. 23:1726(B) Certification Regarding Unpaid Workers Compensation Insurance

A. R.S. 23:1726 prohibits any entity against whom an assessment under Part X of Chapter 11 of Title 23 of the Louisiana Revised Statutes of 1950 (Alternative Collection Procedures & Assessments) is in effect, and whose right to appeal that assessment is exhausted, from submitting a bid or proposal for or obtaining any contract pursuant to Chapter 10 of Title 38 of the Louisiana Revised Statutes of 1950 and Chapters 16 and 17 of Title 39 of the Louisiana Revised Statutes of 1950.

B. By signing this bid /proposal, Affiant certifies that no such assessment is in effect against the bidding / proposing entity.

_____ _____

NAME OF BIDDER **NAME OF AUTHORIZED SIGNATORY OF BIDDER**

_____ _____

DATE **TITLE OF AUTHORIZED SIGNATORY OF BIDDER**

_____

SIGNATURE OF AUTHORIZED
SIGNATORY OF BIDDER/AFFIANT

Sworn to and subscribed before me by Affiant on the _____ day of _____ , 20___ .

_____
Notary Public

SUPPLEMENTARY CONDITIONS

These Supplementary Conditions modify, change, delete from or add to the General Conditions of the Contract for Construction, AIA Document A201, 2017 Edition. Where any Article of the General Conditions is modified or any Section, Paragraph, Subparagraph or Clause thereof is modified or deleted by these supplements, the unaltered provisions of that Section, Article, Paragraph, Subparagraph or Clause shall remain in effect.

Articles, Sections, Paragraphs, Subparagraphs or Clauses modified or deleted have the same numerical designation as those occurring in the General Conditions.

ARTICLE 1

GENERAL PROVISIONS

1.1 BASIC DEFINITIONS

1.1.1. The Contract Documents
In Section 1.1.1 delete the third sentence, and add the following sentence:
The Contract Documents shall include the Bid Documents as listed in the Instructions to Bidders and any modifications made thereto by addenda.

1.1.8 Initial Decision Maker
Delete all after the words, “shall not show partiality to the Owner or Contractor”.

1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE [REFER TO *La R.S. 38:2317*]

1.5.1 Delete the first sentence of the paragraph.

1.5.1 In the third sentence: delete the remainder after the word “publication”.

1.7 DIGITAL DATA USE AND TRANSMISSION

In the first sentence after the words, “in digital form” delete “. The parties will use AIA Document E203 2013, Building Information Modeling and Digital Data Exhibit”.

1.8 BUILDING INFORMATION MODELS USE AND RELIANCE

Delete Section 1.8.

ARTICLE 2

OWNER

2.2 EVIDENCE OF THE OWNER’S FINANCIAL ARRANGEMENTS

Delete Section 2.2.

2.3 INFORMATION AND SERVICES REQUIRED OF THE OWNER

2.3.1 In the first sentence, delete: all before "the Owner shall secure…"

Delete Section 2.3.2 and substitute the following:

2.3.2 The term Architect, when used in the Contract Documents, shall mean the prime Designer (Architect, Engineer, or Landscape Architect), or his authorized representative, lawfully licensed to practice architecture, engineering, or landscape architecture in the State of Louisiana, identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number.

2.3.3 Delete the words: "to whom the Contractor has no reasonable objection and".

ARTICLE 3

CONTRACTOR

3.4 LABOR AND MATERIALS

3.4.2 Delete Section 3.4.2.

Delete Section 3.4.3 and substitute with the following:

3.4.3 Contractor and its employees, officers, agents, representatives, and Subcontractors shall conduct themselves in an appropriate and professional manner, in accordance with the Owner's requirements, at all times while working on the Project. Any such individual who behaves in an inappropriate manner or who engages in the use of inappropriate language or conduct while on Owner's property, as determined by the Owner, shall be removed from the Project at the Owner's request. Such individual shall not be permitted to return without the written permission of the Owner. The Owner shall not be responsible or liable to Contractor or any Subcontractor for any additional costs, expenses, losses, claims or damages incurred by Contractor or its Subcontractor as a result of the removal of an individual from the Owner's property pursuant to this Section. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

3.5 WARRANTY

3.5.2 Replace reference to "Section 9.8.4" with "Section 9.8.6".

3.7 PERMITS, FEES, NOTICES, AND COMPLIANCE WITH LAWS (La R.S. 40:1724[A])

3.7.1 Delete Section 3.7.1.

Delete Section 3.7.5 and substitute the following:

3.7.5 If, during the course of the Work, the Contractor discovers human remains, unmarked burial or archaeological sites, burial artifacts, or wetlands, which are not indicated in the Contract Documents, the Contractor shall follow all procedures mandated by State and Federal law, including but not limited to La R.S. 8:671 et seq., the Office of Coastal Protection and Restoration, and Sections 401 & 404 of the Federal Clean Water Act. Request for adjustment of the Contract Sum and Contract Time arising from the existence of such remains or features shall be submitted in writing to the Owner pursuant to the Contract Documents.

3.8 ALLOWANCES

3.9 SUPERINTENDENT

3.9.1 Add the following to the end of the paragraph:
Important communications shall be confirmed in writing. Other communications shall be similarly confirmed on written request in each case.

3.10 CONTRACTOR'S CONSTRUCTION AND SUBMITTAL SCHEDULES

3.10.1 Add the following: For projects with a contract sum greater than $1,000,000.00, the Contractor shall include with the schedule, for the Owner's and Architect's information, a network analysis to identify those tasks which are on the critical path, i.e., where any delay in the completion of these tasks will lengthen the project timescale, unless action is taken. A revised schedule shall be submitted with each Application and Certificate for Payment. No payment shall be made until this schedule is received.

3.10.3 In the first sentence, delete the word "general".

After the first sentence, add the following:
If the Work is not on schedule, as determined by the Architect, and the Contractor fails to take action to bring the Work on schedule, then the Contractor shall be deemed in default under this Contract and the progress of the Work shall be deemed unsatisfactory. Such default may be considered grounds for termination by the Owner for cause in accordance with Section 14.2.

Add the following Sections:

3.10.4 Add the following: Submittal by the contractor of a schedule or other documentation showing a completion date for his Work prior to the completion date stated in the contract shall not impose any obligation or responsibility on the Owner or Architect for the earlier completion date.

3.10.5 In the event the Owner employs a commissioning consultant, the Contractor shall cooperate fully in the commissioning process and shall require all subcontractors and

others under his control to cooperate. The purpose of such services shall be to ensure that all systems perform correctly and interactively according to the provisions of the Contract Documents.

3.11 DOCUMENTS AND SAMPLES AT THE SITE

Add the following: This requirement is of the essence of the contract. The Architect shall determine the value of these documents and this amount shall not be approved for payment to the Contractor until all of the listed documents are delivered to the Architect in good order, completely marked with field changes and otherwise complete in all aspects.

ARTICLE 4

ARCHITECT

4.2 ADMINISTRATION OF THE CONTRACT

4.2.1 In the first sentence, delete the phrase: "the date the Architect issues the final Certificate for Payment" and replace with the phrase "final payment is due, and with the Owner's concurrence, from time to time during the one year period for correction of Work described in Section 12.2."

4.2.2 In the first sentence, after the phrase: "become generally familiar with"; insert the following: "and to keep the Owner informed about".

In the first sentence, after the phrase "portion of the Work completed", insert the following: "to endeavor to guard the Owner against defects and deficiencies in the Work,"

4.2.4 In the first sentence, delete all after "The Owner and Contractor", and add the following "may communicate directly with each other, when deemed necessary by the Owner, and the Owner will notify the Architect of any decision."

4.2.10 Add the following sentence to the end of Section 4.2.10: There shall be no restriction on the Owner having a Representative.

4.2.11 Add the following sentence to the end of Section 4.2.11:

If no agreement is made concerning the time within which interpretation required of the Architect shall be furnished in compliance with this Section 4.2, then delay shall not be recognized on account of failure by the Architect to furnish such interpretation until 15 days after written request is made for them.

4.2.14 Insert the following sentence between the second and third sentences of Section 4.2.14:

If no agreement is made concerning the time within which interpretation required of the Architect shall be furnished in compliance with this Section 4.2, then delay shall not be recognized on account of failure by the Architect to furnish such interpretation until 15 days after written request is made for them.

ARTICLE 5

SUBCONTRACTORS

5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

Delete Section 5.2.1, and substitute the following:

5.2.1 Unless otherwise required by the Contract Documents, the Contractor shall furnish at the Pre-Construction Conference, to the Owner and the Architect, in writing, the names of the persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each of the principal portions of the Work. No Contractor payments shall be made until this information is received.

Delete Section 5.2.2, and substitute the following:

5.2.2 The Contractor shall be solely responsible for selection and performance of all subcontractors. The Contractor shall not be entitled to claims for additional time and/or an increase in the contract sum due to a problem with performance or nonperformance of a subcontractor.

Delete Sections 5.2.3 and 5.2.4 and substitute the following:

5.2.3 The Contractor shall notify the Architect and the Owner when a subcontractor is to be changed and substituted with another subcontractor.

5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

Delete Sections 5.4, 5.4.1, 5.4.2 and 5.4.3

ARTICLE 7

CHANGES IN THE WORK

7.1 GENERAL

Add the following Sections:

7.1.4 As part of the pre-construction conference submittals, the Contractor shall submit the following prior to the Contractor's initial request for payment:

7.1.4.1 Fixed job site overhead cost itemized with documentation to support daily rates.

7.1.4.2 Bond Premium Rate with supporting information from the General Contractor's carrier.

7.1.4.3 Labor Burden by trade for both Subcontractors and General Contractor. The Labor Burden shall be supported by the Worker's Compensation and Employer's Liability Insurance Policy Information Page. Provide for all trades.

7.1.4.4 Internal Rate Charges for all significant company owned equipment.

7.1.5 If the General Contractor fails to submit the aforementioned documentation as part of the pre-construction submittals, then pay applications shall not be processed until such time as the Owner receives this information.

7.2 CHANGE ORDERS

Delete Section 7.2.1, and substitute the following Sections:

7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, the Architect, and the Contractor issued after execution of the Contract, authorizing a change in the Work and/or an adjustment in the Contract Sum and/or the Contract Time. The Contract Sum and the Contract Time may be changed only by Change Order. A Change Order signed by the Contractor indicates his agreement therewith, including the adjustment in the Contract Sum or the Contract Time. Any reservation of rights, stipulation, or other modification made on the change order by the contractor shall have no effect.

7.2.2 "Cost of the Work" for the purpose of Change Orders shall be the eligible costs required to be incurred in performance of the Work and paid by the Contractor and Subcontractors which eligible costs shall be limited to:

7.2.2.1 Actual wages paid directly to labor personnel, with a labor burden markup exclusively limited to applicable payroll taxes, worker's compensation insurance, unemployment compensation, and social security taxes for those labor personnel performing the Work. Wages shall be the basic hourly labor rate paid an employee exclusive of fringe benefits or other employee costs. The labor burden percentage for the "Cost of the Work" is limited to categories listed herein. Employer-provided health insurance, fringe benefits, employee training (whether a requirement of employment or not), vacation pay, etc., are examples of ineligible labor burden costs which ***shall not*** be included, as these costs are already compensated by the Overhead and Profit markup.

Supervision shall not be included as a line item in the "Cost of the Work", except when the change results in a documented delay in the critical path, as described in Section 7.2.7.

7.2.2.2 Cost of all materials and supplies necessary and required to perform the Work, identifying each item and its individual cost, including taxes. Incidental consumables are not eligible costs and shall not be included.

7.2.2.3 Cost of each necessary piece of machinery and equipment required to perform the Work, identifying each item and its individual cost, including taxes. Incidental small tools of a specific trade (i.e., shovels, saws, hammers, air compressors, etc.,) and general use vehicles, such as pickup trucks even for

moving items around the site, fuel for these general use vehicles, travel, lodging, and/or meals are not eligible and shall not be included.

7.2.2.4 Eligible Insurance costs shall be limited to documented increases in "Builder's Risk" insurance premium / costs only. Commercial General Liability, Automobile Liability, and all other required insurances, where referenced in the Contract shall be considered part of normal overhead. These costs are already compensated by the Overhead and Profit markup.

7.2.2.5 Cost for the General Contractor Performance and Payment Bond premium, where the documented cost of the premiums have been increased due to the Change Order.

7.2.3 Overhead and Profit - The Contractor and Subcontractor shall be due home office fixed overhead and profits on the Cost of the Work, but shall not exceed a total of 16% of the direct cost of any portion of Work.

The credit to the Owner resulting from a change in the Work shall be the sum of those items above, including overhead and profit. Where a change results in both credits to the Owner and extras to the Contractor for related items, overhead and profit shall be computed for credits to the Owner and extras to the Contractor. The Owner shall receive full credit for the computed overhead and profit on credit change order items.

7.2.4 The cost to the Owner resulting from a change in the Work shall be the sum of: Cost of the Work (as defined at Section 7.2.2) and Overhead and Profit (as defined at Section 7.2.3), and shall be computed as follows:

7.2.4.1 When all of the Work is General Contractor Work; 8% markup on the Cost of the Work.

7.2.4.2 When the Work is all Subcontract Work; 8% markup on the Cost of the Work for Subcontractor's Overhead and Profit, plus 8% markup on the Cost of the Work, not including the Subcontractor's Overhead and Profit markup, for General Contractor's Overhead and Profit.

7.2.4.3 When the Work is a combination of General Contractor Work and Subcontract Work; that portion of the direct cost that is General Contract Work shall be computed per Section 7.2.4.1 and that portion of the direct cost that is Subcontract Work shall be computed per Section 7.2.4.2.

Premiums for the General Contractor's bond may be included, but after the markup is added to the Cost of the Work.
Premiums for the Subcontractor's Bond shall not be included.

7.2.4.4 Subcontract cost shall consist of the items in Section 7.2.2 above plus Overhead and Profit as defined in Section 7.2.3.

7.2.5 Before a Change Order is prepared, the Contractor shall prepare and deliver to the Architect the following information concerning the Cost of the Work, not subject to waiver, within a reasonable time after being notified to prepare said Change Order:

A detailed, itemized list of labor, material and equipment costs for the General Contractor's Work including quantities and unit costs for each item of labor, material and equipment.

An itemized list of labor, material and equipment costs for each Subcontractor's and/or Sub-Subcontractor's Work including quantities and unit costs for each item of labor, material and equipment.

7.2.6 After a Change Order has been approved, no future requests for extensions of time or additional cost shall be considered for that Change Order.

7.2.7 Extended fixed job-site costs are indirect costs that are necessary to support the work in the field. Examples of fixed job-site costs are field office rental, salaries of field office staff, field office utilities, and telephone.

Extended fixed job-site costs or equitable adjustment may be included in a Change Order due to a delay in the critical path, with the exception of weather related delays. In the event of a delay in the critical path, the Contractor shall submit all changes or adjustments to the Contract Time **within twenty-one (21) days** of the event giving rise to the delay. The Contractor shall submit documentation and justification for the adjustment by performing a critical path analysis of its most recent schedule in use prior to the change, which shows an extension in critical path activities.

The Contractor shall notify the Architect in writing that the Contractor is making a claim for extended fixed job-site overhead as required by Section 15.1.2. The Contractor shall provide proof that the Contractor is unable to mitigate financial damages through Alternate Work within this Contract or replacement work. "Replacement Work" is that work which the Contractor is obligated to perform under any construction contract separate from this Contract. Reasonable proof shall be required by the Architect that the delays affected the Completion Date.

7.2.8 "Cost of the Work" whether General Contractor cost or Subcontractor cost shall not apply to the following:

7.2.8.1 Salaries or other compensation of the Contractor's personnel at the Contractor's principal office and branch offices.

7.2.8.2 Any part of the Contractor's capital expenses, including interest on the Contractor's capital employed for the Work.

7.2.8.3 Overhead and general expenses of any kind or the cost of any item not specifically and expressly included above in Cost of the Work.

7.2.8.4 Cost of supervision refer to section 7.2.2.1, with exception as provided in Section 7.2.7.

7.2.9 When applicable as provided by the Contract, the cost to Owner for Change Orders shall be determined by quantities and unit prices. The quantity of any item shall be as

submitted by the Contractor and approved by the Architect. Unit prices shall cover cost of Material, Labor, Equipment, Overhead and Profit.

7.3 CONSTRUCTION CHANGE DIRECTIVES

7.3.3 In the first sentence after "following methods" insert: ", but not to exceed a specified amount".

7.3.4 From .1 of the list, delete all after "Costs of labor, including" and substitute the following "social security, old age and employment insurance, applicable payroll taxes, and workers' compensation insurance;"

Delete the following from .4 of the list: "permit fees,"

Delete Section 7.3.9 and substitute the following:

7.3.9 Pending final determination of the total costs of a Construction Change Directive to the Owner, amounts not in dispute for such changes in the Work shall be included in Applications for Payment accompanied by a Change Order indicating the parties' agreement with part or all of such costs.

ARTICLE 8

TIME

8.1 DEFINITIONS

Add the following:

8.1.5 The Contract Time shall not be changed by the submission of a schedule that shows an early completion date unless specifically authorized by change order.

8.2 PROGRESS AND COMPLETION

Add to Section 8.2.1 the following:

Completion of the Work must be within the Time for Completion stated in the Agreement, subject to such extensions as may be granted under Section 8.3. The Contractor agrees to commence Work not later than fourteen (14) days after the transmittal date of Written Notice to Proceed from the Owner and to substantially complete the project within the time stated in the Contract. The Owner will suffer financial loss if the project is not substantially complete in the time set forth in the Contract Documents. The Contractor and the Contractor's Surety shall be liable for and shall pay to the Owner the sum stated in the Contract Documents as fixed, agreed and liquidated damages for each consecutive calendar day (Saturdays, Sundays and holidays included) of delay until the Work is substantially complete. The Owner shall be entitled to the sum stated in the Contract Documents. Such Liquidated Damages shall be withheld by the Owner from the amounts due the Contractor for progress payments.

Delete Section 8.2.2.

8.3 DELAYS AND EXTENSIONS OF TIME

8.3.1 In the first sentence after the words "Owner pending" delete the words "mediation and binding dispute resolution" and add the word "litigation", and delete the last word "determine" and add the following: "recommend, subject to Owner's approval of Change Order. If the claim is not made within the limits of Article 15, all rights for future claims for that month are waived."

ARTICLE 9

PAYMENTS AND COMPLETION

9.1 CONTRACT SUM

Delete Section 9.1.2.

Delete Section 9.2 and substitute the following:

9.2 SCHEDULE OF VALUES

At the Pre-Construction Conference, the Contractor shall submit to the Owner and the Architect a Schedule of Values prepared as follows:

9.2.1 The attached Schedule of Values Format shall be used. If applicable, the cost of Work for each section listed under each division, shall be given. The cost for each section shall include Labor, Materials, Overhead and Profit.

9.2.2 The Total of all items shall equal the Total Contract Sum. This schedule, when approved by the Architect, shall be used as a basis for the Contractor's Applications for Payment and it may be used for determining the cost of the Work in deductive change orders, when a specific item of Work listed on the Schedule of Values is to be removed. Once the Schedule of Values is submitted at the Pre-Construction Conference, the schedule shall not be modified without approval from the Owner and Architect.

9.3 APPLICATIONS FOR PAYMENT

Delete Sections 9.3.1, 9.3.1.1, and 9.3.1.2 and substitute the following:

9.3.1 Monthly, the Contractor shall submit to the Architect a Facility Planning and Control – Application and Certification for Payment form, supported by any additional data substantiating the Contractor's right to payment as the Owner or the Architect may require. Application for Payment shall be submitted on or about the first of each month for the value of labor and materials incorporated into the Work and of materials, suitably stored, at the site as of the twenty-fifth day of the preceding month, less normal retainage as follows, per La R.S. 38:2248:

9.3.1.1 Projects with Contract price up to $500,000.00 – 10% of the Contract price.

9.3.1.2 Projects with Contract price of $500,000.00, or more – 5% of the Contract price.

9.3.1.3 No payment shall be made until the revised schedule required by Section 3.10.1 is received.

9.3.1.4 The normal retainage shall not be due the Contractor until after substantial completion and expiration of the forty-five day lien period and submission to the Architect of a clear lien certificate, consent of surety, and invoice for retainage.

Delete Section 9.3.2 and substitute the following:

9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. Payments for materials or equipment stored on the site shall be conditioned upon submission by the Contractor of bills of sale or such other procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, including applicable insurance.

9.5 DECISIONS TO WITHHOLD CERTIFICATION

Section 9.5.1.7: Delete the word "repeated".

Delete Section 9.5.4.

9.6 PROGRESS PAYMENTS

Delete Section 9.6.1 and substitute the following:

9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment within twenty days except for projects funded fully or in part by a Federal reimbursement program. For such projects the Owner will make payment in a timely manner consistent with reimbursement.

9.6.2 Delete the phrase: "no later than seven days" from the first sentence.

After the end of the second sentence, add the following:

La R.S. 9:2784 (A) and (C) require a Contractor or Subcontractor to make payment due to each Subcontractor and supplier within fourteen (14) consecutive days of the receipt of payment from the Owner. If not paid, a penalty in the amount of ½ of 1% per day is due, up to a maximum of 15% from the expiration date until paid. The contractor or subcontractor, whichever is applicable, is solely responsible for payment of a penalty.

9.6.4 Delete the first two sentences of Section 9.6.4 and add the following to the end of the Section:

Pursuant to La. R.S. 38:2242 and La. R.S. 38:2242.2, when the Owner receives any claim of nonpayment arising out of the Contract, the Owner shall deduct 125% of such claim from the Contract Sum. The Contractor, or any interested party, may deposit security, in accordance with La. R.S. 38:2242.2, guaranteeing payment of the claim with the recorder

of mortgages of the parish where the Work has been done. When the Owner receives original proof of such guarantee from the recorder of mortgages, the claim deduction will be added back to the Contract Sum.

Delete Section **9.7 FAILURE OF PAYMENT**.

Delete Section 9.8 and substitute the following:

9.8 SUBSTANTIAL COMPLETION

9.8.1 Substantial Completion is the stage in the progress of the Work when the Work is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use. The Architect shall determine if the project is substantially complete in accordance with this Section.

9.8.2 When the Contractor considers that the Work is Substantially Complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

9.8.3 Upon receipt of the Contractor's list, the Architect shall make an inspection to determine whether the Work is substantially complete. A prerequisite to the Work being considered as substantially complete is the Owner's receipt of the executed Roofing Contractor's and Roofing Manufacturer's guarantees, where roofing Work is part of the Contract. Prior to inspection by the Architect, the Contractor shall notify the Architect that the project is ready for inspection by the State Fire Marshal's office. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use, the Contractor shall, before the Work can be considered as Substantially Complete, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

9.8.4 When the Architect determines that the project is Substantially Complete, he shall prepare a punch list of exceptions and the dollar value related thereto. The monetary value assigned to this list will be the sum of the cost estimate for each particular item of Work the Architect develops based on the mobilization, labor, material and equipment costs of correcting the item and shall be retained from the monies owed the contractor, above and beyond the standard lien retainage. The cost of these items shall be prepared in the same format as the schedule of values. At the end of the forty-five day lien period payment shall be approved for all punch list items completed up to that time. After that payment, none of the remaining funds shall be due the contractor until all punch list items are completed and are accepted by the Architect. If the dollar value of the punch list exceeds the amount of funds, less the retainage amount, in the remaining balance of the Contract, then the Project shall not be considered as substantially complete. If funds remaining are less than that required to complete the Work, the Contractor shall pay the difference.

9.8.5 When the preparation of the punch list is complete the Architect shall prepare a Recommendation of Acceptance incorporating the punch list and submit it to the Owner. Upon approval of the Recommendation of Acceptance, the Owner may issue a Notice of Acceptance of Building Contract which shall establish the Date of Substantial Completion. The Contractor shall record the Notice of Acceptance with the Clerk of Court in the Parish in which the Work has been performed. If the Notice of Acceptance has not been recorded seven (7) days after issuance, the Owner may record the Acceptance at the Contractor's expense. All additive change orders must be processed before issuance of the Recommendation of Acceptance. The Owner shall not be responsible for payment for any Work associated with change orders that is not incorporated into the contract at the time of the Recommendation of Acceptance.

9.8.6 Warranties required by the Contract Documents shall commence on the date of Acceptance of the Work unless otherwise agreed to in writing by the Owner and Contractor. Unless otherwise agreed to in writing by the Owner and Contractor, security, maintenance, heat, utilities, damage to the Work not covered by the punch list and insurance shall become the Owner's responsibility on the Date of Substantial Completion.

9.8.7 If all punch list items have not been completed by the end of the forty-five (45) day lien period, through no fault of the Architect or Owner, the Owner may hold the Contractor in default. If the Owner finds the Contractor is in default, the Surety shall be notified. If within forty-five (45) days after notification, the Surety has not completed the punch list, through no fault of the Architect or Owner, the Owner may, at his option, contract to have the balance of the Work completed and pay for such Work with the unpaid funds remaining in the Contract sum. Finding the Contractor in default shall constitute a reason for disqualification of the Contractor from bidding on future state contracts. If the surety fails to complete the punch list within the stipulated time period, the Owner may not accept bonds submitted, in the future, by the surety.

9.9 PARTIAL OCCUPANCY OR USE

Delete Section 9.9.1 and substitute the following:

9.9.1 Partial Occupancy is that stage in the progress of the Work when a designated portion of the Work is sufficiently complete in accordance with the Contract Documents so the Owner can occupy or utilize the designated portion of the Work for its intended use. The Owner may occupy or use any substantially completed portion of the Work so designated by separate agreement with the Contractor and authorized by public authorities having jurisdiction over the Work. Such occupancy or use may commence provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers the designated portion substantially complete the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld.

9.10 FINAL COMPLETION AND FINAL PAYMENT

Delete Section 9.10.4 and replace with the following:

9.10.4 The making of final payment shall not constitute a waiver of Claims by the Owner for the following:

9.10.4.1 Claims, security interests, or encumbrances arising out of the Contract and unsettled;

9.10.4.2 failure of the Work to comply with the requirements of the Contract Documents irrespective of when such failure is discovered;

9.10.4.3 terms of special warranties required by the Contract Documents; or

9.10.4.4 audits performed by the Owner, after final payment.

ARTICLE 10

PROTECTION OF PERSONS AND PROPERTY

10.2 SAFETY OF PERSONS AND PROPERTY

10.2.2 In the first sentence, between the words: "bearing on" and "safety", add the words: "the health and,"

10.3 HAZARDOUS MATERIALS

10.3.1 In the second sentence after (PCB) add: "or lead".

10.3.2 After the first sentence, delete all remaining sentences.

Add at the end: "The Contract time shall be extended appropriately."

Delete Section 10.4 and substitute the following:

10.4 EMERGENCIES

In an emergency affecting the safety of persons or property, the Contractor shall notify the Owner and Architect immediately of the emergency, simultaneously acting at his discretion to prevent damage, injury or loss. Any additional compensation or extension of time claimed by the Contractor on account of emergency Work shall be determined as provided in Article 15 and Article 7.

ARTICLE 11

INSURANCE AND BONDS

AIA A101 – 2017 Exhibit A is not a part of these documents. Delete all of Sections 11.1, 11.2, 11.3, 11.4, and 11.5, and substitute the following:

INSURANCE REQUIREMENTS FOR NEW CONSTRUCTION, ADDITIONS AND RENOVATIONS

11.1 CONTRACTOR'S LIABILITY INSURANCE

The Contractor shall purchase and maintain without interruption for the duration of the contract insurance against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the Work hereunder by the Contractor, its agents, representatives, employees or subcontractors. The duration of the contract shall be from the inception of the contract until the date of final payment.

11.2 MINIMUM SCOPE AND LIMITS OF INSURANCE

11.2.1 Worker's Compensation

Worker's Compensation insurance shall be in compliance with the Worker's Compensation law of the Contractor's headquarters. Employers Liability is included with a minimum limit of $1,000,000 per accident/per disease/per employee. If Work is to be performed over water and involves maritime exposure, applicable LHWCA, Jones Act or other maritime law coverage shall be included. A.M. Best's insurance company rating requirement may be waived for Worker's compensation coverage only.

11.2.2 Commercial General Liability

Commercial General Liability insurance, including Personal and Advertising Injury Liability and Products and Completed Operations Liability, shall have a minimum limit per occurrence based on the project value. The Insurance Services Office (ISO) Commercial General Liability occurrence coverage form CG 00 01 (current form approved for use in Louisiana), or equivalent, is to be used in the policy. Claims-made form is unacceptable.

The aggregate loss limit must apply to each project. ISO form CG 25 03 (current form approved for use in Louisiana), or equivalent, shall also be submitted. The State project number, including part number, and project name shall be included on this endorsement.

COMBINED SINGLE LIMIT (CSL) PER OCCURRENCE

Type of Construction	**Projects up to $1,000,000**	**Projects over $1,000,000 up to $10,000,000**	**Projects over $10,000,000**
New Buildings:			
Each Occurrence Minimum Limit	$1,000,000	$2,000,000	$4,000,000
Per Project Aggregate	$2,000,000	$4,000,000	$8,000,000
Renovations:	**The building(s) value for the Project is $9,593,087.53.**		
Each Occurrence Minimum Limit	$1,000,000**	$2,000,000**	$4,000,000**

Per Project Aggregate	2 times per occur limit**	2 times per occur limit**	2 times per occur limit**

**While the minimum Combined Single Limit of $1,000,000 is required for any renovation, the limit is calculated by taking 10% of the building value and rounding it to the nearest $1,000,000 to get the insurance limit. Example: Renovation on a $33,000,000 building would have a calculated $3,000,000 combined single limit of coverage (33,000,000 times .10 = 3,300,000 and then rounding down to $3,000,000). If the calculated limit is less than the minimum limit listed in the above chart, then the amount needed is the minimum listed in the chart. Maximum per occurrence limit required is $10,000,000 regardless of building value. The per project aggregate limit is then calculated as twice the per occurrence limit.

11.2.3 Automobile Liability

Automobile Liability Insurance shall have a minimum combined single limit per occurrence of $1,000,000. ISO form number CA 00 01 (current form approved for use in Louisiana), or equivalent, is to be used in the policy. This insurance shall include third-party bodily injury and property damage liability for owned, hired and non-owned automobiles.

11.2.4 Excess Umbrella

Excess Umbrella Insurance may be used to meet the minimum requirements for General Liability and Automobile Liability only.

11.2.5 Builder's Risk

11.2.5.1 Builder's Risk Insurance shall be in an amount equal to the amount of the construction contract including any amendments and shall be upon the entire Work included in the contract. The policy shall provide coverage equivalent to the ISO form number CP 10 20, Broad Form Causes of Loss (extended, if necessary, to include the perils of wind, earthquake, collapse, vandalism/malicious mischief, and theft, including theft of materials whether or not attached to any structure). The policy must include architects' and engineers' fees necessary to provide plans, specifications and supervision of Work for the repair and/or replacement of property damage caused by a covered peril, not to exceed 10% of the cost of the repair and/or replacement.

11.2.5.2 Flood coverage shall be provided by the Contractor on the first floor and below for all projects, except as otherwise noted. The builder's risk insurance policy, sub-limit for flood coverage shall not be less than ten percent (10%) of the total contract cost per occurrence. If flood is purchased as a separate policy, the limit shall be ten percent (10%) of the total contract cost per occurrence (with a max of $500,000 if NFIP). Coverage for roofing projects shall **not** require flood coverage.

11.2.5.3 A Specialty Contractor may provide an installation floater in lieu of a Builder's Risk policy, with the similar coverage as the Builder's Risk policy, upon the

system to be installed in an amount equal to the amount of the contract including any amendments. Flood coverage is not required.

11.2.5.4 The policy must include coverage for the Owner, Contractor and any subcontractors as their interests may appear.

11.2.6 Pollution Liability *(required when asbestos or other hazardous material abatement is included in the contract)*

Pollution Liability insurance, including gradual release as well as sudden and accidental, shall have a minimum limit of not less than $1,000,000 per claim. A claims-made form will be acceptable. A policy period inception date of no later than the first day of anticipated Work under this contract and an expiration date of no earlier than 30 days after anticipated completion of all Work under the contract shall be provided. There shall be an extended reporting period of at least 24 months, with full reinstatement of limits, from the expiration date of the policy if the policy is not renewed. The policy shall not be cancelled for any reason, except non-payment of premium.

11.2.7 Deductibles and Self-Insured Retentions

Any deductibles or self-insured retentions must be declared to and accepted by the Owner. The Contractor shall be responsible for all deductibles and self-insured retentions.

11.3 OTHER INSURANCE PROVISIONS

11.3.1 The policies are to contain, or be endorsed to contain, the following provisions:

11.3.1.1 Worker's Compensation and Employers Liability Coverage

11.3.1.1.1 To the fullest allowed by law, the insurer shall agree to waive all rights of subrogation against the Owner, its officers, agents, employees and volunteers for losses arising from Work performed by the Contractor for the Owner.

11.3.1.2 Commercial General Liability Coverage

11.3.1.2.1 The Owner, its officers, agents, employees and volunteers are to be added as additional insureds as respects liability arising out of activities performed by or on behalf of the Contractor; products and completed operations of the Contractor, premises owned, occupied or used by the Contractor. ISO Form CG 20 10 (for ongoing work) AND CG 20 37 (for completed work) (current forms approved for use in Louisiana), or equivalent, are to be used.

11.3.1.2.2 The Contractor's insurance shall be primary as respects the Owner, its officers, agents, employees and volunteers for any and all losses that occur under the contract. The coverage shall contain no special limitations on the scope of protection afforded to the Owner, its officers, officials, employees or volunteers. Any insurance or self-

insurance maintained by the Owner shall be excess and non-contributory of the Contractor's insurance.

11.3.1.3 Builder's Risk

The policy must include an endorsement providing the following:

In the event of a disagreement regarding a loss covered by this policy, which may also be covered by a State of Louisiana self-insurance or commercial property policy through the Office of Risk Management (ORM), Contractor and its insurer agree to follow the following procedure to establish coverage and/or the amount of loss:

Any party to a loss may make written demand for an appraisal of the matter in disagreement. Within 20 days of receipt of written demand, the Contractor's insurer and either ORM or its commercial insurance company shall each select a competent and impartial appraiser and notify the other of the appraiser selected. The two appraisers shall select a competent and impartial umpire. The appraisers shall then identify the policy or policies under which the loss is insured and, if necessary, state separately the value of the property and the amount of the loss that must be borne by each policy. If the two appraisers fail to agree, they shall submit their differences to the umpire. A written decision by any two shall determine the policy or policies and the amount of the loss. Each insurance company agrees that the decision of the appraisers and the umpire if involved shall be binding and final and that neither party will resort to litigation. Each of the two parties shall pay its chosen appraiser and bear the cost of the umpire equally.

11.3.1.4 All Coverages

11.3.1.4.1 All policies must be endorsed to require 30 days written notice of cancellation to the Agency. Ten-day written notice of cancellation is acceptable for non-payment of premium. Notifications shall comply with the standard cancellation provisions in the Contractor's policy. In addition, Contractor is required to notify Agency of policy cancellations or reductions in limits.

11.3.1.4.2 Neither the acceptance of the completed Work nor the payment thereof shall release the Contractor from the obligations of the insurance requirements or indemnification agreement.

11.3.1.4.3 The insurance companies issuing the policies shall have no recourse against the Owner for payment of premiums or for assessments under any form of the policies.

11.3.1.4.4 Any failure of the Contractor to comply with reporting provisions of the policy shall not affect coverage provided to the Owner, its officers, agents, employees and volunteers.

11.3.2 Acceptability of Insurers

All required insurance shall be provided by a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located. Insurance shall be placed with insurers with an A.M. Best's rating of **A-: VI or higher**. This rating requirement may be waived for Worker's compensation coverage only.

If at any time an insurer issuing any such policy does not meet the minimum A.M. Best rating, the Contractor shall obtain a policy with an insurer that meets the A.M. Best rating and shall submit another certificate of insurance within 30 days.

11.3.3 Verification of Coverage

Contractor shall furnish the Owner with Certificates of Insurance reflecting proof of required coverage. The Certificates for each insurance policy are to be signed by a person authorized by that insurer to bind coverage on its behalf. The Certificates are to be received and approved by the Owner before Work commences and upon any contract renewal or insurance policy renewal thereafter. The Certificate Holder must be listed as follows:

State of Louisiana
Name of Owner
Owner Address
City, State, Zip
Attn: Project # _____

The Owner reserves the right to request complete certified copies of all required insurance policies at any time.

Upon failure of the Contractor to furnish, deliver and maintain required insurance, this contract, at the election of the Agency, may be suspended, discontinued, or terminated. Failure of the Contractor to purchase and/or maintain any required insurance shall not relieve the Contractor from any liability or indemnification under the contract.

If the Contractor does not meet the insurance requirements at policy renewal, at the option of the Owner, payment to the Contractor may be withheld until the requirements have been met, OR the Owner may pay the renewal premium and withhold such payment from any monies due the Contractor, OR the contract may be suspended or terminated for cause.

11.3.4 Subcontractors

Contractor shall include all subcontractors as insureds under its policies OR shall be responsible for verifying and maintaining the certificates provided by each subcontractor. Subcontractors shall be subject to all of the requirements stated herein. The Owner reserves the right to request copies of subcontractor's certificates at any time.

If Contractor does not verify subcontractors' insurance as described above, Owner has the right to withhold payments to the Contractor until the requirements have been met.

11.3.5 Worker's Compensation Indemnity

In the event Contractor is not required to provide or elects not to provide Worker's compensation coverage, the parties hereby agree the Contractor, its Owners, agents and employees shall have no cause of action against, and shall not assert a claim against, the State of Louisiana, its departments, agencies, agents and employees as an employer, whether pursuant to the Louisiana Worker's Compensation Act or otherwise, under any circumstance. The parties also hereby agree that the State of Louisiana, its departments, agencies, agents and employees shall in no circumstance be, or considered as, the employer or statutory employer of Contractor, its Owners, agents and employees. The parties further agree that Contractor is a wholly independent Contractor and is exclusively responsible for its employees, Owners, and agents. Contractor hereby agrees to protect, defend, indemnify and hold the State of Louisiana, its departments, agencies, agents and employees harmless from any such assertion or claim that may arise from the performance of this contract.

11.3.6 Indemnification/Hold Harmless Agreement

Contractor agrees to protect, defend, indemnify, save, and hold harmless, the State of Louisiana, all State Departments, Agencies, Boards and Commissions, its officers, agents, servants, employees and volunteers, from and against any and all claims, damages, expenses and liability arising out of injury or death to any person or the damage, loss or destruction of any property which may occur, or in any way grow out of, any act or omission of Contractor, its agents, servants and employees, or any and all costs, expenses and/or attorney fees incurred by Contractor as a result of any claims, demands, suits or causes of action, except those claims, demands, suits or causes of action arising out of the negligence of the State of Louisiana, all State Departments, Agencies, Boards, Commissions, its officers, agents, servants, employees and volunteers.

Contractor agrees to investigate, handle, respond to, provide defense for and defend any such claims, demands, suits or causes of action at its sole expense and agrees to bear all other costs and expenses related thereto, even if the claims, demands, suits, or causes of action are groundless, false or fraudulent. The State of Louisiana may, but is not required to, consult with the Contractor in the defense of claims, but this shall not affect the Contractor's responsibility for the handling and expenses of all claims.

11.4 PERFORMANCE AND PAYMENT BOND

11.4.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract.

11.4.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

11.4.3 Recordation of Contract and Bond [La R.S. 38:2241 thru 38:2241.1]

The Owner shall record within thirty (30) days the Contract Between Owner and Contractor and Performance and Payment Bond with the Clerk of Court in the Parish in which the Work is to be performed.

ARTICLE 12

UNCOVERING AND CORRECTION OF WORK

12.2 CORRECTION OF WORK

12.2.1 Before Substantial Completion

At the end of the paragraph, add the following sentences:
"If the Contractor fails to correct Work identified as defective within a thirty (30) day period, through no fault of the Designer, the Owner may hold the Contractor in default. If the Owner finds the Contractor in default, the Surety shall be notified. If within thirty (30) days after notification, the Surety has not corrected the nonconforming Work, through no fault of the Architect or Owner, the Owner may contract to have nonconforming Work corrected and hold the Surety and Contractor responsible for the cost, including architectural fees and other indirect costs. If the Surety fails to correct the Work within the stipulated time period and fails to meet its obligation to pay the costs, the Owner may elect not to accept bonds submitted in the future by the Surety. Finding the Contractor in default shall constitute a reason for disqualification of the Contractor from bidding on future state contracts.

12.2.2 After Substantial Completion

12.2.2.1 At the end of the paragraph delete the last sentence and add the following sentences:
"If the Contractor fails to correct nonconforming Work, or Work covered by warranties, within a thirty (30) day period, through no fault of the Architect or Owner, the Owner may hold the Contractor in default. If the Owner finds the Contractor is in default, the Surety shall be notified. If within thirty (30) days after notification, the Surety has not corrected the non-conforming or warranty Work, through no fault of the Architect or Owner, the Owner may contract to have the nonconforming or warranty Work corrected and hold the Surety responsible for the cost including architects fees and other indirect costs. Corrections by the Owner shall be in accordance with Section 2.4. If the Surety fails to correct the nonconforming or warranty Work within the stipulated time period and fails to meet its obligation to pay the costs, the Owner may not accept bonds submitted, in the future, by the Surety."

ARTICLE 13

MISCELLANEOUS PROVISIONS

13.1 GOVERNING LAW

Delete all after the word "located".

13.2 SUCCESSORS AND ASSIGNS

13.2.1 In the second sentence, delete "Except as … 13.2.2"

Delete Section 13.2.2.

13.3 RIGHTS AND REMEDIES

Add the following Section 13.3.3:

13.3.3 The Fourth Judicial Court in and for the Parish of Ouachita, State of Louisiana shall have sole jurisdiction and venue in any action brought under this contract.

13.4 TESTS AND INSPECTIONS

In Section 13.4.1, delete the second sentence and substitute the following:

The Contractor shall make arrangements for such tests, inspections and approvals with the Testing Laboratory provided by the Owner, and the Owner shall bear all related costs of tests, inspections and approvals.

Delete the last two sentences of Section 13.4.1.

13.5 INTEREST

Delete Section 13.5.

ARTICLE 14

TERMINATION OR SUSPENSION OF THE CONTRACT

14.1 TERMINATION BY THE CONTRACTOR

Delete Section 14.1.1.4.

In Section 14.1.3, after the word "profit," delete the words "on Work not executed" and substitute the following: "for Work completed prior to stoppage".

14.2 TERMINATION BY THE OWNER FOR CAUSE

Add the following Section:

14.2.1.5 failure to complete the punch list within the lien period as provided in 9.8.7.

14.2.3 Add the following sentence:

"Termination by the Owner shall not suspend assessment of liquidated damages against the Surety."

Add the following Section:

14.2.5 If an agreed sum of liquidated damages has been established, termination by the Owner under this Article shall not relieve the Contractor and/or Surety of his obligations under the liquidated damages provisions and the Contractor and/or Surety shall be liable to the Owner for per diem liquidated damages.

14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

In Section 14.4.3, delete all after "incurred by reason of the termination," and add "along with reasonable profit on the Work not executed."

ARTICLE 15

CLAIMS AND DISPUTES

15.1 CLAIMS

Delete Section 15.1.2, **Time Limit on Claims,** (See La R.S. 38:2189, and 38:2189.1).

15.1.3.1 Add the following to the end of the paragraph:
"A Reservation of Rights and similar stipulations shall not be recognized under this contract as having any effect. A party must make a claim as defined herein within the time limits provided."

15.1.4.2 In the first sentence of the Section, delete "Initial Decision Maker's" and replace with "Architect's". In the second sentence of the Section, delete "the decision of the Initial Decision Maker" and replace with: "his/her decision".

Delete Section 15.1.6.2 and substitute the following:

15.1.6.2 If adverse weather conditions are the basis for a claim for additional time, the Contractor shall document that weather conditions had an adverse effect on the scheduled construction. An increase in the contract time due to weather shall not be cause for an increase in the contract sum. At the end of each month, the Contractor shall make one Claim for any adverse weather days occurring within the month. The Claim must be accompanied by sufficient documentation evidencing the adverse days and the impact on construction. Failure to make such Claim within **twenty-one (21) days** from the last day of the month shall prohibit any future claims for adverse days for that month. No additional adverse weather days shall be granted after the original or extended contract completion date, except those adverse weather days associated with a National Weather Service named storm or federally declared weather related disaster directly affecting the project site.

Add the following Section:

15.1.6.3 The following are considered reasonably anticipated days of adverse weather on a monthly basis:

January	11 days	July	6 days
February	10 days	August	5 days
March	8 days	September	4 days
April	7 days	October	3 days
May	5 days	November	5 days
June	6 days	December	8 days

The Contractor shall ask for total adverse weather days. The Contractor's request shall be considered only for days over the allowable number of days stated above.

Note: Contract is on a calendar day basis.

15.2 INITIAL DECISION

15.2.1 In the second sentence, delete the word "will" and replace with: "shall always".

In the second sentence, delete the phrase: ", unless otherwise indicated in the Agreement."

In the third sentence, delete the word "mediation" and replace with: "litigation".

At the end of the third sentence, add: "arising prior to the date final payment is due".

Delete the fourth sentence.

15.2.5 In the middle of the first sentence, delete all after the phrase: "rejecting the Claim".

In the second sentence, delete the phrase: "and the Architect, if the Architect is not serving as the Initial Decision Maker,".

In the third sentence, delete all after: "binding on the parties" and add the following: "except that the Owner may reject the decision or suggest a compromise or both".

Delete Section 15.2.6.

Delete Section 15.2.6.1.

15.3 MEDIATION

Delete Section 15.3.

15.4 ARBITRATION

Delete Section 15.4.

LOUISIANA UNIFORM PUBLIC WORK BID FORM
For McClendon Baptist Church Sanctuary Renovation

The undersigned bidder hereby declares and represents that she/he: a) has carefully examined and understands the Bidding Documents, b) has not received, relied on, or based his bid on any verbal instructions contrary to the Bidding Documents or any addenda, c) has personally inspected and is familiar with the project site, and hereby proposes to provide all labor, materials, tools, appliances and facilities as required to perform, in a workmanlike manner, all work and services for the construction and completion of the referenced project, all in strict accordance with the Bidding Documents prepared by: TBA Studio Architect and dated: August 2026.

Bidders must acknowledge all addenda. The Bidder acknowledges receipt of the following **ADDENDA: (**Enter the number the Designer has assigned to each of the addenda that the Bidder is acknowledging) _____**.**

TOTAL BASE BID: For all work required by the Bidding Documents (including any and all unit prices designated "Base Bid" * but not alternates) the sum of:

_____Dollars ($ _____)

ALTERNATES: For any and all work required by the Bidding Documents for Alternates including any and all unit prices designated as alternates in the unit price description.

Deduct Alternate No. 1 (*Deduct from the Base Bid the amount to provide a structural wood stage deck designed to support a 700–800 lb lift in lieu of the concrete stage designed to support a 2,800–3,000 lb lift. See drawings for additional information and reference)* for the lump sum of:

_____Dollars ($ _____)

Deduct Alternate No. 2 *(Deduct for commencing Phase 2 approximately six (6) months earlier than the current anticipated construction sequence.*) for the lump sum of:

_____Dollars ($ _____)

Add Alternate No. 3 (*)* for the lump sum of:

_____Dollars ($_____)

NAME OF BIDDER: _____

ADDRESS OF BIDDER:_____

_____

LOUISIANA CONTRACTOR'S LICENSE NUMBER: _____

NAME OF AUTHORIZED SIGNATORY OF BIDDER: _____

TITLE OF AUTHORIZED SIGNATORY OF BIDDER: _____

SIGNATURE OF AUTHORIZED SIGNATORY OF BIDDER **: _____

DATE: _____

THE FOLLOWING ITEMS ARE TO BE INCLUDED WITH THE SUBMISSION OF THIS LOUISIANA UNIFORM PUBLIC WORK BID FORM:

* The Unit Price Form shall be used if the contract includes unit prices. Otherwise, it is not required and need not be included with the form. The number of unit prices that may be included is not limited and additional sheets may be included if needed.

**** A CORPORATE RESOLUTION OR WRITTEN EVIDENCE** of the authority of the person signing the bid for the public work as prescribed by LA R.S. 38:2212(B)(5).

BID SECURITY in the form of a bid bond, certified check or cashier's check as prescribed by LA R.S. 38:2218(A) attached to and made a part of this bid.

LOUISIANA UNIFORM PUBLIC WORK BID FORM
For McClendon Baptist Church Sanctuary Renovation
UNIT PRICE FORM

UNIT PRICES: This form shall be used for any and all work required by the Bidding Documents and described as unit prices. Amounts shall be stated in figures and only in figures.

DESCRIPTION:	☒ Base Bid or ❑ Alt.# ___			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*

DESCRIPTION:	☒ Base Bid or ❑ Alt # ___			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*

DESCRIPTION:	❑ Base Bid or ❑ Alt.# ___			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*

DESCRIPTION:	❑ Base Bid or ❑ Alt.# ___			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*

DESCRIPTION:	❑ Base Bid or ❑ Alt.# ___			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*

DESCRIPTION:	❑ Base Bid or ❑ Alt.# ___			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*

DESCRIPTION:	❑ Base Bid or ❑ Alt.# ___			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*

DESCRIPTION:	❑ Base Bid or ❑ Alt.# ___			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*

Wording for "DESCRIPTION" is to be provided by the Owner.
All quantities are estimated. The contractor will be paid based upon actual quantities as verified by the Owner.

DOCUMENT 002600 - PROCUREMENT SUBSTITUTION PROCEDURES

1.1 DEFINITIONS

A. Procurement Substitution Requests: Requests for changes in products, materials, equipment, and methods of construction from those indicated in the Procurement and Contracting Documents, submitted prior to receipt of bids.

B. Substitution Requests: Requests for changes in products, materials, equipment, and methods of construction from those indicated in the Contract Documents, submitted following Contract award. See Section 012500 "Substitution Procedures" for conditions under which Substitution requests will be considered following Contract award.

1.2 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.3 PROCUREMENT SUBSTITUTIONS

A. Procurement Substitutions, General: By submitting a bid, the Bidder represents that its bid is based on materials and equipment described in the Procurement and Contracting Documents, including Addenda. Bidders are encouraged to request approval of qualifying substitute materials and equipment when the Specifications Sections list materials and equipment by product or manufacturer name.

B. Procurement Substitution Requests will be received and considered by Owner when the following conditions are satisfied, as determined by Architect; otherwise requests will be returned without action:

1. Extensive revisions to the Contract Documents are not required.
2. Proposed changes are in keeping with the general intent of the Contract Documents, including the level of quality of the Work represented by the requirements therein.
3. The request is fully documented and properly submitted.

1.4 SUBMITTALS

A. Procurement Substitution Request: Submit to **Architect**. Procurement Substitution Request must be made in writing[**by prime contract Bidder only**] in compliance with the following requirements:

1. Requests for substitution of materials and equipment will be considered if received no later than **10** days prior to date of bid opening.
2. Submittal Format: Submit **three** 3 copies of each written Procurement Substitution Request, using [**CSI Substitution Request Form 1.5C**].

3. Submittal Format: Submit Procurement Substitution Request, using format provided on Project Web site.

    a. Identify the product or the fabrication or installation method to be replaced in each request. Include related Specifications Sections and drawing numbers.
    b. Provide complete documentation on both the product specified and the proposed substitute, including the following information as appropriate:

        1) Point-by-point comparison of specified and proposed substitute product data, fabrication drawings, and installation procedures.
        2) Copies of current, independent third-party test data of salient product or system characteristics.
        3) Samples where applicable or when requested by Architect.
        4) Detailed comparison of significant qualities of the proposed substitute with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
        5) Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
        6) Research reports, where applicable, evidencing compliance with building code in effect for Project, from [**ICC-ES**].
        7) Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, which will become necessary to accommodate the proposed substitute.

    c. Provide certification by manufacturer that the substitute proposed is equal to or superior to that required by the Procurement and Contracting Documents, and that its in-place performance will be equal to or superior to the product or equipment specified in the application indicated.
    d. Bidder, in submitting the Procurement Substitution Request, waives the right to additional payment or an extension of Contract Time because of the failure of the substitute to perform as represented in the Procurement Substitution Request.

B. Architect's Action:

1. Architect may request additional information or documentation necessary for evaluation of the Procurement Substitution Request. Architect will notify all bidders of acceptance of the proposed substitute by means of an Addendum to the Procurement and Contracting Documents.

C. Architect's approval of a substitute during bidding does not relieve Contractor of the responsibility to submit required shop drawings and to comply with all other requirements of the Contract Documents.

END OF DOCUMENT 002600

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Work under separate contracts.
4. Access to site.
5. Work restrictions.
6. Specification and drawing conventions.
7. Miscellaneous provisions.

B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.2 PROJECT INFORMATION

A. Project Identification:

1. Project Location: 206 Downing Pines Road, West Monroe, LA 71292

B. Owner: McClendon Baptist Church

C. Architect: TBA Studio Architects

D. Project Web Site: A project Web site administered by Architect will be used for purposes of managing communication and documents during the construction stage.

1. See Section 013100 "Project Management and Coordination." for requirements for using Project Web site.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of this Project is defined by the Contract Documents and consists of the following: The project consists of renovations to occupied church including new sanctuary/worship center, education/fellowship additions, and a new kitchen (see division 11 for food service equipment).

B. Type of Contract.

1. Project will be constructed under a single prime contract.

1.4 WORK UNDER SEPARATE CONTRACTS

A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.

1.5 ACCESS TO SITE

A. Pre-Bid Access: The buildings will be available for field verification on the day of the pre-bid unless other arrangements are made with the owner. Parties seeking access to the buildings shall notify Architect, through Prime Bidders, to coordinate scheduling of access. Failure to provide said notification shall not be cause for claim of inability to perform pre-bid field verification, nor shall failure of party(s) to make themselves available, during the time period the buildings are available.

B. General: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project. See Notes above for additional information.

C. Use of Site: Limit use of Project site to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Limits: Limit site disturbance, including earthwork and clearing of vegetation, to 40 feet beyond building perimeter; 10 feet beyond surface walkways, patios, surface parking, and utilities less than 12 inches in diameter; 15 feet beyond primary roadway curbs and main utility branch trenches; and 25 feet beyond constructed areas with permeable surfaces (such as pervious paving areas, storm-water detention facilities, and playing fields) that require additional staging areas in order to limit compaction in the constructed area.
2. Driveways, Walkways and Entrances: Keep driveways, loading areas and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

    a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
    b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

D. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

1.6 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

1. Notify Architect not less than 3 business days in advance of proposed utility interruptions.
2. Obtain Architect's written permission before proceeding with utility interruptions.

C. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.

1. Notify Architect not less than two business days in advance of proposed disruptive operations.
2. Obtain Architect's written permission before proceeding with disruptive operations.

D. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet of entrances, operable windows, or outdoor-air intakes.

E. Controlled Substances: Use of tobacco products and other controlled substances on Project site is not permitted.

1.7 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.
3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Requirements:

1. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.2 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1.3 ACTION SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use CSI Form 13.1A.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.

i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES, NFPA & ADA.
j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
k. Cost information, including a proposal of change, if any, in the Contract Sum.
l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven (7) days of receipt of a request for substitution. Architect will notify Contractor through Construction Manager of acceptance or rejection of proposed substitution within (15) fifteen days of receipt of request, or (7) seven days of receipt of additional information or documentation, whichever is later.

a. Forms of Acceptance: Change Order, or Architect's Supplemental Instructions for minor changes in the Work.
b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.4 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than (15) fifteen days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied:

a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
b. Requested substitution will not adversely affect Contractor's construction schedule.

c. Requested substitution has received necessary approvals of authorities having jurisdiction.
d. Requested substitution is compatible with other portions of the Work.
e. Requested substitution has been coordinated with other portions of the Work.
f. Requested substitution provides specified warranty.
g. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Not allowed unless otherwise indicated.

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

1.2 MINOR CHANGES IN THE WORK

A. Architect will issue, through Construction Manager, supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on the "Architect's Supplemental Instructions" form included in Project Manual.

1.3 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect or Construction Manager will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Work Change Proposal Requests issued by Architect or Construction Manager are not instructions either to stop work in progress or to execute the proposed change.
2. Within 10 days after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

    a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    c. Include costs of labor and supervision directly attributable to the change.
    d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
    e. Quotation Form: Use forms acceptable to Architect.

B. Contractor-Initiated Work Change Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect or Construction Manager.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.

2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Work Change Proposal Request Form: Use form acceptable to Architect.

1.4 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Changes Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701 (form included in Project Manual).

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Requirements:
1. Section 012600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
2. Section 013200 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

1.2 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule. Cost-loaded Critical Path Method Schedule may serve to satisfy requirements for the schedule of values.

1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:

a. Application for Payment forms with continuation sheets.
b. Submittal schedule.
c. Items required to be indicated as separate activities in Contractor's construction schedule.

2. Submit the schedule of values to Architect through Construction Manager at earliest possible date but no later than seven (7) days before the date scheduled for submittal of initial Applications for Payment.
3. Sub-schedules for Phased Work: Where the Work is separated into phases, requiring separately phased payments, provide sub-schedules showing values, coordinated with each phase of payment.

B. Format and Content: Use Project Manual section 000102 table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section listed in table of contents.

1. Identification: Include the following Project identification on the schedule of values:

a. Owner – McClendon Baptist Church
b. Architect - TBA Studio, West Monroe, Louisiana 71291
c. Architect's project number 25-WM0058
d. Contractor's name and address.
e. Date of submittal.

2. Arrange schedule of values consistent with format of AIA Document G703. Retain option in first subparagraph below where Contractor's ongoing activities related to Project closeout will be a line item subject to Application for Payment approval.
3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five (5) percent of the Contract Sum.

4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
6. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
7. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
8. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

    a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.

9. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders result in a change in the Contract Sum.

1.3 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.

    1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

C. Payment Application Times: Submit Application for Payment to Architect by the 30th of the month. The period covered by each Application for Payment is one month, ending on the last day of the month

D. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.

E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
2. Include amounts of Change Orders issued, before last day of construction period covered by application.

F. Transmittal: Submit five (5) signed and notarized original copies of each Application for Payment to Architect. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit conditional final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.

H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of values.
3. Contractor's construction schedule (preliminary if not final).
4. Schedule of unit prices.
5. Submittal schedule (preliminary if not final).
6. List of Contractor's staff assignments.
7. List of Contractor's principal consultants.
8. Copies of building permits.
9. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
10. Initial progress report.
11. Report of preconstruction conference.
12. Certificates of insurance and insurance policies.

I. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

J. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706-1994, "Contractor's Affidavit of Payment of Debts and Claims."
5. AIA Document G706A-1994, "Contractor's Affidavit of Release of Liens."
6. AIA Document G707-1994, "Consent of Surety to Final Payment."
7. Evidence that claims have been settled.
8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
9. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. Coordination drawings.
2. Requests for Information (RFIs).
3. Project Web site.
4. Project meetings.
5. Multi-consultant/phased job

B. Related Requirements:

1. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.

1.2 DEFINITIONS

A. RFI: Request from Owner, Construction Manager, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.3 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.

1.4 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

1.5 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:

a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
b. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid.
2. Plenum Space: Indicate sub-framing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility.

1.6 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
2. Project number.
3. Date.
4. Name of Contractor.
5. Name of Architect and Construction Manager
6. RFI number, numbered sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.
11. Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
12. Contractor's signature.
13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

C. RFI Forms: AIA Document G716 acceptable to Architect.

D. Architect's and Construction Manager's Action: Architect and Construction Manager will review each RFI, determine action required, and respond. Allow seven (7) working days for Architect's response for each RFI. RFIs received by the Construction Manager, after 1:00 p.m., will be considered as received the following working day.

1. The following RFIs will be returned without action:

a. Requests for approval of submittals.
b. Requests for approval of substitutions.
c. Requests for coordination information already indicated in the Contract Documents.
d. Requests for adjustments in the Contract Time or the Contract Sum.
e. Requests for interpretation of Architect's actions on submittals.
f. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."

a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify the Construction Manager in writing within (10) ten days of receipt of the RFI response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Include the following:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect and Construction Manager.
4. RFI number including RFIs that were dropped and not submitted.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's and Construction Manager's response was received.

F. On receipt of Architect's and Construction Manager's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect and Construction Manager within seven (7) days if Contractor disagrees with response.

1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.7 PROJECT MEETINGS

A. General: Schedule and conduct, Construction Manager will schedule and conduct meetings and conferences at Project site unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner, Construction Manager, and Architect, within three (3) days of the meeting.

B. Preconstruction Conference: Architect or Construction Manager will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.

1. Attendees: Authorized representatives of Owner, Construction Manager, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Discuss items of significance that could affect progress, including the following:

    a. Tentative construction schedule.
    b. Phasing.
    c. Critical work sequencing and long-lead items.
    d. Designation of key personnel and their duties.
    e. Procedures for processing field decisions and Change Orders.
    f. Procedures for RFIs.
    g. Procedures for testing and inspecting.
    h. Procedures for processing Applications for Payment.
    i. Distribution of the Contract Documents.
    j. Submittal procedures.
    k. Preparation of record documents.
    l. Use of the premises[and existing building].
    m. Work restrictions.
    n. Working hours.
    o. Owner's occupancy requirements.
    p. Responsibility for temporary facilities and controls.
    q. Procedures for moisture and mold control.
    r. Procedures for disruptions and shutdowns.
    s. Parking availability.
    t. Office, work, and storage areas.
    u. Equipment deliveries and priorities.
    v. First aid.
    w. Security.
    x. Progress cleaning.

3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect, Construction Manager, and Owner of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

    a. Contract Documents.
    b. Options.
    c. Related RFIs.
    d. Related Change Orders.
    e. Purchases.
    f. Deliveries.
    g. Submittals.
    h. Review of mockups.
    i. Possible conflicts.
    j. Compatibility problems.
    k. Time schedules.
    l. Weather limitations.
    m. Manufacturer's written instructions.
    n. Warranty requirements.
    o. Compatibility of materials.
    p. Acceptability of substrates.
    q. Temporary facilities and controls.
    r. Space and access limitations.
    s. Regulations of authorities having jurisdiction.
    t. Testing and inspecting requirements.
    u. Installation procedures.
    v. Coordination with other work.
    w. Required performance results.
    x. Protection of adjacent work.
    y. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Progress Meetings: Conduct progress meetings at monthly intervals.

1. Attendees: In addition to representatives of Owner, Construction Manager, and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

1) Review schedule for next period.

b. Review present and future needs of each entity present, including the following:

1) Interface requirements.
2) Sequence of operations.
3) Status of submittals.
4) Deliveries.
5) Off-site fabrication.
6) Access.
7) Site utilization.
8) Temporary facilities and controls.
9) Progress cleaning.
10) Quality and work standards.
11) Status of correction of deficient items.
12) Field observations.
13) Status of RFIs.
14) Status of proposal requests.
15) Pending changes.
16) Status of Change Orders.
17) Pending claims and disputes.
18) Documentation of information for payment requests.

3. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.

a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Contractor's construction schedule.
2. Construction schedule updating reports.
3. Daily construction reports.
4. Site condition reports.

B. Related Requirements:

1.2 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

D. Float: The measure of leeway in starting and completing an activity.

1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date].

1.3 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:

1. Working electronic copy of schedule file, where indicated.
2. PDF electronic file.
3. Two paper copies.

B. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

C. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.

1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
3. Total Float Report: List of all activities sorted in ascending order of total float.
4. Earnings Report: Compilation of Contractor's total earnings from the Notice to Proceed until most recent Application for Payment.

D. Construction Schedule Updating Reports: Submit with Applications for Payment.

E. Daily Construction Reports: Submit at monthly intervals.

F. Site Condition Reports: Submit at time of discovery of differing conditions.

1.4 COORDINATION

A. Coordinate Contractor's construction schedule with the schedule of values,[list of subcontracts,] submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established from the “Notice to Proceed” to date of Substantial Completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.

2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.

    a. <Insert list of major items or pieces of equipment>.

3. Submittal Review Time: Include review and re-submittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
4. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's and Construction Manager's administrative procedures necessary for certification of Substantial Completion.
6. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.
2. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
3. Work Restrictions: Show the effect of the following items on the schedule:

    a. Coordination with existing construction.
    b. Limitations of continued occupancies.
    c. Uninterruptible services.
    d. Partial occupancy before Substantial Completion.
    e. Use of premises restrictions.
    f. Provisions for future construction.
    g. Seasonal variations.
    h. Environmental control.

4. Work Stages: Indicate important stages of construction for each major portion of the Work.
5. Other Constraints:

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion, and the following milestone:

1. <Insert milestones not indicated elsewhere>.

E. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:

1. Unresolved issues.
2. Unanswered Requests for Information.
3. Rejected or unreturned submittals.
4. Notations on returned submittals.

5. Pending modifications affecting the Work and Contract Time.

F. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule.

G. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's construction schedule within 30 days of date established for the Notice to Proceed.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

1. For construction activities that require three months or longer for completion indicate an estimated completion percentage in ten (10) percent increments within time bar.

2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

A. General: Prepare network diagrams using AON (activity-on-node) format.

B. Startup Network Diagram: Submit diagram within 14 days of date established for the Notice to Proceed. Outline significant construction activities for the first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

C. CPM Schedule: Prepare Contractor's construction schedule using a[cost- and resource-loaded,] time-scaled CPM network analysis diagram for the Work.

1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 60 days after date established for [the Notice to Proceed.

a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Architect's approval of the schedule.

2. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
3. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule in order to coordinate with the Contract Time.

D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.

1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:

    a. Preparation and processing of submittals.
    b. Mobilization and demobilization.
    c. Purchase of materials.
    d. Delivery.
    e. Fabrication.
    f. Utility interruptions.
    g. Installation.
    h. Work by Owner that may affect or be affected by Contractor's activities.
    i. Testing and commissioning.
    j. Punch list and final completion.
    k. Activities occurring following final completion.

2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.

    a. Sub-networks on separate sheets are permissible for activities clearly off the critical path.

E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall project schedule.

F. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:

1. Contractor or subcontractor and the Work or activity.
2. Description of activity.
3. Main events of activity.
4. Immediate preceding and succeeding activities.
5. Early and late start dates.
6. Early and late finish dates.
7. Activity duration in workdays.
8. Total float or slack time.
9. Average size of workforce.
10. Dollar value of activity (coordinated with the schedule of values).

G. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:

1. Identification of activities that have changed.

2. Changes in early and late start dates.
3. Changes in early and late finish dates.
4. Changes in activity durations in workdays.
5. Changes in the critical path.
6. Changes in total float or slack time.
7. Changes in the Contract Time.

2.4 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions, including presence of rain or snow.
7. Accidents.
8. Meetings and significant decisions.
9. Unusual events.
10. Stoppages, delays, shortages, and losses.
11. Meter readings and similar recordings.
12. Emergency procedures.
13. Orders and requests of authorities having jurisdiction.
14. Change Orders received and implemented.

B. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week, before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate final completion percentage for each activity.

B. Distribution: Distribute copies of approved schedule to Architect or Construction Manager, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 013200

SECTION 013233 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Preconstruction photographs.
2. Periodic construction photographs.

B. Related Requirements:

1. Section 017700 "Closeout Procedures" for submitting photographic documentation as Project Record Documents at Project closeout.

1.2 INFORMATIONAL SUBMITTALS

A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph or video recording. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.

B. Digital Construction Photographs: Submit unaltered, original, full-size image files within three days of taking photographs.

1. Digital Camera: Minimum sensor resolution of 8 megapixels.
2. Identification: Provide the following information with each image description in file metadata tag:

a. Name of Project.
b. Name of Architect and Construction Manager.
c. Name of Contractor.
d. Date photograph was taken if not date stamped by camera.
e. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
f. Unique sequential identifier keyed to accompanying key plan.

1.3 USAGE RIGHTS

A. Obtain and transfer copyright usage rights from contractor to Owner for unlimited reproduction of photographic documentation.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

A. Digital Images: Provide images in JPG format, with minimum size of 8 megapixels.

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

A. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.

1. Maintain key plan with each set of construction photographs that identifies each photographic location.

B. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.

1. Date and Time: Include date and time in file name for each image.
2. Field Office Images: Maintain one set of images accessible in the field office at Project site, available at all times for reference. Identify images in the same manner as those submitted to Construction Manager.

C. Preconstruction Photographs: Before starting construction, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Construction Manager.

1. Flag excavation areas, construction limits before taking construction photographs.
2. Take 20 photographs to show existing conditions adjacent to property before starting the Work.

D. Periodic Construction Photographs: Take 20 photographs monthly, coinciding with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

E. Final Completion Construction Photographs: Take 20 color photographs after date of Substantial Completion for submission as Project Record Documents. Architect or Construction Manager will inform contractor of desired vantage points.

F. Additional Photographs: Architect or Construction Manager may request photographs in addition to periodic photographs specified. Additional photographs shall be included in the Contract Sum.

1. Three days' notice will be given, where feasible.
2. In emergency situations, take additional photographs within 24 hours of request.
3. Circumstances that could require additional photographs include, but are not limited to, the following:

a. Special events planned at Project site.
b. Immediate follow-up when on-site events result in construction damage or losses.
c. Photographs to be taken at fabrication locations away from Project site. These photographs are not subject to unit prices or unit-cost allowances.
d. Substantial Completion of a major phase or component of the Work.
e. Extra record photographs at time of final acceptance.
f. Owner's request for special publicity photographs.

END OF SECTION 013233

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

1. Submittals for Special Systems, required by the Authority(s) Having Jurisdiction, are not exempt, from the requirements of this Section.

B. All documents transmitted for the purpose of administration among team members shall be through the project management software **PROCORE (www.procore.com)** The Contractors use of this software shall be discussed at the pre-construction meeting.

C. Besides submittals for review, information, and closeout, this procedure applies to requests for information (RFIs), progress documentation, contract modification documents, supplementary instructions, change proposals, change orders, applications for payment, field reports and meeting minutes, and any other document any participant wishes to make part of the project record.

D. Contractor and Architect is required to use this service.

E. It is the contractors responsibility to submit documents in PDF format. All documents submitted to the architect shall first be review by the contractor and shall carry the contractors approval stamp indicating compliance with the Contract Documents.

F. Users of the service need an email address, internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat).

G. PAPER document transmittals **will not** be reviewed; emailed PDF documents **will not** be reviewed. Provide paper submittals when required to submit fire alarm or sprinkler shop drawings that will be submitted to the Fire Marshal.

H. All other submittal and document transmission procedures apply, except that electronic document requirement will not apply to samples or color selection charts.

I. The service will be at no cost.

J. Submittal Service: The selected service is PROCORE - (866) 477-6267, www.procore.com.

K. Training one, one hour web-based training session will be arranged for all participants, with representatives of TBA Studio and contractor participating, further training is the responsibility of the user of the service.

L. Project Closeout: TBA Studio will determine when to terminate the service for the project and is responsible for obtaining archive copies of the files..

M. Related Requirements:

1. Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
2. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
3. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
4. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.2 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's and Construction Manager's responsive action.

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's and Construction Manager's responsive action. Submittals may be rejected for not complying with requirements.

1.3 ACTION SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect[and Construction Manager] and additional time for handling and reviewing submittals required by those corrections.

1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Architect's Digital Data Files: Electronic copies of digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals as noted below.

1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project record drawings.

B. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.

a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).

3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect and Construction Manager.
4. Transmittal Form for Electronic Submittals: Use software-generated form from PROCORE (www.procore.com), containing the following information:

    a. Project name.
    b. Date.
    c. Name and address of Architect.
    d. Name of Construction Manager.
    e. Name of Contractor.
    f. Name of firm or entity that prepared submittal.
    g. Names of subcontractor, manufacturer, and supplier.
    h. Category and type of submittal.
    i. Submittal purpose and description.
    j. Specification Section number and title.
    k. Specification paragraph number or drawing designation and generic name for each of multiple items.
    l. Drawing number and detail references, as appropriate.
    m. Location(s) where product is to be installed, as appropriate.
    n. Related physical samples submitted directly.
    o. Indication of full or partial submittal.
    p. Transmittal number, numbered consecutively.
    q. Submittal and transmittal distribution record.
    r. Other necessary identification.
    s. Remarks.

5. Metadata: Include the following information as keywords in the electronic submittal file metadata:

    a. Project name.
    b. Number and title of appropriate Specification Section.
    c. Manufacturer name.
    d. Product name.

C. Options: Identify options requiring selection by Architect.

D. Deviations: Identify deviations from the Contract Documents on submittals.

E. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Architect's[and Construction Manager's] action stamp.

F. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

G. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's and Construction Manager' action stamp.

H.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements:

1. Send electronic submittals as PDF electronic files directly to Architect and /or Construction Manager specifically established for Project.

    a. Architect, through Construction Manager, will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

2. Submit electronic submittals via email as PDF electronic files.

    a. Architect, through Construction Manager, will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

3. Action Submittals: Submit three paper copies of each submittal unless otherwise indicated. Architect, through Construction Manager, will return two copies.
4. Informational Submittals: Submit two paper copies of each submittal unless otherwise indicated. Architect and Construction Manager will not return copies.
5. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

    a. Provide a digital signature with digital certificate on electronically-submitted certificates and certifications where indicated.
    b. Provide a notarized statement on original paper copy certificates and certifications where indicated.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

    a. Manufacturer's catalog cuts.
    b. Manufacturer's product specifications.
    c. Standard color charts.
    d. Statement of compliance with specified referenced standards.

e. Testing by recognized testing agency.
f. Application of testing agency labels and seals.
g. Notation of coordination requirements.
h. Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:

a. Wiring diagrams showing factory-installed wiring.
b. Printed performance curves.
c. Operational range diagrams.
d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before or concurrent with Samples.
6. Submit Product Data in the following format:

a. PDF electronic file.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal based on Architect's digital data drawing files is otherwise permitted.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

a. Identification of products.
b. Schedules.
c. Compliance with specified standards.
d. Notation of coordination requirements.
e. Notation of dimensions established by field measurement.
f. Relationship and attachment to adjoining construction clearly indicated.
g. Seal and signature of professional engineer if specified.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm), but no larger than 24 by 36 inches (914 by 607).
3. Submit Shop Drawings in the following format:

a. PDF electronic file.
b. Three opaque copies of each submittal. Architect and Construction Manager will retain one copy; remainder will be returned.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:

a. Generic description of Sample.

b. Product name and name of manufacturer.
c. Sample source.
d. Number and title of applicable Specification Section.

3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

   a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
   b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

   a. Number of Samples: Submit one full set of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect, through Construction Manager, will return submittal with options selected.

6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

   a. Number of Samples: Submit three sets of Samples. Architect and Construction Manager will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record sample.

      1) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three number sets of paired units that show approximate limits of variations.

E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Submit product schedule in the following format:

   a. PDF electronic file.
   b. Three paper copies of product schedule or list unless otherwise indicated. Architect, through Construction Manager, will return two copies.

F. Coordination Drawings Submittals: Comply with requirements specified in Section 013100 "Project Management and Coordination."

G. Contractor's Construction Schedule: Comply with requirements specified in Section 013200 "Construction Progress Documentation."

H. Application for Payment and Schedule of Values: Comply with requirements specified in Section 012900 "Payment Procedures.

I. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014000 "Quality Requirements."

J. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017700 "Closeout Procedures."

K. Maintenance Data: Comply with requirements specified in Section 017823 "Operation and Maintenance Data."

L. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

M. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

N. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

O. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

P. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

Q. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

R. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

S. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

T. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.

U. Schedule of Tests and Inspections: Comply with requirements specified in Section 014000 "Quality Requirements."

V. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

W. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

X. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

Y. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file and three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections

and field dimensions. Mark with approval stamp before submitting to Architect and Construction Manager.

B. Project Closeout and Maintenance Material Submittals: See requirements in Section 017700 "Closeout Procedures."

C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S AND CONSTRUCTION MANAGER'S ACTION

A. General: Architect and Construction Manager will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Architect and Construction Manager will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect or Construction Manager will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.

C. Informational Submittals: Architect and Construction Manager will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect and Construction Manager will forward each submittal to appropriate party.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 013300

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
2. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, Construction Manager, or authorities having jurisdiction are not limited by provisions of this Section.
3. Specific test and inspection requirements are not specified in this Section.

1.2 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect or Construction Manager.

C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

1. Laboratory Mockups: Full-size physical assemblies constructed at testing facility to verify performance characteristics.

D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.3 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.4 INFORMATIONAL SUBMITTALS

A. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:

1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Architect.

2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Architect.

B. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

1.5 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and re-inspecting.

B. Manufacturer's Field Reports: Prepare written information documenting tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
4. Results of operational and other tests and a statement of whether observed performance complies with requirements.
5. Other required items indicated in individual Specification Sections.

C. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.6 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or products that are similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Manufacturer's Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

1. Contractor responsibilities include the following:

a. Provide test specimens representative of proposed products and construction.
b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
c. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.

d. When testing is complete, remove test specimens, assemblies, mockups and laboratory mockups; do not reuse products on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, through Construction Manager, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

J. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect or Construction Manager.
2. Notify Architect and Construction Manager seven days in advance of dates and times when mockups will be constructed.
3. Demonstrate the proposed range of aesthetic effects and workmanship.
4. Obtain Architect's and Construction Manager's approval of mockups before starting work, fabrication, or construction.

a. Allow seven days for initial review and each re-review of each mockup.

5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
6. Demolish and remove mockups when directed unless otherwise indicated.

K. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Specification Sections.

1.7 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a manufacturer's representative to observe and inspect the Work. Manufacturer's representative's services include examination of substrates and conditions, verification of materials, inspection of completed portions of the Work, and submittal of written reports.

D. Retesting/Re-inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and re-inspecting, for construction that replaced Work that failed to comply with the Contract Documents.

E. Testing Agency Responsibilities: Cooperate with Architect, Construction Manager, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect, Construction Manager, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.8 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified testing agency or special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner and as follows:

B. Special Tests and Inspections: Conducted by a qualified testing agency or special inspector as required by authorities having jurisdiction, as indicated in individual Specification Sections and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.
2. Notifying Construction Manager and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect, through Construction Manager, with copy to Contractor and to authorities having jurisdiction.
4. Submitting of a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and re-inspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's and Construction Manager's reference during normal working hours.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.2 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.3 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

1. AABC - Associated Air Balance Council; www.aabc.com.
2. AAMA - American Architectural Manufacturers Association; www.aamanet.org.
3. AAPFCO - Association of American Plant Food Control Officials; www.aapfco.org.
4. AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
5. AATCC - American Association of Textile Chemists and Colorists; www.aatcc.org.
6. ABMA - American Bearing Manufacturers Association; www.americanbearings.org.
7. ACI - American Concrete Institute; (Formerly: ACI International); www.concrete.org.
8. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
9. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
10. AF&PA - American Forest & Paper Association; www.afandpa.org.
11. AGA - American Gas Association; www.aga.org.
12. AHAM - Association of Home Appliance Manufacturers; www.aham.org.
13. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
14. AI - Asphalt Institute; www.asphaltinstitute.org.
15. AIA - American Institute of Architects (The); www.aia.org.
16. AISC - American Institute of Steel Construction; www.aisc.org.
17. AISI - American Iron and Steel Institute; www.steel.org.
18. AITC - American Institute of Timber Construction; www.aitc-glulam.org.
19. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
20. ANSI - American National Standards Institute; www.ansi.org.
21. AOSA - Association of Official Seed Analysts, Inc.; www.aosaseed.com.
22. APA - APA - The Engineered Wood Association; www.apawood.org.
23. APA - Architectural Precast Association; www.archprecast.org.
24. API - American Petroleum Institute; www.api.org.
25. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
26. ARI - American Refrigeration Institute; (See AHRI).
27. ARMA - Asphalt Roofing Manufacturers Association; www.asphaltroofing.org.
28. ASCE - American Society of Civil Engineers; www.asce.org.
29. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
30. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
31. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
32. ASSE - American Society of Safety Engineers (The); www.asse.org.
33. ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.

34. ASTM - ASTM International; (American Society for Testing and Materials International); www.astm.org.
35. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.
36. AWEA - American Wind Energy Association; www.awea.org.
37. AWI - Architectural Woodwork Institute; www.awinet.org.
38. AWMAC - Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.
39. AWPA - American Wood Protection Association; (Formerly: American Wood-Preservers' Association); www.awpa.com.
40. AWS - American Welding Society; www.aws.org.
41. AWWA - American Water Works Association; www.awwa.org.
42. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
43. BIA - Brick Industry Association (The); www.gobrick.com.
44. BICSI - BICSI, Inc.; www.bicsi.org.
45. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); www.bifma.com.
46. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
47. BOCA - BOCA; (Building Officials and Code Administrators International Inc.); (See ICC).
48. BWF - Badminton World Federation; (Formerly: International Badminton Federation); www.bwfbadminton.org.
49. CDA - Copper Development Association; www.copper.org.
50. CEA - Canadian Electricity Association; www.electricity.ca.
51. CEA - Consumer Electronics Association; www.ce.org.
52. CFFA - Chemical Fabrics & Film Association, Inc.; www.chemicalfabricsandfilm.com.
53. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
54. CGA - Compressed Gas Association; www.cganet.com.
55. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
56. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
57. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
58. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
59. CPA - Composite Panel Association; www.pbmdf.com.
60. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
61. CRRC - Cool Roof Rating Council; www.coolroofs.org.
62. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
63. CSA - Canadian Standards Association; www.csa.ca.
64. CSA - CSA International; (Formerly: IAS - International Approval Services); www.csa-international.org.
65. CSI - Construction Specifications Institute (The); www.csinet.org.
66. CSSB - Cedar Shake & Shingle Bureau; www.cedarbureau.org.
67. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.cti.org.
68. CWC - Composite Wood Council; (See CPA).
69. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
70. DHI - Door and Hardware Institute; www.dhi.org.
71. ECA - Electronic Components Association; www.ec-central.org.
72. ECAMA - Electronic Components Assemblies & Materials Association; (See ECA).
73. EIA - Electronic Industries Alliance; (See TIA).
74. EIMA - EIFS Industry Members Association; www.eima.com.
75. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
76. ESD - ESD Association; (Electrostatic Discharge Association); www.esda.org.

77. ESTA - Entertainment Services and Technology Association; (See PLASA).
78. EVO - Efficiency Valuation Organization; www.evo-world.org.
79. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); www.fiba.com.
80. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.
81. FM Approvals - FM Approvals LLC; www.fmglobal.com.
82. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
83. FRSA - Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.; www.floridaroof.com.
84. FSA - Fluid Sealing Association; www.fluidsealing.com.
85. FSC - Forest Stewardship Council U.S.; www.fscus.org.
86. GA - Gypsum Association; www.gypsum.org.
87. GANA - Glass Association of North America; www.glasswebsite.com.
88. GS - Green Seal; www.greenseal.org.
89. HI - Hydraulic Institute; www.pumps.org.
90. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
91. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
92. HPVA - Hardwood Plywood & Veneer Association; www.hpva.org.
93. HPW - H. P. White Laboratory, Inc.; www.hpwhite.com.
94. IAPSC - International Association of Professional Security Consultants; www.iapsc.org.
95. IAS - International Approval Services; (See CSA).
96. ICBO - International Conference of Building Officials; (See ICC).
97. ICC - International Code Council; www.iccsafe.org.
98. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
99. ICPA - International Cast Polymer Alliance; www.icpa-hq.org.
100. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
101. IEC - International Electrotechnical Commission; www.iec.ch.
102. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
103. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); www.ies.org.
104. IESNA - Illuminating Engineering Society of North America; (See IES).
105. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
106. IGMA - Insulating Glass Manufacturers Alliance; www.igmaonline.org.
107. IGSHPA - International Ground Source Heat Pump Association; www.igshpa.okstate.edu.
108. ILI - Indiana Limestone Institute of America, Inc.; www.iliai.com.
109. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
110. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
111. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
112. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
113. ISO - International Organization for Standardization; www.iso.org.
114. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
115. ITU - International Telecommunication Union; www.itu.int/home.
116. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
117. LMA - Laminating Materials Association; (See CPA).
118. LPI - Lightning Protection Institute; www.lightning.org.

119. MBMA - Metal Building Manufacturers Association; www.mbma.com.
120. MCA - Metal Construction Association; www.metalconstruction.org.
121. MFMA - Maple Flooring Manufacturers Association, Inc.; www.maplefloor.org.
122. MFMA - Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
123. MHIA - Material Handling Industry of America; www.mhia.org.
124. MIA - Marble Institute of America; www.marble-institute.com.
125. MMPA - Moulding & Millwork Producers Association; (Formerly: Wood Moulding & Millwork Producers Association); www.wmmpa.com.
126. MPI - Master Painters Institute; www.paintinfo.com.
127. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; www.mss-hq.org.
128. NAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.
129. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
130. NADCA - National Air Duct Cleaners Association; www.nadca.com.
131. NAIMA - North American Insulation Manufacturers Association; www.naima.org.
132. NBGQA - National Building Granite Quarries Association, Inc.; www.nbgqa.com.
133. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
134. NCMA - National Concrete Masonry Association; www.ncma.org.
135. NEBB - National Environmental Balancing Bureau; www.nebb.org.
136. NECA - National Electrical Contractors Association; www.necanet.org.
137. NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
138. NEMA - National Electrical Manufacturers Association; www.nema.org.
139. NETA - InterNational Electrical Testing Association; www.netaworld.org.
140. NFHS - National Federation of State High School Associations; www.nfhs.org.
141. NFPA - NFPA; (National Fire Protection Association); www.nfpa.org.
142. NFPA - NFPA International; (See NFPA).
143. NFRC - National Fenestration Rating Council; www.nfrc.org.
144. NHLA - National Hardwood Lumber Association; www.nhla.com.
145. NLGA - National Lumber Grades Authority; www.nlga.org.
146. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
147. NOMMA - National Ornamental & Miscellaneous Metals Association; www.nomma.org.
148. NRCA - National Roofing Contractors Association; www.nrca.net.
149. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
150. NSF - NSF International; (National Sanitation Foundation International); www.nsf.org.
151. NSPE - National Society of Professional Engineers; www.nspe.org.
152. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.
153. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
154. NWFA - National Wood Flooring Association; www.nwfa.org.
155. PCI - Precast/Prestressed Concrete Institute; www.pci.org.
156. PDI - Plumbing & Drainage Institute; www.pdionline.org.
157. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); www.plasa.org.
158. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
159. RFCI - Resilient Floor Covering Institute; www.rfci.com.
160. RIS - Redwood Inspection Service; www.redwoodinspection.com.
161. SAE - SAE International; (Society of Automotive Engineers); www.sae.org.
162. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
163. SDI - Steel Deck Institute; www.sdi.org.

164. SDI - Steel Door Institute; www.steeldoor.org.
165. SEFA - Scientific Equipment and Furniture Association; www.sefalabs.com.
166. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
167. SIA - Security Industry Association; www.siaonline.org.
168. SJI - Steel Joist Institute; www.steeljoist.org.
169. SMA - Screen Manufacturers Association; www.smainfo.org.
170. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
171. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
172. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
173. SPIB - Southern Pine Inspection Bureau; www.spib.org.
174. SPRI - Single Ply Roofing Industry; www.spri.org.
175. SRCC - Solar Rating and Certification Corporation; www.solar-rating.org.
176. SSINA - Specialty Steel Industry of North America; www.ssina.com.
177. SSPC - SSPC: The Society for Protective Coatings; www.sspc.org.
178. STI - Steel Tank Institute; www.steeltank.com.
179. SWI - Steel Window Institute; www.steelwindows.com.
180. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
181. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
182. TCNA - Tile Council of North America, Inc.; (Formerly: Tile Council of America); www.tileusa.com.
183. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.tema.org.
184. TIA - Telecommunications Industry Association; (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
185. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
186. TMS - The Masonry Society; www.masonrysociety.org.
187. TPI - Truss Plate Institute; www.tpinst.org.
188. TPI - Turfgrass Producers International; www.turfgrasssod.org.
189. TRI - Tile Roofing Institute; www.tileroofing.org.
190. UBC - Uniform Building Code; (See ICC).
191. UL - Underwriters Laboratories Inc.; www.ul.com.
192. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
193. USAV - USA Volleyball; www.usavolleyball.org.
194. USGBC - U.S. Green Building Council; www.usgbc.org.
195. USITT - United States Institute for Theatre Technology, Inc.; www.usitt.org.
196. WASTEC - Waste Equipment Technology Association; www.wastec.org.
197. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
198. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
199. WDMA - Window & Door Manufacturers Association; www.wdma.com.
200. WI - Woodwork Institute; (Formerly: WIC - Woodwork Institute of California); www.wicnet.org.
201. WMMPA - Wood Moulding & Millwork Producers Association; (See MMPA).
202. WSRCA - Western States Roofing Contractors Association; www.wsrca.com.
203. WPA - Western Wood Products Association; www.wwpa.org.

B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

1. DIN - Deutsches Institut fur Normung e.V.; www.din.de.
2. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
3. ICC - International Code Council; www.iccsafe.org.
4. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.

C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

1. COE - Army Corps of Engineers; www.usace.army.mil.
2. CPSC - Consumer Product Safety Commission; www.cpsc.gov.
3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
4. DOD - Department of Defense; http://dodssp.daps.dla.mil.
5. DOE - Department of Energy; www.energy.gov.
6. EPA - Environmental Protection Agency; www.epa.gov.
7. FAA - Federal Aviation Administration; www.faa.gov.
8. FG - Federal Government Publications; www.gpo.gov.
9. GSA - General Services Administration; www.gsa.gov.
10. HUD - Department of Housing and Urban Development; www.hud.gov.
11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; http://eetd.lbl.gov.
12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
13. SD - Department of State; www.state.gov.
14. TRB - Transportation Research Board; National Cooperative Highway Research Program; www.trb.org.
15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
17. USDJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
18. USP - U.S. Pharmacopeia; www.usp.org.
19. USPS - United States Postal Service; www.usps.com.

D. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list.

1. CFR - Code of Federal Regulations; Available from Government Printing Office; www.gpo.gov/fdsys.
2. DOD - Department of Defense; Military Specifications and Standards; Available from Department of Defense Single Stock Point; http://dodssp.daps.dla.mil.
3. DSCC - Defense Supply Center Columbus; (See FS).
4. FED-STD - Federal Standard; (See FS).
5. FS - Federal Specification; Available from Department of Defense Single Stock Point; http://dodssp.daps.dla.mil.

    a. Available from Defense Standardization Program; www.dsp.dla.mil.
    b. Available from General Services Administration; www.gsa.gov.

c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org/ccb.

6. MILSPEC - Military Specification and Standards; (See DOD).
7. USAB - United States Access Board; www.access-board.gov.
8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

E. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

1. CBHF - State of California; Department of Consumer Affairs; Bureau of Electronic Appliance and Repair, Home Furnishings and Thermal Insulation; www.bearhfti.ca.gov.
2. CCR - California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.calregs.com.
3. CDHS - California Department of Health Services; (See CDPH).
4. CDPH - California Department of Public Health; Indoor Air Quality Program; www.cal-iaq.org.
5. CPUC - California Public Utilities Commission; www.cpuc.ca.gov.
6. SCAQMD - South Coast Air Quality Management District; www.aqmd.gov.
7. TFS - Texas Forest Service; Forest Resource Development and Sustainable Forestry; http://txforestservice.tamu.edu.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

SECTION 01 45 00 – QUALITY CONTROL/LABORATORY TESTING

PART 1 – GENERAL

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A This section describes lab/testing work being contracted by the Owner under a separate agreement. This section also includes the requirements for Contractor cooperation and coordination, to facilitate execution of its required services. The Contractor's cooperation and coordination is part of his Contract requirements. Employment of a testing laboratory by the Owner shall in no way relieve the Contractor of his obligations to perform the Work of his Contract.

B Where a local building official requires special testing under Chapter 17 of IBC-2021 an approved agency will be employed by the Owner. Coordination by the Contractor is required.

1.2 RELATED DOCUMENTS:

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

B Inspections and testing required by laws, ordinances, rules, regulations, orders or approvals of public authorities: Sections 00 72 00 and 01 40 00.

1.3 QUALITY ASSURANCE:

A Qualifications of Laboratory: Testing Laboratory Services are to be provided by a laboratory qualified in accordance with ASTM E-329 "Standards of Recommended Practice for Inspection and Testing Agencies for Concrete and Steel as Used in Construction," meet "Recommended Requirements for Independent Laboratory Qualification," published by American Council of Independent Laboratories, for asbestos related testing, NVLAP approved and participation in the Pat Program, American Industrial Hygiene Associations and approved by the Architect.

B Qualifications of Personnel: For actual inspecting and testing, use only personnel who are thoroughly trained and experienced in necessary skills, completely familiar with requirements specified, pertinent portions of Contract Documents, and selected standard for inspecting and testing.

C Testing Equipment: Calibrated at reasonable intervals by devices of accuracy traceable to either National Bureau of Standards or accepted values of natural physical constants.

D Location: Authorized to operate in state in which Project is located.

E All manufacturer items, articles, materials, and equipment shall be applied, installed, connected, erected, made operative, cleaned, and conditioned as directed by the manufacturers. In case of conflict with the architect's directions, notify the architect in writing with a request for clarification.

F STANDARDS:

i References to various standards (such as ASTM, CRSI, etc.) shall mean the latest edition of the standard prior to the date of these specifications. The standard, by reference to it in these specifications, is made a part of these specifications as though it were written in full in the specifications.

ii If no reference is made to establish quality of the work, then the recommendation and standards of the established trade association will apply. In all case the Architect's judgment will be the final authority.

G COMPATIBLE MATERIALS: The Contractor shall report in writing to the Architect if any specified item or details are not compatible or if they do not interface correctly with adjacent materials. Failure to do so shall imply that the materials are compatible and meet with the approval of the manufacturer, supplier, applicator, installer, and contractor. Any defects or failures shall be corrected at no additional expense to the Owner or the Architect.

H ACCEPTANCE OF SURFACES: Starting work on a surface shall be the Contractor's acceptance of the surface as being suitable to receive the work. Any defect or failure due to unsuitable surfaces shall be corrected at no extra cost to the Owner or the Architect. Should any surface not be acceptable to receive work, the person responsible for applying work to the surface shall report it in writing to the Contractor who shall notify the Architect in writing, prior to starting work in said surface.

1.4 TESTING LABORATORY DUTIES:

A General: Cooperate with Owner, Architect and Contractor; provide qualified personnel and equipment after due notice.

B Tests: Perform specified inspections, sampling and testing of materials as follows:

i Comply with specified standards.

ii Ascertain compliance of materials with requirements of Contract Documents.

C Notification: Promptly notify Owner, Architect and Contractor in writing of observed irregularities or deficiencies of work or products.

D Additional Tests: Provide additional tests as required by Architect or Owner.

E Notice: Limitations of Authority of Testing Laboratory: Testing Laboratory is not authorized to release, revoke, alter or enlarge on requirements of Contract Documents; approve or accept any portion of Work; or perform any duties of Contractor.

F SUBMITTALS: General: Testing laboratory shall promptly submit two (2) copies of written reports of all tests and inspections to both Architect and Contractor. Each report shall include:

i Date issued.

ii Project title and number.

iii Testing laboratory name, address and telephone number.

iv Name and signature of laboratory inspector.

v Date and time of sampling or inspection.

vi Record of temperature and weather conditions.

vii Date of test.

viii Identification of product and specification section.

ix Location of sample or test in the Project.

x Type of test or inspection.

xi Results of tests and compliance with Contract Documents.

xii Interpretation of test results, when so requested by Architect.

1.5 CONTRACTOR'S RESPONSIBILITIES:

A General: Cooperate with Testing Laboratory personnel, provide access to work.

B Samples: Secure and deliver to Testing Laboratory adequate quantities of representational samples of materials proposed to be used and which require testing.

C Mix Designs: Contractor shall be responsible for all mix designs. Selection of and payment of services of a testing laboratory for mix designs shall be responsibility of Contractor. Contractor is required to submit to Architect following verified mix designs:

i Concrete Design Mix: In advance of concrete and reinforced masonry work, Contractor shall submit a concrete design mix for each strength and type of concrete indicated and/or specified.

D Product Tests: Furnish to Architect three (3) copies of any product test reports as specified in other sections.
E Labor and Facilities: Contractor shall furnish all incidental labor and facilities:
  i To provide access to Work to be tested.
  ii To obtain and handle samples at Project site or at source of products to be tested.
  iii To facilitate inspections and tests.
  iv For storage and curing of test samples.
F Material Sources: Advise Testing Laboratory of identity of material sources and instruct material suppliers to allow tests or inspections by Laboratory.
G Notification: Notify Testing Laboratory sufficiently in advance of operations to allow for Testing Laboratory assignment of personnel and scheduling of tests or inspections.
H Note: Contractor shall reimburse OWNER for all tests conducted by Testing Laboratory hired by Owner that fail to meet requirements of Contract Documents. Contractor shall also reimburse OWNER for all schedule tests that are cancelled when a Testing Laboratory field crew is on site at time that particular test is cancelled.

1.6 REJECTION OF MATERIALS OR INSTALLATION:
A General: Testing Laboratory shall notify in writing Owner, Architect and Contractor or Contractor's authorized representative of any material or installation which are not in full compliance with the Contract Documents.

1.7 TESTS AND INSPECTIONS REQUIRED:
A General: Laboratory shall conduct tests and inspections as directed by Owner or Architect or Engineer.
B Tests: Following tests and inspections that may be conducted by Testing Laboratory are listed below for Contractors general information only; however, in no way is it suggested that tests or inspections by Testing Laboratory are limited to those listed herein.
C SOILS TESTS:
  i Required Tests: Provide soils tests and inspections as follows for earthwork specified in Section 31 23 20 Earthwork for Structures as indicated:
    a Classification, compaction, and complete field supervision of fill operations. (Full time inspection)
    b Minimum number soils tests to be made:
      b.1) One (1) Proctor Curve for natural ground and each change in natural ground material.
      b.2) One (1) Proctor Curve for each change in fill material.
      b.3) One (1) compaction test for each 200 square yards of natural ground and for each 200 square yards of each lift of fill material.
    c Note: Refer to soil compaction requirements as noted in Section 31 23 20.
D CONCRETE TESTS:
  i Required Tests: Provide concrete tests and inspections as follows for concrete work specified in Section 03 30 00 "Cast-In-Place Concrete" and as indicated:
  ii Inspection: Prior to concrete placement, inspect forms, rebar count and location, inserts and other embedded items for general conformance with requirements of Drawings and Specifications.
    a Samples: Sample concrete for slump, temperature and strength as follows:
      a.1) Samples per ASTM C-172.
      a.2) Cylinders per ASTM C-31 and ASTM C-39.
      a.3) Slump per ASTM C-143.
    b Number of Strength Tests:
      b.1) One each days concrete placement greater than five (5) cubic yards;

b.2) One per 25 to 50 cubic yards; one minimum representative of each concrete element such as footings, slabs, beams, walls, columns, etc. and special major placements such as vaults.

c Number of Cylinder per Tests: Three (3) cylinders per test.

d Test Procedure: Job cure cylinders for 7 days, transfer to Testing Laboratory and break one cylinder for 7 day strength; Laboratory cure remaining cylinders to be broken for 28 day strength.

e Test Reports: Test reports shall indicate date of placement and date of breaks, location of placement, mix and strength, air and concrete temperature, slump, results of compression test, amount of water added at Project site.

1.8 Special Inspections

A STRUCTURAL STEEL TESTS: Provide tests and inspections as follows for structural steel, steel joist and girders, and metal deck work specified in Sections 05 12 23, 05 21 19, and 05 31 00 and as indicated:

Verification and Inspection	Frequency	Reference Standard
1. Material verification of high strength bolts, nuts and washers:		
a. Identification markings to conform to ASTM standards specified in the approved construction documents.	Periodic	AISC 360, Section A3.3 and applicable ASTM Standards
b. Manufacturer's certificate of compliance required.	Periodic	
2. Inspection of high strength bolting:		
a. Snug-tight joints	Periodic	AISC 360, Section M2.5 and IBC 1704.3.3
b. Pretensioned and slip-critical joints using turn-of-nut with matchmarking, twist-off bolt or direct tension indicator methods of installation.	Periodic.	
c. Pretensioned and slip-critical joints using turn-of-nut without matchmarking or calibrated wrench methods of installation.	Continuous.	
3. Material verification of structural steel and cold-formed steel deck:		
a. For structural steel, identification markings to conform to AISC 360.	Periodic.	AISC 360, Section M5.5
b. For other steel, identification markings to conform to ASTM standards specified in the approved construction documents.	Periodic.	Applicable ASTM material standards
c. Manufacturer's certified test reports.	Periodic.	
4. Material verification of weld filler materials:		
a. Identification markings to conform to AWS specification in the approved construction document.	Periodic.	AISC 360, Section A3.5 and applicable AWS A5 documents.
b. Manufacturer's certificate of compliance required.	Periodic.	

5. Inspection of welding:		
a. Structural steel and cold-formed steel deck:		
1) Complete and partial penetration groove welds.	Continuous.	AWS D1.1 and IBC 1704.3.1
2) Multipass fillet welds.	Continuous.	
3) Single-pass fillet welds >5/16”.	Continuous.	
4) Plug and slot welds.	Continuous.	
5) Single-pass fillet welds<=5/16”.	Periodic.	
6) Floor and roof deck welds.	Periodic.	AWS D1.3
b. Reinforcing Steel.		
1) Verification of weldability of reinforcing steel other than ASTM A706.	Periodic.	AWS D1.4 and ACI 318: Section 3.5.2.
2) Reinforcing steel resisting flexural and axial forces in intermediate and special moment frames, and boundary elements of special structural walls of concrete and shear reinforcement.	Continuous.	
3) Shear reinforcement.	Continuous.	
4) Other reinforcing steel.	Periodic.	
6. Inspection of steel frame joint details for compliance:		
a. Details such as bracing and stiffening.	Periodic.	IBC 1704.3.2
b. Member locations.	Periodic.	
c. Application of joint details at each connection.	Periodic.	

Inspection of fabricated items shall be required unless the fabricator is is approved by the Building Official to perform work without special inspections.

B CONCRETE TESTING: Provide tests and inspections as follows for concrete work as specified in Sections 03 33 00 and as indicated:

Verification and Inspection	Frequency	Reference Standard
1 Inspection of reinforcing steel, size and placement.	Periodic	ACI 318: 3.5, 7.1-7.7; IBC 1913.4
2 Inspection of drilled piers:	Continuous During Task	IBC 1704.9
a. Observe drilling operations and maintain complete and accurate records for each element.		
b. `Verify placement locations and plumbness, confirm element diameters, bell diameters (if applicable), lengths, embedment into bedrock (if applicable) and adequate end bearing strata capacity. Record concrete or grout volumes.		

3 Inspection of reinforcing steel welding:		
a. Verification of weldability of reinforcing Steel other than ASTM A706.	Periodic	AWS D1.4, ACI 318: 3.5.2
b. Shear reinforcement	Continuous	
c. Other reinforcing steel.	Periodic	
4. Inspection of bolts to be installed in concrete prior to and during placement.	Continuous	ACI 318: 8.1.3, 21.2.8; IBC 1911.5, 1912.1.
5. Inspection of anchors installed in hardened concrete.	Periodic	ACI 318: 3.8.6, 8.1.3, 21.2.8; IBC 1912.1
6. Verify use of required design mix	Periodic	ACI 318: CH 4, 5.2-5.4; IBC 1904.3, 1913.2, 1913.3
7. At the time fresh concrete is sampled to fabricate specimens for strength tests, perform slump and air content tests, and determine the temperature of the concrete.	Continuous	ASTM: C 172, C 31; ACI 318: 5.6, 5.8; IBC 1913.10
8. Inspection of concrete placement for proper application techniques.	Continuous	ACI 318: 5.9, 5.10; IBC 1913.6, 1913.7, 1913.8
9. Inspection for maintenance of specified curing temperature and techniques.	Periodic	ACI 318: 5.11-5.13; IBC 1913.9
10. Erection of precast concrete members	Periodic	ACI 318: Ch 16
11. Inspect formwork for shape, location and dimensions of the concrete member being formed.	Periodic	ACI 318: 6.1.1

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION – 01 45 00

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Requirements:

1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.

1.2 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, testing agencies, and authorities having jurisdiction.

B. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

C. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.3 INFORMATIONAL SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

B. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

C. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire prevention program.

1.4 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

C. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.5 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS FOR TEMPORARY FACILITIES

A. Chain-Link Fencing: Minimum 2-inch, 0.148-inch thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch OD line posts and 2-7/8-inch OD corner and pull posts, with 1-5/8-inch OD top rails.

B. Portable Chain-Link Fencing: Minimum 2-inch, 0.148-inch thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch OD line posts and 2-7/8-inch OD corner and pull posts, with 1-5/8-inch OD top and bottom rails. Provide concrete or galvanized-steel bases for supporting posts.

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Securable/Lockable prefabricated or mobile units with adequate space & amenities for review of construction drawings, by the Construction Manager & up to 3 other persons, and foundations adequate for normal loading.

B. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

2.3 EQUIPMENT FOR TEMPORARY FACILITIES

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.

2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.

D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

1. Toilets: Use of Owner's existing toilet facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

E. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

G. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

1. Install electric power service underground unless otherwise indicated.

H. Telephone Service:

1. Provide superintendent with cellular telephone for use at and when away from field office.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas as indicated on Drawings.

1. Provide dust-control treatment that is nonpolluting and non-tracking. Reapply treatment as required to minimize dust.

C. Temporary Use of Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.

1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
2. Prepare sub-grade and install sub-base and base for temporary roads and paved areas according to Section 312000 "Earth Moving."
3. Recondition base after temporary use, including removing contaminated material, re-grading, proof-rolling, compacting, and testing.
4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Section 321216 "Asphalt Paving."

D. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

E. Parking: Provide temporary or Use designated areas of Owner's existing parking areas for construction personnel as approved by owner prior to starting construction.

F. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

G. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.

1. Identification Signs: Provide Project identification signs as indicated on Drawings.
2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.

a. Provide temporary, directional signs for construction personnel and visitors.

3. Maintain and touchup signs so they are legible at all times.

H. Waste Disposal Facilities: Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

I. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 017300 "Execution."

J. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

K. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

L. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

C. Temporary Erosion and Sedimentation Control: Comply with[requirements of 2003 EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent and] requirements specified in Section 311000 "Site Clearing."

D. Storm-water Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of storm-water from heavy rains.

E. Tree and Plant Protection: Comply with requirements specified in Section 015639 "Temporary Tree and Plant Protection."

F. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.

G. Site Enclosure Fence: Before construction operations begin and Prior to commencing earthwork, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.

1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.

H. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.

I. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

J. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weather-tight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.
2. Construct dustproof partitions with two layers of 6-mil polyethylene sheet on each side. Cover floor with two layers of 6-mil polyethylene sheet, extending sheets 18 inches up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant-treated plywood.

    a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches between doors. Maintain water-dampened foot mats in vestibule.

3. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
4. Insulate partitions to control noise transmission to occupied areas.
5. Seal joints and perimeter. Equip partitions with gasketed, dustproof doors and security locks where openings are required.
6. Protect air-handling equipment.
7. Provide walk-off mats at each entrance through temporary partition.

K. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire prevention program.

1. Prohibit smoking in construction areas.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.

B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect materials from water damage and keep porous and organic materials from coming into prolonged contact with concrete.

C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:

1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
2. Keep interior spaces reasonably clean and protected from water damage.
3. Discard or replace water-damaged and wet material.
4. Discard, replace, or clean stored or installed material that begins to grow mold.
5. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:

1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Remove materials that cannot be completely restored to their manufactured moisture level within 48 hours.

3.6 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000

SECTION 015639 - TEMPORARY TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction.

1.2 DEFINITIONS

A. Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, and defined by a circle concentric with each tree with a radius 1.5 times the diameter of the drip line unless otherwise indicated.

1.3 INFORMATIONAL SUBMITTALS

A. Existing Conditions: Documentation of existing trees and plantings indicated to remain, which establishes preconstruction conditions that might be misconstrued as damage caused by construction activities.

1.4 PROJECT CONDITIONS

A. The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

B. Do not direct vehicle or equipment exhaust toward protection zones.

C. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Protection-Zone Fencing: Fencing fixed in position and meeting the following requirements.

1. Plastic Protection-Zone Fencing: Plastic construction fencing constructed of high-density extruded and stretched polyethylene fabric with 2-inch maximum opening in pattern and supported by tubular or T-shape galvanized-steel posts spaced not more than 8 feet apart. High-visibility orange color, non-fading.
2. Height of Fencing: 4 feet.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.

3.2 PROTECTION ZONES

A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones in a manner that will prevent people from easily entering protected area except by entrance gates.

1. Posts: Set or drive posts into ground one-third the total height of the fence without concrete footings. Where a post is located on existing paving or concrete to remain, provide appropriate means of post support acceptable to Architect.

B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect.

C. Maintain protection-zone fencing and signage in good condition as acceptable to Architect and remove when construction operations are complete and equipment has been removed from the site.

3.3 EXCAVATION

A. Trenching near Trees: Where utility trenches are required within protection zones, hand excavate under or around tree roots or tunnel under the roots by drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots as required for root pruning.

B. Do not allow exposed roots to dry out before placing permanent backfill.

3.4 ROOT PRUNING

A. Prune roots that are affected by temporary and permanent construction. Prune roots as follows:

1. Cut roots manually by digging a trench and cutting exposed roots with sharp pruning instruments; do not break, tear, chop, or slant the cuts. Do not use a backhoe or other equipment that rips, tears, or pulls roots.

2. Temporarily support and protect roots from damage until they are permanently covered with soil.
3. Cover exposed roots with burlap and water regularly.
4. Backfill as soon as possible according to requirements in Section 312000 "Earth Moving."

B. Root Pruning at Edge of Protection Zone: Prune roots by cleanly cutting all roots to the depth of the required excavation.

C. Root Pruning within Protection Zone: Clear and excavate by hand to the depth of the required excavation to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.

3.5 REGRADING

A. Lowering Grade: Where new finish grade is indicated below existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

B. Raising Grade: Where new finish grade is indicated above existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

C. Minor Fill within Protection Zone: Where existing grade is 2 inches or less below elevation of finish grade, fill with topsoil. Place topsoil in a single un-compacted layer and hand grade to required finish elevations.

3.6 FIELD QUALITY CONTROL

A. Inspections: Engage a qualified arborist to direct plant-protection measures in the vicinity of trees, shrubs, and other vegetation indicated to remain and to prepare inspection reports.

3.7 REPAIR AND REPLACEMENT

A. General: Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect.

1. Perform repairs within 24 hours.
2. Replace vegetation that cannot be repaired and restored to full-growth status, as determined by Architect.

3.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove excess excavated material, displaced trees, trash and debris, and legally dispose of them off Owner's property.

END OF SECTION 015639

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Requirements:

1. Section 012500 "Substitution Procedures" for requests for substitutions.

1.2 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.3 ACTION SUBMITTALS

A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor **through Construction Manager** of approval or rejection of proposed comparable product request within **15** days of receipt of request, or **seven** days of receipt of additional information or documentation, whichever is later.

    a. Form of Approval: As specified in Section 013300 "Submittal Procedures."
    b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300 "Submittal Procedures." Show compliance with requirements.

1.4 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

B. Under no circumstances shall any materials containing asbestos be used in this project. The contractor shall provide documentation verifying that all materials supplied are asbestos-free, in accordance with local, state, and federal regulations.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.

4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.

1.6 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturers' disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. Refer to other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.

5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
3. Products:

    a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience **will** be considered **unless otherwise indicated**.
    b. Non-restricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.

4. Manufacturers:

    a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience **will** be considered **unless otherwise indicated**.
    b. Non-restricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.

5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Coordination of Owner-installed products.
6. Progress cleaning.
7. Starting and adjusting.
8. Protection of installed construction.

B. Related Requirements:

1. Section 011000 "Summary" for limits on use of Project site.
2. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
3. Section 078413 "Penetration Firestopping" for patching penetrations in fire-rated construction.

1.2 INFORMATIONAL SUBMITTALS

A. Certificates: Submit certificate signed by land surveyor or professional engineer certifying that location and elevation of improvements comply with requirements.

B. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

C. Certified Surveys: Submit two copies signed by land surveyor or professional engineer.

D. Final Property Survey: Submit 10 copies showing the Work performed and record survey data.

1.3 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection

2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.

3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.

4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to local utility or Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect and Construction Manager promptly.

B. General: Engage a land surveyor or professional engineer] to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish limits on use of Project site.

3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
4. Inform installers of lines and levels to which they must comply.
5. Check the location, level and plumb, of every major element as the Work progresses.
6. Notify Construction Manager when deviations from required lines and levels exceed allowable tolerances.
7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect and Construction Manager.

3.4 FIELD ENGINEERING

A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.

C. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and site-work.

D. Final Property Survey: Engage a land surveyor or professional engineer to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor or professional engineer, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.

1. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize or prevent interruption to occupied areas.

G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry : Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.

2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.8 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements"

3.9 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 017300

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for the following:
   1. Disposing of nonhazardous demolition and construction waste.

B. Related Requirements:

   1. Section 042113 "Brick Masonry" for disposal requirements for masonry waste.
   2. Section 311000 "Site Clearing" for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.

1.2 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

1.3 INFORMATIONAL SUBMITTALS

A. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

1.4 WASTE MANAGEMENT PLAN

A. General: Develop a waste management plan according to ASTM E 1609 and requirements in this Section. Plan shall consist of waste identification, and cost/revenue analysis. Distinguish between demolition and construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

   1. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.

PRODUCTS (Not Used)

PART 2 - EXECUTION

2.1 PLAN IMPLEMENTATION

A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

B. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
   1. Comply with Section 015000 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

2.2 DISPOSAL OF WASTE

A. General: Remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

   1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
   2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Remove waste materials and dispose of at designated spoil areas on Owner's property.

D. Disposal: Remove waste materials from Owner's property and legally dispose of them.

END OF SECTION 017419

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.
5. Repair of the Work.

B. Related Requirements:

1. Section 013233 "Photographic Documentation" for submitting final completion construction photographic documentation.
2. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
3. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
4. Section 017900 "Demonstration and Training" for requirements for instructing Owner's personnel.

1.2 ACTION SUBMITTALS

A. Product Data: For cleaning agents.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.3 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

C. Field Report: For pest control inspection.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.5 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect or Construction Manager. Label with manufacturer's name and model number where applicable.

    a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Architect's or Construction Manager's signature for receipt of submittals.

5. Submit test/adjust/balance records.
6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
3. Complete startup and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
6. Advise Owner of changeover in heat and other utilities.
7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.

9. Complete final cleaning requirements, including touchup painting.
10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect and Construction Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.6 FINAL COMPLETION PROCEDURES

A. Preliminary Procedures: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Section 012900 "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report and warranty.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection to determine acceptance. On receipt of request, Architect and Construction Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.7 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction. Use CSI Form 14.1A.

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Submit list of incomplete items in the following format:

    a. PDF electronic file. Architect[, through Construction Manager,] will return annotated copy.

1.8 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Remove snow and ice to provide safe access to building.
f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
h. Sweep concrete floors broom clean in unoccupied spaces.
i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
k. Remove labels that are not permanent.
l. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
o. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
p. Leave Project clean and ready for occupancy.

C. Pest Control: Comply with pest control requirements in Section 015000 "Temporary Facilities and Controls." Prepare written report.

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.

    a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 017700

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Emergency manuals.
3. Operation manuals for systems, subsystems, and equipment.
4. Product maintenance manuals.
5. Systems and equipment maintenance manuals.

1.2 CLOSEOUT SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. Architect will comment on whether content of operations and maintenance submittals are acceptable.
2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operations and maintenance manuals in the following format:

1. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Architect, through Construction Manager, will return two copies.

C. Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.

1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information.

B. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

C. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Construction Manager.
7. Name and contact information for Architect.
8. Name and contact information for Commissioning Authority.
9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
10. Cross-reference to related systems in other operation and maintenance manuals.

D. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

E. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf, post-type binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

a. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
4. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

    a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
    b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.2 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:

1. Type of emergency.
2. Emergency instructions.
3. Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

1. Fire.
2. Flood.
3. Gas leak.
4. Water leak.
5. Power failure.
6. Water outage.
7. System, subsystem, or equipment failure.
8. Chemical release or spill.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include the following, as applicable:

1. Instructions on stopping.
2. Shutdown instructions for each type of emergency.
3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

2.3 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
2. Performance and design criteria if Contractor is delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.4 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins.

2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training video recording, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

C. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

D. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

E. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1. Do not use original project record documents as part of operation and maintenance manuals.

F. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.

B. Related Requirements:

1. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.2 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit one set of marked-up record prints.
2. Number of Copies: Submit copies of record Drawings as follows:

a. Initial Submittal:

1) Submit one paper-copy set of marked-up record prints.
2) Submit PDF electronic files of scanned record prints and one set of file prints.
3) Submit record digital data files and one set of plots.
4) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.

b. Final Submittal:

1) Submit three paper-copy sets of marked-up record prints.
2) Submit PDF electronic files of scanned record prints and three sets of prints.
3) Print each drawing, whether or not changes and additional information were recorded.

B. Record Specifications: Submit one paper copy and annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit one paper copy and annotated PDF electronic files and directories of each submittal.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised Drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
b. Record data as soon as possible after obtaining it.
c. Record and check the markup before enclosing concealed installations.

2. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
3. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
4. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Construction Manager. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:

1. Format: Same digital data software program, version, and operating system as the original Contract Drawings.
2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
3. Refer instances of uncertainty to Architect through Construction Manager for resolution.
4. Architect will furnish Contractor one set of digital data files of the Contract Drawings for use in recording information.

C. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Format: Annotated PDF electronic file with comment function enabled.
3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
4. Identification: As follows:

a. Project name.

b. Date.
c. Designation "PROJECT RECORD DRAWINGS."
d. Name of Architect and Construction Manager.
e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. Note related Change Orders[, record Product Data,] and record Drawings where applicable.

B. Format: Submit record Specifications as annotated PDF electronic file or paper copy.

2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders[, record Specifications,] and record Drawings where applicable.

B. Format: Submit record Product Data as annotated PDF electronic file or paper copy.

2.4 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

B. Format: Submit miscellaneous record submittals as [PDF electronic file or paper copy.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's[and Construction Manager's] reference during normal working hours.

END OF SECTION 017839

SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.
2. Training in operation and maintenance of systems, subsystems, and equipment.
3. Demonstration and training video recordings.

1.2 INFORMATIONAL SUBMITTALS

A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

1.3 CLOSEOUT SUBMITTALS

A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.

1. At completion of training, submit complete training manual(s) for Owner's use in PDF electronic file format on compact disc].

1.4 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.

C. Pre-instruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to demonstration and training.

1.5 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

B. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:

    a. System, subsystem, and equipment descriptions.
    b. Performance and design criteria if Contractor is delegated design responsibility.
    c. Operating standards.
    d. Regulatory requirements.
    e. Equipment function.
    f. Operating characteristics.
    g. Limiting conditions.
    h. Performance curves.

2. Documentation: Review the following items in detail:

    a. Emergency manuals.
    b. Operations manuals.
    c. Maintenance manuals.
    d. Project record documents.
    e. Identification systems.
    f. Warranties and bonds.
    g. Maintenance service agreements and similar continuing commitments.

3. Emergencies: Include the following, as applicable:

    a. Instructions on meaning of warnings, trouble indications, and error messages.
    b. Instructions on stopping.
    c. Shutdown instructions for each type of emergency.
    d. Operating instructions for conditions outside of normal operating limits.

e. Sequences for electric or electronic systems.
f. Special operating instructions and procedures.

4. Operations: Include the following, as applicable:

a. Startup procedures.
b. Equipment or system break-in procedures.
c. Routine and normal operating instructions.
d. Regulation and control procedures.
e. Control sequences.
f. Safety procedures.
g. Instructions on stopping.
h. Normal shutdown instructions.
i. Operating procedures for emergencies.
j. Operating procedures for system, subsystem, or equipment failure.
k. Seasonal and weekend operating instructions.
l. Required sequences for electric or electronic systems.
m. Special operating instructions and procedures.

5. Adjustments: Include the following:

a. Alignments.
b. Checking adjustments.
c. Noise and vibration adjustments.
d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:

a. Diagnostic instructions.
b. Test and inspection procedures.

7. Maintenance: Include the following:

a. Inspection procedures.
b. Types of cleaning agents to be used and methods of cleaning.
c. List of cleaning agents and methods of cleaning detrimental to product.
d. Procedures for routine cleaning
e. Procedures for preventive maintenance.
f. Procedures for routine maintenance.
g. Instruction on use of special tools.

8. Repairs: Include the following:

a. Diagnosis instructions.
b. Repair instructions.
c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
d. Instructions for identifying parts and components.
e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."

3.2 INSTRUCTION

A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.

B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

1. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
2. Owner will furnish an instructor to describe Owner's operational philosophy.
3. Owner will furnish Contractor with names and positions of participants.

C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Schedule training with Owner, through Construction Manager, with at least seven days' advance notice.

D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

E. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.

3.3 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.

1. At beginning of each training module, record each chart containing learning objective and lesson outline.

B. Video Recording Format: Provide high-quality color video recordings with menu navigation in format acceptable to Architect.

C. Narration: Describe scenes on video recording by audio narration by microphone while dubbing audio narration off-site after video recording is recorded. Include description of items being viewed.

D. Pre-produced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

END OF SECTION 017900

SECTION 024100 - DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

A. Scope of Work:
   1. Section includes removal and disposal and/or salvage of pavement, minor structures, utilities and other miscellaneous existing features affecting the project as identified in the Drawings.
   2. The Contractor shall furnish all materials, tools, equipment, devices, appurtenances, facilities and services as required for performing the demolition work.

1.2 QUALITY ASSURANCE

A. Conform to applicable code for demolition of structures, safety of adjacent structures, dust control, and disposal.

B. Conform to applicable State of Louisiana code requirements for procedures when hazardous or contaminated materials are discovered.

C. Obtain required permits from authorities having jurisdiction.

1.3 SITE CONDITIONS

A. Protection of Persons and Property:
   1. Erect and maintain temporary bracing, shoring, lights, barricades, signs and other measures as necessary to protect the public, workers and adjoining property from damage from demolition work.
   2. Open depressions and excavations occurring as part of this work shall be barricaded and posted with warning lights when accessible through adjacent property or through public access. Operate warning lights during hours from dusk to dawn each day and as otherwise required.
   3. Protect utilities, pavements and facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by demolition operations.

B. Protection of Utilities:
   1. Protect active sewer, water, gas, electric and other utilities as well as drainage and irrigation lines indicated, or when not indicated, found or otherwise made known to the Contractor before or during demolition work. If utility is damaged, immediately notify the utility owner to schedule corrective action.
   2. Arrange with and perform work required by Owner, utility companies and municipal departments for discontinuance or interruption of utility services due to demolition work.

C. Unknown Conditions:

1. The Drawings and related documents may not represent all surface conditions at the site and adjoining areas. The known surface conditions are as indicated, and shall be compared with actual conditions before commencement of work.
2. Existing utilities and drainage systems below grade are located from existing documents and from surface utilities such as manholes, valve boxes, area drains and other surface fixtures.
3. If existing active services encountered are not indicated or otherwise made known to the Contractor and interfere with the permanent facilities under construction, notify the Engineer in writing, requesting instructions on their disposition. Take immediate steps to ensure that the service provide is not interrupted.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 PREPARATION

A. Call Louisiana One Call at 1-800-272-3020 not less than three working days before performing Work.
   1. Request underground utilities to be located and marked within and surrounding construction areas.

B. Notify affected utility companies before starting work and comply with utility's requirements.

C. Erect, and maintain temporary barriers and security devices , including warning signs and lights, and similar measures, for protection of the public and existing improvements indicated to remain.

3.2 DEMOLITION REQUIREMENTS

A. Use of explosives is not permitted.

B. Conduct demolition to minimize interference with adjacent facilities.

C. Cease operations immediately when adjacent facilities appear to be in danger. Notify Engineer and do not resume operations until directed.

D. Conduct operations with minimum interference to public or private accesses to occupied adjacent facilities.

3.3 DEMOLITION

A. Perform demolition of miscellaneous items as indicated in the Drawings.

B. Empty underground wetwells or tanks located within demolition area.

C. Maintain flow of existing sewers through the project site at all times.

D. Remove underground wetwell, manholes, tanks, components, and piping from site as indicated in the drawings.

E. Remove materials to be re-installed or retained in manner to prevent damage.

F. Fill voids, compact and rough grade areas affected by demolition to maintain site grades and contours. Fill material used to fill voids shall be select fill and shall be compacted to 95% Standard Proctor Density.

G. Continuously clean-up and remove demolished materials from site. Do not allow materials to accumulate on site.

H. Do not burn or bury materials on site. Leave site in clean condition.

END OF SECTION

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.
2. Demolition and removal of selected site elements.
3. Salvage of existing items to be reused or recycled.

1.2 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.3 PREINSTALLATION MEETINGS

A. Pre-demolition Conference: Conduct conference at Project site.

1.4 INFORMATIONAL SUBMITTALS

A. Schedule of selective demolition activities with starting and ending dates for each activity.

B. Pre-demolition photographs or video.

C. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician.

1.5 CLOSEOUT SUBMITTALS

A. Inventory of items that have been removed and salvaged.

1.6 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.7 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: Refer to Section 011000 “Summary” for information, regarding hazardous materials, which will be present during construction.

1. If suspected hazardous materials, beyond those indicated, by said Section 011000, are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

G. Arrange selective demolition schedule so as not to interfere with Owner's operations.

1.8 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials and using approved contractors so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Inventory and record the condition of items to be removed and salvaged.

3.2 PREPARATION

A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
2. Arrange to shut off utilities with utility companies.
3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.

    a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
    c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
    d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
    e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
    f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
    g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

3.4 PROTECTION

A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

C. Remove temporary barricades and protections where hazards no longer exist.

3.5 SELECTIVE DEMOLITION

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
4. Maintain fire watch during and for at least 1 hour after flame-cutting operations.
5. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
6. Dispose of demolished items and materials promptly. Comply with requirements in Section 017419 "Construction Waste Management and Disposal."

B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

C. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable,

protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.6 CLEANING

A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction and recycle or dispose of them according to Section 017419 "Construction Waste Management and Disposal."

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
4. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

B. Burning: Do not burn demolished materials.

C. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

SECTION 03 10 00 - CONCRETE FORMWORK

1. PART 1 GENERAL

1.1. SECTION INCLUDES

A. Formwork for cast-in place concrete, with shoring, bracing and anchorage.
B. Openings for other work.
C. Form accessories.
D. Form stripping.

1.2. PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

A. Section 03 30 00 - Cast-In-Place Concrete: Supply of concrete accessories for placement by this section.

1.3. RELATED SECTIONS

A. Section 03 20 00 - Concrete Reinforcement.
B. Section 03 30 00 - Cast-in-Place Concrete.
C. Section 31 63 29 – Drilled Concrete Piers.

1.4. UNIT PRICE - MEASUREMENT AND PAYMENT

A. Concrete formwork will not be paid for directly but will be included in the cost bid for other items.

1.5. REFERENCES

Codes and Standards: Comply with provisions of following codes, specifications, and standards, except where more stringent requirements are shown or specified:

A. 2021 edition of the International Building Code (IBC), including applicable local ordinances and amendments.
B. ACI 117 "Standard Specifications for Tolerances for Concrete Construction and Materials."
C. ACI 301 "Specifications for Structural Concrete for Buildings".
D. ACI 302 "Guide for Concrete Floor and Slab Construction."
E. ACI 304 "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete."
F. ACI 305 "Hot Weather Concreting."
G. ACI 306 "Cold Weather Concreting."
H. ACI 309 Specification for Liquid Membrane Forming Compounds for Curing Concrete."
I. ACI 315 "Manual of Standard Practice for Detailing Concrete Structures.
J. ACI 318 "Building Code Requirements for Reinforced Concrete."
K. ASTM A 123 "Specifications for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel."
L. ASTM "Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement."
M. ASTM A 615 "Specification for Deformed and Plain Billet-Steel Bars for Concrete
N. Reinforcement."ASTM A 706 "Specification for Low-Alloy Steel Deformed Bars for Concrete Reinforcement."
O. ASTM C 31 "Method of Making and Curing Concrete Test Specimens in the Field."."
P. ASTM C 33 "Specification for Concrete Aggregates."
Q. ASTM C 39 "Test Method for Compressive Strength of Cylindrical Concrete Specimens."

R. ASTM C94 "Specification for Ready Mix Concrete."
S. ASTM C 143 "Test Method for Slump of Portland Cement Concrete."
T. ASTM C 150 "Specification for Portland Cement."
U. Concrete Reinforcing Steel Institute, (CRSI) "Manual of Standard Practice," latest edition.
V. Concrete Reinforcing Steel Institute, (CRSI) "Manual of Standard Practice and Specifications for Placing Reinforcement," latest edition.

1.6. DESIGN REQUIREMENTS
A. Design, engineer and construct formwork, shoring and bracing to conform to code requirements; resultant concrete to conform to required shape, line and dimension.

1.7. SUBMITTALS
A. Submit under provisions of Section 01 33 00.
B. Shop Drawings: Indicate pertinent dimensions, materials, bracing, and arrangement of joints and ties.
C. Product Data: Provide data on void form materials [and installation requirements].

1.8. QUALITY ASSURANCE
A. Perform Work in accordance with ACI 318.

1.9. QUALIFICATIONS
A. Design formwork under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the state where the Project is located.

1.10. REGULATORY REQUIREMENTS
A. Conform to applicable code for design, fabrication, erection and removal of formwork.

1.11. FIELD SAMPLES
A. Provide under provisions of Section 01 40 00. Coordinate with requirements stated in Section 03 10 00 and 03 30 00.

1.12. DELIVERY, STORAGE, AND HANDLING
A. Deliver, store, protect and handle products to site under provisions of Section 01600.
B. Deliver void forms and installation instructions in manufacturer's packaging.
C. Store off ground in ventilated and protected manner to prevent deterioration from moisture.

1.13. COORDINATION
A. Coordinate work under provisions of Section 01 03 90.
B. Coordinate this Section with other Sections of work which require attachment of components to formwork.
C. If formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement before proceeding, request instructions from Architect/Engineer.

2. PART 2 PRODUCTS
2.1. WOOD FORM MATERIALS
A. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or

other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings.

B. Use overlaid plywood complying with U.S. Product Standard PS-1 "A-C or B-B High Density Overlaid Concrete Form", Class I.
C. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.
D. Form Coatings: Provide commercial formulation form-coating compounds that will not bond with, stain nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.

2.2. FORMWORK ACCESSORIES

A. Form Ties: Snap-off type, metal, adjustable length, 1 inch back break dimension, free of defects that could leave holes larger than 1 inch in concrete surface.
B. Form Release Agent: Colorless mineral oil which will not stain concrete, or absorb moisture or impair natural bonding or color characteristics of coating intended for use on concrete.
C. Corners: Chamfer, wood strip1x 1 inch size; maximum possible lengths
D. Flashing Reglets: Galvanized steel, 22 gage thick, longest possible lengths, with alignment splines for joints, release tape sealed slots, anchors for securing to concrete formwork.
E. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.
F. Waterstops: Polyvinyl chloride, minimum 1,750 psi tensile strength, minimum 50 degrees F to plus 175 degrees F working temperature range, maximum possible lengths, ribbed profile, preformed corner sections, heat welded jointing; manufactured by Greenstreak.

3. PART 3 EXECUTION

3.1. EXAMINATION

A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

3.2. EARTH FORMS

A. All grade beams shall be formed. Earth Forms are not acceptable.

3.3. ERECTION - FORMWORK

A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.
B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to over stressing by construction loads.
C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
D. Align joints and make watertight. Keep form joints to a minimum.
E. Obtain approval before framing openings in structural members which are not indicated on Drawings.
F. Install void forms in accordance with manufacturer's recommendations. Protect forms from moisture or crushing.

3.4. APPLICATION - FORM RELEASE AGENT

A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings which are effected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.5. INSERTS, EMBEDDED PARTS, AND OPENINGS

A. Provide formed openings where required for items to be embedded in passing through concrete work.
B. Locate and set in place items which will be cast directly into concrete.
C. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other Work.
D. Position recessed reglets for brick veneer masonry anchors to spacing and intervals specified in Section 04 30 00.
E. Install accessories in accordance with manufacturer's instructions, straight, level, and plumb. Ensure items are not disturbed during concrete placement.
F. Install waterstops continuous without displacing reinforcement.
G. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
H. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

3.6. FORM CLEANING

A. Clean forms as erection proceeds, to remove foreign matter within forms.
B. Clean formed cavities of debris prior to placing concrete.
C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
D. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.7. FORMWORK TOLERANCES

A. Construct formwork to maintain tolerances required by ACI 301.

3.8. FIELD QUALITY CONTROL

A. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.
B. Do not reuse wood formwork more than 1 times for concrete surfaces to be exposed to view. Do not patch formwork.

3.9. FORM REMOVAL

A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.
B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

END OF SECTION 03 10 00

SECTION 031521 - TERMITE BARRIER

PART ONE - GENERAL

DESCRIPTION

Provide soil treatment for termite control under and around buildings or construction as described below.

RELATED WORK SPECIFIED ELSEWHERE

General & Supplementary Conditions, Special Requirements:
Earthwork: Section 02200
Cast-in-Place Concrete: Section 03300

QUALITY ASSURANCE

Applicator shall be registered or licensed as required by state or other governing jurisdictions.

Applicator shall comply with termite control requirements of the state or other governing jurisdictions and with the requirements of this Specification where it exceeds other requirements. Should Government Regulations outlaw or restrict use of any pesticide as specified, Contractor shall submit revised and equal treatment to Architect prior to application.

GUARANTEE

Deliver to the Owner a bonded guarantee that the below listed requirements have been met and that re-treatment will be made, without cost to Owner, on evidence of termite infestation within a period of five *(5)* years after date of Substantial Completion. Re-treatment material shall be same quality and rate of concentration as originally used materials.

SUBMITTALS

Before proceeding with the work, provide Architect with manufacturer’s mixing and application instructions.

PART TWO - PRODUCTS

MATERIALS

Apply one of the listed chemicals, at not less than the designated concentration, to areas to be treated:

Permathrin (Dragnet FT & Torpedo): 0.5 – 1.0 percent applied in water emulsion.

Biflex TC: 0.06 – 0.12 percent applied in water emulsion.

Demon: 0.25 – 0.50 percent applied in water emulsion.

Bifenthrin: .0.06 – 0.12 percent applied in water emulsion

Cypermethrin: 0.25 – 0.50 percent applied in water emulsion

Imidacloprid: 0.05 – 0.10 percent applied in water emulsion

Proprietary materials, which pass a 5-year test by U. S. Forest Service or U. S. Department of Agriculture, and contain one or more of the above chemicals in the proper concentrations, and can provide proof that no toxic effect will result in human, beneficial plant or animal life, are acceptable. Contractor shall not use any material that is banned or prohibited by any U. S. Government Agency. If any such material is called for herein, Contractor shall notify Architect, who will select an acceptable substitute.

MIXES

Follow manufacturer's mixing instructions.

PART THREE - EXECUTION

INSPECTION

Notify Architect 48 hours prior to planned application of chemicals. Do not proceed without approval of Architect.

Do not begin work until all fill under slabs has been compacted, and after piping and other sub-slab work is in place. Treat before installation of vapor barrier.

Verify that soil is in friable condition with moisture content low enough to permit absorption of toxicant solution.

APPLICATION

Apply to areas beneath concrete floor slabs on grade or fill, and along both sides of interior and exterior grade beams.

Apply also at expansion joints, construction joints, conduit, piping and other construction penetrations through slabs.

SLABS ON GRADE: One (10) gallon to each ten (10) square feet of area within building

lines.

GRADE BEAMS: One (1) gallon (each side) for each for (4) lineal feet of grade beam.

EXPANSION AND CONSTRUCTION JOINTS: Two (2) gallons for each five *(5)* linear feet of joint.

PIPE CONDUITS & OTHER SLAB PENETRATIONS: Two (2) gallons for each seven (7) square feet for a minimum radius of three (3) feet from penetration.

PROTECTION

Allow not less than 12 hours for drying after application, before beginning concrete placement or other construction activities.

Cover areas immediately following application of material.

Provide protection necessary to prevent human and animal contact with treatment materials and with treated surfaces.

Protect persons from injury and property damage. Satisfactorily repair or remove and replace work that has been damaged.

CLEANING

Clean adjacent surfaces not intended for treatment from soil, stain and adhered materials. Remove and replace damaged work that cannot be restored to original conditions.

Remove excess material and debris from site.

END OF SECTION

SECTION 03 20 00 - CONCRETE REINFORCEMENT

1. PART 1 GENERAL

1.1. SECTION INCLUDES
- A. Reinforcing steel bars, wire fabric and accessories for cast-in-place concrete.

1.2. RELATED SECTIONS
- A. Section 03 10 00 - Concrete Formwork.
- B. Section 03 30 00 - Cast-in-Place Concrete.

1.3. UNIT PRICE - MEASUREMENT AND PAYMENT
- A. Concrete reinforcement shall not be paid for directly but shall be included in the prices bid for other items.

1.4. REFERENCES
- A. ACI 301 - Structural Concrete for Buildings.
- B. ACI 318 - Building Code Requirements For Reinforced Concrete.]
- C. ACI SP-66 - American Concrete Institute - Detailing Manual.
- D. ANSI/ASTM A82 - Cold Drawn Steel Wire for Concrete Reinforcement.
- E. ANSI/ASTM A184 - Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.
- F. ANSI/ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.
- G. ANSI/ASTM A496 - Deformed Steel Wire Fabric for Concrete Reinforcement.
- H. ANSI/ASTM A497 - Welded Deformed Steel Wire Fabric for Concrete Reinforcement.
- I. ANSI/AWS D1.4 - Structural Welding Code for Reinforcing Steel.
- J. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
- K. ASTM A616 - Rail Steel Deformed and Plain Bars for Concrete Reinforcement.
- L. ASTM A617 - Axle Steel Deformed and Plain Bars for Concrete Reinforcement.
- M. ASTM A704 - Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement.
- N. ASTM A706 - Low-Alloy Steel Deformed Bars for Concrete Reinforcement.
- O. ASTM A767 - Zinc-Coated (Galvanized) Bars for Concrete Reinforcement.
- P. ASTM A775 - Epoxy-Coated Reinforcing Steel Bars.
- Q. ASTM D3963 - Epoxy-Coated Reinforcing Steel.
- R. AWS D12.1 - Welding Reinforcement Steel, Metal Inserts and Connections in Reinforced Concrete Construction.
- S. CRSI - Concrete Reinforcing Steel Institute - Manual of Practice.
- T. CRSI 63 - Placing Reinforcing Bars.
- U. ASTM A884 - Epoxy-Coated Steel Wire and Welded Wire Fabric for Reinforcement.

1.5. SUBMITTALS
- A. Submit under provisions of Section 01 33 00.
- B. Shop Drawings: Indicate bar sizes, spacings, locations, and quantities of reinforcing steel and wire fabric, bending and cutting schedules, and supporting and spacing devices and.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.6. QUALITY ASSURANCE
- A. Perform Work in accordance with CRSI - Manual of Standard Practice, ACI 301, and

ACI 318.

B. Submit certified copies of mill test report of reinforcement materials analysis.
C. Provide Architect/Engineer with access to fabrication plant to facilitate inspection of reinforcement. Provide notification of commencement and duration of shop fabrication in sufficient time to allow inspection.

1.7. QUALIFICATIONS

A. Design reinforcement under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State where the Project is located.
B. Welders' Certificates: Submit under provisions of Section 01 40 00 Manufacturer's Certificates, certifying welders employed on the Work, verifying AWS qualification within the previous 12 months.

1.8. COORDINATION

A. Coordinate work under provisions of Section 01 31 00.
B. Coordinate with placement of formwork, formed openings and other Work.

2. PART 2 PRODUCTS

2.1. REINFORCEMENT

A. Reinforcing Steel: ASTM A615, 60 ksi yield grade; deformed billet steel bars, unfinished
B. Welded Reinforcing Steel: ASTM A706, 60 ksi yield grade; deformed low-alloy steel bars, unfinished.
C. Welded Steel Wire Fabric: ASTM A185 in flat sheets unfinished

2.2. ACCESSORY MATERIALS

A. Tie Wire: Minimum 16 gage annealed type
B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapor barrier puncture.
C. Special Chairs, Bolsters, Bar Supports, Spacers Adjacent to Weather Exposed Concrete Surfaces: Plastic coated steel type; size and shape as required.

2.3. FABRICATION

A. Fabricate concrete reinforcing in accordance with CRSI Manual of Practice.
B. Weld reinforcement in accordance with AWS D1.4.
C. Locate reinforcing splices not indicated on drawings, at point of minimum stress. Review location of splices with Architect/Engineer.

3. PART 3 EXECUTION

3.1. PLACEMENT

A. Place, support and secure reinforcement against displacement. Do not deviate from required position.
B. Do not displace or damage vapor barrier.
C. Accommodate placement of formed openings.
D. Maintain concrete cover around reinforcing as follows:

E. Conform to ACI 318-19 code for concrete cover over reinforcement.
F. Bond and ground all reinforcement to requirements of Section 26 05 26.

3.2. FIELD QUALITY CONTROL

A. Field inspection will be performed under provisions of Section 01 45 00.

END OF SECTION 03 20 00

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A Cast-in-place concrete.
B Floors and slabs on grade.
C Control, expansion and contraction joint devices associated with concrete work, including joint sealants.

1.2 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

A Section 03100 - Concrete Formwork.

1.3 RELATED SECTIONS

A Section 031000 - Concrete Formwork: Formwork and accessories.
B Section 032000 - Concrete Reinforcement.
C Section 316329 – Drilled Concrete Piers

1.4 REFERENCES

A ACI 301 - Structural Concrete for Buildings.
B ACI 302 - Guide for Concrete Floor and Slab Construction.
C ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
D ACI 305R - Hot Weather Concreting.
E ACI 306R - Cold Weather Concreting.
F ACI 308 - Standard Practice for Curing Concrete.
G ACI 318 - Building Code Requirements for Reinforced Concrete.
H ANSI/ASTM D994 - Preformed Expansion Joint Filler for Concrete (Bituminous Type).
I ANSI/ASTM D1190 - Concrete Joint Sealer, Hot-Poured Elastic Type.
J ANSI/ASTM D1751 - Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).
K ANSI/ASTM D1752 - Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
L ASTM B221 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.
M ASTM C33 - Concrete Aggregates. N
ASTM C94 - Ready-Mixed Concrete.
O ASTM C150 - Portland Cement.
P ASTM C260 - Air Entraining Admixtures for Concrete.
Q ASTM C330 - Light Weight Aggregates For Structural Concrete.
R ASTM C494 - Chemicals Admixtures for Concrete.
S ASTM C618 - Fly Ash and Raw or Calcinated Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.

1.5 SUBMITTALS

A Submit under provisions of Section 01 30 00.
B Product Data: Provide data on joint devices, attachment accessories, admixtures.
C Samples: Submit two, 12 inch long samples of expansion/contraction joint and control joint.

D Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent Work.

1.6 PROJECT RECORD DOCUMENTS

A Submit under provisions of Section 01 70 00.

B Accurately record actual locations of embedded utilities and components which are concealed from view.

1.7 QUALITY ASSURANCE

A Perform Work in accordance with ACI 301.

B Acquire cement and aggregate from same source for all work.

C Conform to ACI 305R when concreting during hot weather.

D Conform to ACI 306R when concreting during cold weather.

1.8 FIELD SAMPLES

A Provide under provisions of Section 01 40 00. Coordinate with Section 03 10 00.

B Construct and erect a field sample for architectural concrete surfaces receiving special treatment or finish as result of formwork.

C Sample Panel: Sufficient size to indicate special treatment or finish required.

D If requested by Architect/Engineer, cast concrete against sample panel. Obtain acceptance of resultant surface finish prior to erecting formwork.

E Locate as directed in field by Architect or Owner’s construction manager.

F Accepted sample panel is considered basis of quality for the finished work. Keep sample panel exposed to view for duration of concrete work.

G Accepted sample may not remain as part of the Work.

1.9 COORDINATION

A Coordinate work under provisions of Section 01 03 90.

B Coordinate the placement of joint devices with erection of concrete formwork and placement of form accessories.

2. PART 2 PRODUCTS

2.1 CONCRETE MATERIALS

A Cement: ASTM C150, Type I. Obtained from a single source.

B Fine and Coarse Aggregates: ASTM C33.

C Water: Clean and not detrimental to concrete.

2.2 ADMIXTURES

A Air Entrainment: ASTM C260;.

B Chemical: ASTM C494 Type A - Water Reducing; Type B – Retarding; Type C – Accelerating; Type D - Water Reducing and Retarding; Type E - Water Reducing and Accelerating;.

C Fly Ash, ASTM C618, Class F, except that the maximum allowable loss on ignition must not exceed 6 percent. Add with cement. Fly ash content must be a maximum of 25% percent by weight of cementitious material, provided the fly ash does not reduce the amount of cement in the concrete mix below the minimum requirements of local building codes. Where the use of fly ash cannot meet the minimum level, provide the maximum amount of fly ash permittable that meets the code requirements for cement content. Report the chemical analysis of the fly ash in accordance with ASTM C311/C311M.

Evaluate and classify fly ash in accordance with ASTM D5759

D Calcinated Pozzolan: NOT ALLOWED.

2.3 ACCESSORIES

A Bonding Agent: Polyvinyl Acetate.

B Vapor Barrier: 15 mil thick Stego Wrap polyethylene film type recommended for below grade application.

C Non-Shrink Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,500 psi in 28 days.

2.4 JOINT DEVICES AND FILLER MATERIALS

A Joint Filler Type A; Asphalt impregnated fiberboard or felt, ½ inch thick; tongue and groove profile.

B Construction Joint Devices: Integral galvanized steel; as detailed, formed to tongue and groove profile, with removable top strip exposing sealant trough, knockout holes spaced at 6 inches, ribbed steel spikes with tongue to fit top screed edge.

C Sealant and Primer: as specified in Section 07900.

2.5 CONCRETE MIX

A Mix concrete in accordance with ACI 304. Deliver concrete in accordance with ASTM C94.

B Cement to be Type I or II; hydraulic cement not allowed.

C Select proportions for normal weight concrete in accordance with ACI 301 Method 1..

D Provide concrete to the following criteria:

i 5”/6” slab-on-grade, 3500-psi, 28-day compressive strength; water-cement ratio, 0.48 maximum, 4" maximum slump, 1" max nominal aggregate, hard trowel finish, No Air.

ii Footings/Grade Beams, 3500-psi, 28-day compressive strength; water-cement ratio, 0.48 maximum (air-entrained), 4" maximum slump.

iii Elevated slab, 4000-psi, 28-day compressive strength; water-cement ratio, 0.48 maximum (NO air-entrained), 3/4” max aggregate, 4" slump.

iv Miscellaneous: 3000-psi, 28-day compressive strength; water-cement ratio, 0.58 maximum (non-air-entrained), 0.46 maximum (air-entrained).

E Use accelerating admixtures in cold weather only when approved by Architect/Engineer. Use of admixtures will not relax cold weather placement requirements.

F Calcium chloride shall NOT be used.

G Use set retarding admixtures during hot weather only when approved by Architect/Engineer.

H Add air entraining agent to normal weight concrete mix for work exposed to exterior.

I Use set retarding admixtures during hot weather only when approved by Architect/Engineer.

3. PART 3 EXECUTION

3.1 EXAMINATION

A Verify site conditions under provisions of Section 01039.

B Verify requirements for concrete cover over reinforcement.

C Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete

are accurately placed, positioned securely, and will not cause hardship in placing concrete.

3.2 PREPARATION

A Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.

B In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.

3.3 PLACING CONCRETE

A Place concrete in accordance with ACI 318.

B Notify Architect/Engineer minimum 96 hours prior to commencement of operations.

C Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints, and are not disturbed during concrete placement.

D Install vapor barrier under interior slabs on grade. Lap joints minimum 6 inches and seal watertight by taping edges and ends.

E Repair vapor barrier damaged during placement of concrete reinforcing. Repair with vapor barrier material; lap over damaged areas minimum 6 inches and seal watertight.

F Separate slabs on grade from vertical surfaces with ½” inch thick joint filler.

G Place joint filler in floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.

H Extend joint filler from bottom of slab to within 1/8 inch of finished slab surface. Conform to Section 07900 for finish joint sealer requirements.

I Install joint devices in accordance with manufacturer's instructions.

J Install construction joint devices in coordination with floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.

K Install joint device anchors. Maintain correct position to allow joint cover to be flush with floor finish.

L Install joint covers in longest practical length, when adjacent construction activity is complete.

M Apply sealants in joint devices in accordance with Section 07900.

N Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

O Place concrete continuously between predetermined expansion, control, and construction joints.

P Do not interrupt successive placement; do not permit cold joints to occur.

Q Place floor slabs and saw cut pattern indicated.

R Saw cut joints within 2 hours of placing. Use 3/16 inch thick blade, cut into ¼ depth of slab thickness. All joints to be cut using the SoffCut system.

S Screed floors and slabs on grade level, maintaining surface flatness of maximum 3/16 inch in 10 ft.

3.4 SEPARATE FLOOR TOPPINGS

3.5 CONCRETE FINISHING

A Slab Finishing - General Requirements. Unless specified elsewhere, slabs shall be troweled to a smooth hard finish in accordance with ACI 302 for the class of slab specified on the plans.

i Strikeoff and Consolidation All slab surfaces shall be placed by the use of

continuous mechanical vibratory screeds which are straight and which have been supported by chairs or other approved methods to give surfaces which are within the specified tolerances. Screeds shall be advanced as quickly as proper consolidation allows. Wet screeding shall only be used as approved by the Engineer. All screed operations shall be completed before any excess moisture or bleeding water is present on the surface.

ii Leveling. Immediately following screeding operations, the surface shall be leveled by the Highway Straightedge or bullfloating methods as required to produce the specified finished tolerances. All leveling operations shall be completed prior to any excess moisture or bleed water is present on the surface.

iii Edging and Jointing. Immediately following the leveling procedure, all edging or jointing as indicated on the plans or specified herein shall be completed. All jointed surfaces which are indicated as being saw-cut shall not be jointed. A straight edge shall be used for all jointing operations. All edging and jointing operations shall not commence until all excess and bleed water has left the surface or been mechanically removed.

iv Floating. All concrete surfaces shall be floated after edging and jointing operations are complete. Floating shall not begin until the concrete surface will support a finisher and knee boards with no more than ¼" indentation or when the power float machine will neither dig in nor disrupt the level of the surface.

v Exterior Finish. All concrete finishes shall be troweled unless noted otherwise.

a Troweling operations shall commence immediately after floating. No surfaces shall be troweled without first being power or hand floated. Surfaces shall be worked smooth to a good hard even surface, free from tool marks and other defects, and finished according to best practice. Successive trowelings may be needed to insure the proper finish and surface density as specified. Each successive troweling shall be made with smaller trowel blades at greater angles.

b Fine broom finish. Apply trowel finish as specified, immediately followed by slightly scarifying the surface with a fine broom.

c Non-slip Broom Finish. Apply non-slip broom finish to exterior concrete platforms, steps, and ramps and elsewhere as indicated. Immediately after trowel finishing, slightly roughen concrete surface by brooming in a direction perpendicular to the main traffic route. Coordinate required final finish with engineer before application.

vi Protection During Curing. Concrete shall not be applied when weather conditions are unsuitable or else temporary protection (canvas, polyethylene) shall be supplied during finishing and setting period.

B Tolerances. In accordance with ACI 117 Section 4.5.7 as scheduled on the drawings.

C The contractor shall remedy any floor section measuring below either of the minimum local values for flatness or levelness by grinding or by removal and replacement of the affected areas. Under no circumstance will filling of low spots be permitted. All costs for corrective work will be borne by the Contractor.

D Concrete Surfaces Exposed to View. Vertical and horizontal surfaces shall receive a rubbed finished.

E Concrete Surfaces Not Exposed to View. Unless specified elsewhere, surfaces shall receive a broom finish or shall be floated in such a manner to provide a granular matte appearance.

3.6 CURING AND PROTECTION

A General. Protect freshly placed concrete from premature drying and excessive cold or hot temperature, and maintain without drying at a relatively constant temperature for the period of time necessary for hydration of the cement and proper hardening of the concrete. Start initial curing as soon as free moisture has disappeared from the concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 72 hours. Begin final curing procedures immediately following initial curing and before the concrete has dried. Continue final curing for at least 7 days and in accordance with ACI 301 procedures. Avoid rapid drying at the end of the final curing period.

B Curing Methods. Perform final curing of concrete by one of following methods at Contractor's option.

i Moisture Curing. Keeping the surface of the concrete continuously wet by covering with water.

ii Moisture - Cover. Moisture retaining cover shall be placed on surfaces for curing period.

iii Liquid Membrane applied to damp concrete surfaces as water film has disappeared in accordance with manufacturer's directions. The entire exposed surface of the concrete shall be sprayed uniformly with white pigmented curing compound immediately after completion of surface finishing as soon as surface water evaporates. If the pavement is cured initially with burlap mats and mats are removed prior to expiration of 72 hours, curing compound shall be applied immediately. Curing compound shall not be applied during rainfall.

a Curing compound shall be applied under pressure by mechanical sprayers at the rate recommended by the manufacturer but in no case less than 1 gallon per 100 square feet of surface area. Spraying equipment shall be of the fully atomizing type equipped with a tank agitator. At time of use, the compound shall be thoroughly mixed. During application, the compound shall be stirred continuously by mechanical methods. Hand spraying of odd widths or shapes and on surfaces exposed by form removal will be permitted provided curing compound has been thoroughly agitated prior to placing in the sprayer. Curing compound shall not be applied to inside faces of joints to be sealed. In split slab construction, curing compound shall be applied in such manner as to prevent spraying exposed reinforcing steel.

b Should the film become damaged within the curing period, the damaged portions shall be repaired immediately with additional compound.

C Upon removal of side forms, exposed sides of slabs shall be protected immediately with a curing treatment equal to that provided for the surface.

D Exposed reinforcing steel and joints shall be covered or shielded to prevent contact with curing compound.

E Temperature of Concrete During Curing. When the atmospheric temperature is 40 deg. F. and below, maintain the concrete temperature between 50 and 70 deg. F. continuously throughout the curing period. When necessary, make arrangements before concrete placing for continuous heating, covering, insulation, or housing as required for the concrete curing period. Provide cold weather predictions complying with the requirements of ACI 306.

3.7 FIELD QUALITY CONTROL

A Field inspection and testing will be performed in accordance with ACI 301 and under provisions of Section 01 40 00.

B Provide free access to Work and cooperate with appointed firm.
C Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of Work.
D Tests of cement and aggregates may be performed to ensure conformance with specified requirements.
E Three concrete test cylinders will be taken for every 50 or less cu yds of each class of concrete placed.
F One additional test cylinder will be taken during cold weather concreting, cured on job site under same conditions as concrete it represents.
G One slump test will be taken for each set of test cylinders taken.

3.8 PATCHING

A Allow Architect/Engineer to inspect concrete surfaces immediately upon removal of forms.
B Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Architect/Engineer upon discovery.
C Patch imperfections as directed.

3.9 DEFECTIVE CONCRETE

A Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
B Repair or replacement of defective concrete will be determined by the Architect/Engineer.
C Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect/Engineer for each individual area.

END OF SECTION 03 30 00

SECTION 033513 – EXPOSED POLISHED CONCRETE FLOORING

PART 1 – GENERAL

1.1 SUMMARY

A. Work includes furnishing and installing a full aggregate exposed, polished concrete floor system on a laser-screeded cast-in-place slab.
B. Related Sections:

1. Section 03 30 00 – Cast-in-Place Concrete
2. Section 07 92 00 – Joint Sealants

1.2 SUBMITTALS

A. Product data for grinding/polishing equipment, densifier/sealer, and joint filler.
B. Concrete mix design.
C. Sample 4’x4’ mock-up for approval showing full aggregate exposure and finish sheen.
D. Maintenance instructions.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Minimum 3 years experience with exposed polished concrete.
B. Comply with the latest editions of:
1. ACI 302 – Guide for Concrete Floor and Slab Construction
2. ACI 117 – Tolerances for Concrete Construction
3. Concrete Polishing Council (CPC) Guidelines

1.3 MOCK-UP

A. Provide a minimum 4’x4’ sample on project slab for review of aggregate exposure, sheen, and joint detailing.
B. Approved mock-up shall serve as quality benchmark.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials in dry, protected conditions.
B. Protect finished slab from staining during construction.

PART 2 – PRODUCTS

2.1 CONCRETE MIX

A. Compressive Strength: 4,000 psi minimum at 28 days.

B. Aggregate: 3/4" max coarse aggregate

C. Slump: 5–6" prior to any water-reducing admixtures

D. Air Content: Not to exceed 3% (interior only, no air entrainment)

E. Admixtures: Water reducer and superplasticizer as needed; no calcium chloride

2.2 SLAB CONSTRUCTION EQUIPMENT

A. Use **laser screed equipment** to place and level slab to required flatness.

B. Final finish: Pan float and trowel finish suitable for polishing.

2.3 POLISHING MATERIALS

A. Densifier: Lithium- or sodium-silicate based, VOC-compliant

B. Grouting Material: Approved filler for pinholes and minor surface voids

C. Joint Filler: Polyurea, color to match concrete tone

D. Grinding Equipment: Planetary grinder with dust control and multiple grit pads

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify concrete mix, placement tolerances, and curing compliance.

B. Ensure slab is free of curing compounds, sealers, or surface contaminants.

3.2 PLACEMENT

A. Place slab using **laser screed**.

B. Achieve flatness tolerances of **FF 50 / FL 35** minimum.

C. Sawcut control joints as shown on drawings; protect joint edges from chipping.

3.3 POLISHING PROCESS

A. Begin grinding once slab has reached sufficient strength and moisture content.

B. Grind to expose **full aggregate (Class C exposure)**.

C. Sequential grinding and polishing:

1. 40–80 grit metal
2. Densifier application

3. 100–400 grit resin pads (or as scheduled)

D. Final sheen: Satin finish unless noted otherwise.

E. Fill joints and surface imperfections after initial grinding.

F. Clean and protect slab after final polishing.

3.4 PROTECTION

A. Cover slab with breathable protection after polishing until substantial completion.

B. Avoid staining, oil, paint, or damage from trades.

SECTION 040519 - MASONRY ANCHORAGE AND REINFORCING

PART 1 GENERAL

1. 01 SUMMARY

A. Section Includes
   1. Installation of masonry repair systems.

B. Related Requirements
   1. Section 01 25 00- Substitution Procedures.
   2. Section 01 33 00- Submittal Procedures.
   3. Section 01 35 91- Historic Preservation Inspection Services
   4. Section 01 45 80- Testing Laboratory Services.
   5. Section 01 60 00- Product Requirements.
   6. Section 04 01 00- Maintenance of Masonry.
   7. Section 04 01 20.91- Unit Masonry Restoration.
   8. Section 04 01 40.91 Stone Restoration.
   9. Section 04 20 00- Unit Masonry.
   10. Section 04 26 13 – Masonry Veneer.

1.02 REFERENCES

A. The date of the standard is that in effect as the date of receipt of bids for the project.

B. The Masonry Society (TMS):
   1. TMS 402/602 Building Code Requirements and Specifications for Masonry Structures.

C. ASTM International (ASTM):
   1. ASTM A 276/ 276M- Standard Specification for Stainless Steel Bars and Shapes.
   2. ASTM A580/580M – Standard Specification for Stainless Steel Wire.
   3. ASTM A582 – Standard Specification for Free-Machining Stainless Steel Bars.
   4. ASTM B16/16M – Standard Specification for Free-Cutting Brass Rod, Bar, and Shapes for Use in Screw Machines.
   5. ASTM C 1093- Standard Practice for Accreditation of Testing Agencies for Masonry.

D. The Brick Industry Association (BIA):
   1. Tek Note #44b- Wall Ties for Brick Masonry.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Meeting: Convene before the start of work on new concrete slabs, patching of existing concrete slabs and start of application of concrete finish system.
   1. Require attendance of parties directly affecting work of this Section, including the Owner’s Representative, Contractor, Architect, Engineer, and Installer. Meeting should only convene when required parties are present.
   2. Review the following:
      a. Installation procedure.
      b. Quality control.

c. Coordination with other Work.

1.04 SUBMITTALS

A. Product Data:
1. Submit manufacturer's product data sheets and tested physical and performance properties for each product to be used, indicating the size and length of anchor to be used for the work.

1.05 QUALITY ASSURANCE

A. Installer Qualifications:
1. Installer to be familiar with the specified requirements and the methods needed for proper installation of anchoring systems, including coordination with wall assembly components. Installer must have the proper equipment available to perform work within the scope of this project on a timely basis.

B. Manufacturer: Provide product design, product engineering, and technical assistance for the selection, application, and installation of an appropriate anchoring system for the project.

C. Testing Agency:
1. Field Testing: The inspector must be experienced with the proper use of calibrated test equipment.
2. Laboratory Testing: The testing agency must be qualified in accordance with ASTM C1093 for the testing indicated.

D. Mock-up: On-site, prior to the start of work within this section.
1. Require attendance of parties directly affecting work of this Section, including the Contractor, Installer, Architect, Engineer, and Owner's Representative.
2. Notify the above parties at least one week in advance of the date and time when the mock-up will be completed.
3. Install anchor for evaluation of application of workmanship
4. Perform in-situ testing of the installed anchors in the wall to be repaired to confirm the retrofit anchor performs as expected in both the veneer and backup independently.
5. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in the mockups unless the Architect/Engineer specifically approves such deviations in writing.
6. Subject to compliance with requirements, an approved mockup may become part of the completed work.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the worksite in manufacturer's original and unopened package, labeled with manufacturer's name and type of product.

B. Store materials in an environment recommended on published manufacturer's product datasheets.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design: PROSOCO, Inc., (800) 255-4255, customercare@prosoco.com.

B. Substitutions: In accordance with Section 012500 – Substitution Procedures.

2.02 ANCHORS AND TIES

A. Mechanical expansion anchors: For veneers three inches or greater, provide a torque-activated anchor with components that expand in an umbrella shape, compressing against the base material to provide a positive connection.
   1. Material:
      a. Provide ties and anchors specified in this article that are made from materials that comply with the following, unless otherwise indicated.
         1) Stainless steel threaded rod: ASTM A276, Type 316.
         2) Brass: ASTM B16/16M, Type 360.
   2. Application:
      a. Solid concrete backup conditions:
         1) 5000 Series Grip-Tie Anchors.
         2) 5000R Series Grip-Tie Anchors.
      b. Hollow CMU backup conditions:
         1) 5100 Series Grip-Tie Anchors.
      c. Structural steel backup conditions:
         1) Stitch-Tie 5200 Series Grip-Tie Anchors.
      d. Stud (wood or steel) backup conditions:
         1) 5300 Series Grip-Tie Anchors.

B. Thin panel veneer mechanical anchors: For veneers less than three inches thick, provide torque or hammer activated anchor with components that expand in an umbrella shape at the backup material, and a larger diameter anchor head for panel restraint. The panel anchors can be used for a load transfer of both gravity and lateral loading.
   1. Material:
      a. Provide ties and anchors specified in this article that are made from materials that comply with the following, unless otherwise indicated.
         1) Stainless steel threaded rod: ASTM A276, Type 316.
         2) Stainless steel rod: ASTM A582, Type 303.
         3) Brass: ASTM B16/16M, Type 360.
   2. Application:
      a. Lateral only load transfer with solid concrete backup:
         1) 6000-1 Series Stone-Grip Tie Anchors by PROSOCO, Inc.
         2) 6000-2 Series Stone-Grip Tie Anchors by PROSOCO, Inc.
         3) 6000-2LD Series Stone-Grip Tie Anchors by PROSOCO, Inc.
      b. Lateral only load transfer with hollow backup:
         1) 6100-1 Series Stone-Grip Tie Anchors by PROSOCO, Inc.
         2) 6100-2 Series Stone-Grip Tie Anchors by PROSOCO, Inc.
         3) 6100-2LD Series Stone-Grip Tie Anchors by PROSOCO, Inc.
      c. Lateral only load transfer with structural steel or clay tile backup:
         1) 6200-1 Series Stone-Grip Tie Anchors by PROSOCO, Inc.
         2) 6200-2 Series Stone-Grip Tie Anchors by PROSOCO, Inc.
         3) 6200-2LD Series Stone-Grip Tie Anchors by PROSOCO, Inc.
      d. Lateral only load transfer with structural metal or wood stud backup:
         1) 6300-1 Series Stone-Grip Tie Anchors by PROSOCO, Inc.
         2) 6300-2LD Series Stone-Grip Tie Anchors by PROSOCO, Inc.
      e. Gravity and lateral load transfer with solid backup

1) 6500-3 Series Stone-Grip Tie Anchors by PROSOCO, Inc.
2) 6600-3 Series Stone-Grip Tie Anchors by PROSOCO, Inc.
3) 6800-3 Series Stone-Grip Tie Anchors by PROSOCO, Inc.

f. Gravity and lateral load transfer with hollow backup
1) 6500-3 Series Stone-Grip Tie Anchors by PROSOCO, Inc.
2) 6600-3 Series Stone-Grip Tie Anchors by PROSOCO, Inc.

C. Helical ties: Provide an in-plane flexible connection between wythes of material, while maintaining a threaded connection to resist out-of-plane loading for both tension and compression resistance.
1. Material:
a. Provide ties and anchors specified in this article that are made from materials that comply with the following, unless otherwise indicated.
1) Stainless steel wire: ASTM A580/A580M, Type 304.
2. Application:
a. Masonry veneer to solid concrete backup:
1) Asymmetric Stitch-Tie by PROSOCO, Inc., [8mm] [10mm] diameter.
2) Stitch-Tie by PROSOCO, Inc., [8mm] [10mm] diameter.
b. Masonry veneer to hollow CMU backup:
1) Stitch-Tie by PROSOCO, Inc., [8mm] [10mm] diameter.
c. Masonry Veneer to timber backup:
1) Stitch-Tie by PROSOCO, Inc., [8mm] [10mm] diameter.
d. Mass brick masonry:
1) Stitch-Tie by PROSOCO, Inc., [8mm] [10mm] diameter.

D. Reinforced Grouted Helical Anchors: Provide stability to a masonry wall by filling voids in loose material by injecting thixotropic grout reinforced with a helical anchor.
1. Material:
a. Provide ties and anchors specified in this article that are made from materials that comply with the following, unless otherwise indicated.
1) Stainless steel wire: ASTM A580/A580M, Type 304.
2) Grout: BS EN 998-2.
2. Anchor System
a. Grout-Tie by PROSOCO, Inc.
1) 8mm Stitch-Ties by PROSOCO, Inc.
2) SureGrout S (3900 psi / 27.5 Mpa) by Sure CPS.

E. Injection grout sock anchors: Provide engineered sock anchors composed of an encapsulated reinforced stainless-steel core with injection grout to strengthen masonry and repair cracked or delaminated stone with minimal disruption.
1. Material:
a. Provide ties and anchors specified in this article that are made from materials that comply with the following, unless otherwise indicated.
1) Stainless steel rod: ASTM A276, Type 304.
2) Grout: BS EN 445, 446, 447, 196-1, and 196-3
2. Anchor System
a. Heavy Duty Sock (HDS) Anchor by PROSOCO, Inc.
1) HDS Anchor by PROSOCO, Inc.
2) HDS Single component grout (9430 psi / 65 N/mm^2) by PROSOCO, Inc.

F. Horizontal Reinforcement: Provide supplemental joint reinforcement to reinforce cracked masonry and to create structural beams from existing brick veneers.
   1. Material:
      a. Provide ties and anchors specified in this article that are made from materials that comply with the following, unless otherwise indicated.
         1) Stainless steel wire: ASTM A580/A580M, Type 304.
         2) Grout: BS EN 998-2.
   2. Application:
      a. Crack Stitching:
         1) Stitch-Tie Bar by PROSOCO, Inc., 6mm diameter.
         2) Grout: SureGrout S (3900 psi / 27.5 Mpa) by Sure CPS.
      b. Structural helical beam reinforcement:
         1) Stitch-Tie Bar by PROSOCO, Inc., 6mm diameter.
         2) Grout: SureGrout S (3900 psi / 27.5 Mpa) by Sure CPS.

2.03 EQUIPMENT

A. Tools and Equipment:
   1. Mechanical expansion anchors:
      a. Hammer drill or SDS+ rotary hammer drill for solid material pilot holes.
      b. Hammer drill for hollow or thin-shelled material pilot holes.
      c. Drill bits, as required.
      d. Appropriate setting tools per anchor variation as noted in the installation instructions.
   2. Thin panel veneer mechanical anchors:
      a. Hammer drill or SDS+ rotary hammer drill for solid material pilot holes.
      b. Hammer drill for hollow or thin-shelled material pilot holes.
      c. Drill bits, as required.
      d. Appropriate setting tools per anchor variation as noted in the installation instructions.
   3. Helical ties:
      a. Hammer drill or SDS+ rotary hammer drill for solid material pilot holes.
      b. Hammer drill for hollow or thin-shelled material pilot holes.
      c. Drill bits, as required.
      d. Setting tool with SDS+ chuck adapter for hammer only installation per the installation instructions.
   4. Reinforced grouted helical anchors:
      a. Hammer drill or SDS+ rotary hammer drill for solid material pilot holes.
      b. Hammer drill for hollow or thin-shelled material pilot holes.
      c. Drill bits, as required.
      d. Grout mixing paddle.
      e. Grout gun.
      f. Grout installation pinning nozzle with the grout gun adapter.
   5. Injection grout sock anchors:
      a. Appropriate rotary hammer drill or rotary only core drill for the substrate.
      b. Drill bits or core bits, as required.
      c. Cement paddle mixing drill.
      d. Mixing buckets, 5-gallon minimum.
      e. HDS Anchor component kit (1 per anchor assembly).
      f. HDS Grout Fill kit (minimum 1 per project).
      g. Grout injection equipment for smaller projects:
         1) Battery-powered Albion grout gun, model DL-59-T13E.
         2) Albion Nozzle Adapter, model 966-1.

3) Albion threaded front ring cap, model 421-G01.
4) PROSOCO Grout gun component kit, includes adapters and an in-line pressure gauge connecting the Albion DL-59-T13E to the PROSOCO HDS hose fitting.

h. Grout injection equipment for larger projects:
1) Pressure pot, 5-gallon, with a minimum outlet diameter of 1/2", 1/4 turn ball valve for feed control, and a pressure gauge for monitoring feet pressure
a. Recommended source that meets specifications: Void span 5-gallon pressure pot (https://www.voidspan.com/product/5-gallon-pressure-pot/)
2) Air compressor, minimum 2 H.P.
3) Additional plumbing fittings to adapt the pressure pot feed outlet to the 1/2" diameter PROSOCO HDS hose fitting.

6. Horizontal Reinforcement:
a. Angle Grinder.
b. Cement paddle mixing drill.
c. Manual lever grout gun.
d. Appropriate Trowel.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine conditions, with installer present, for compliance with requirements for installation tolerance and other conditions affecting the performance of Work.

B. Do not begin installation until unsatisfactory conditions are resolved. Beginning work constitutes acceptance of site conditions and responsibility for defective installation caused by prior observable conditions.

3.02 PREPARATION

A. Clean dirt, dust, oil, grease, and other contaminants that interfere with penetration or performance of the specified product from surfaces.

B. Locate anchors in the area to be anchored as indicated on the Drawings.

C. Do not proceed until unsatisfactory conditions have been corrected.

D. Install accessory products in accordance with the manufacturer's published recommendations and as noted on Drawings.

3.03 INSTALLATION

A. Install anchors in accordance with manufacturer's published recommendations and mock-up.

B. Mechanical expansion anchor installation:
1. Select proper anchor length by field verification.
2. Drill proper pilot hole size per the anchor type. See manufacturer's product data for recommendations.
3. Blow out drill dust and debris from the pilot hole.
4. Using the appropriate setting tool or adapter, install the anchor into the pre-drilled hole

5. Using the appropriate setting tool or adapter, tighten the backup portion of the anchor to the recommended torque range.
6. Using the appropriate setting tool or adapter, tighten the facade portion of the anchor to the recommended torque range.
7. Conceal the anchor with the specified patching compound.

C. Thin panel veneer mechanical anchors:
1. Select proper anchor length by field verification.
2. Drill proper pilot hole size per the anchor type. See manufacturer's product data for recommendations.
3. Countersink hole in veneer if required. See manufacturer's product data for recommendations.
4. Blow out drill dust and debris from the pilot hole.
5. Using the appropriate setting tool or adapter, install the anchor into the pre-drilled hole
6. Using the appropriate setting tool or adapter, tighten the backup portion of the anchor to the recommended torque range.
7. Using the appropriate setting tool or adapter, install toggle if applicable.
8. Install the anchor head, washer, and gasket on the threaded shaft.
9. Conceal the anchor with the specified patching compound if countersunk.

D. Helical tie installation:
1. Select proper anchor length by field verification.
2. Drill proper pilot hole size per the anchor type. See manufacturer's product data for recommendations.
3. Install helical tie into the dry setting too mounted in an SDS drill.
4. Drive the helical tie anchor in the pilot hole and into the backup material.
5. The setting tool will recess the helical tie approximately 3/8 inch from the surface.
6. Conceal anchor with specified patching compound.
7. Space anchors in a staggered diamond pattern 16 inches on center vertically and 18 inches on center horizontally (1 Tie per 2 square feet). Install additional anchors within 8 inches of openings and discontinuities per BIA Technical note 44b.

E. Reinforced grouted helical anchor installation:
1. Select proper anchor length by field verification.
2. Drill proper pilot hole size per the anchor type. See manufacturer's product data for recommendations.
3. Clean the hole with water.
4. Prepare the helical anchor within the grout pinning nozzle.
5. Insert into the back of the drilled hole.
6. As the grout is injected, the helical anchor is carried with it.
7. Back pressure pushes the nozzle out of the hole to leave the full grouted tie in place.

F. Injection grout sock anchor installation:
1. Select proper anchor length by field verification.
2. Drill proper pilot hole size per the anchor type. See manufacturer's product data for recommendations.
3. Clean to ensure all debris is removed from the hole. Blow out drill dust and debris from the pilot hole.
4. Screw the blanking plug to the end of the sock anchor and install the anchor into the drilled hole, connecting the anchors to the desired length.
5. Attach the grout fill kit to the threaded end of the sock anchor.

6. Add the appropriate amount of water to the mixing bucket, limit water content to 6 to 7 liters maximum per 44 lb bag.
7. Add the appropriate amount of powder grout.
8. Mix the grout for a minimum of 2 minutes until a very fluid but creamy uniform consistency is attained. Always maintain the correct working ratio, as per the manufacturer's instructions.
9. Till the sock anchor using either the battery-operated grout gun or pressure pot with an air compressor. Limit the installation pressure to 44 psi.
10. Once the grout milk is seen running from the hole, stop the pumping and let it "relax" for a minimum of three minutes.
11. Clamp the pipe and remove the filling equipment.
12. Leave the exposed hose on the threaded sock anchor tube for two to three hours after installation prior to removal.
13. Patch the remaining hole with the specified patching compound, color-matched to the existing substrate.

G. Horizontal Reinforcement:
1. Grind away existing mortar, 20 inches minimum on each side of the crack, 1-1/2 inch to 2 inches deep.
2. Clean with water.
3. Apply a bead of the manufacturer's recommended grout.
4. Insert the helical tie bar into the bead of the manufacturer's recommended grout.
5. Apply a bead of grout over the helical tie bar.
6. If an additional helical tie bar is required, insert it into the bead of the manufacturer's recommended grout.
7. Apply a final bead of grout over the additional helical tie bar if required.
8. Compact with an appropriate trowel.

3.04 FIELD QUALITY CONTROL

A. Site testing is encouraged for verification of helical or mechanical expansion anchor load capacity. Each construction site is unique, and the appropriate use of this product is the responsibility of the engineers, architects, and other professionals who are familiar with the specific requirements of the project.
1. Testing Agency: Engage a qualified testing agency to perform tests and inspections. Allow inspectors to access scaffolding and work areas as needed to perform tests and inspections. Re-testing of materials that fail to comply with specified requirements will be at the Contractor's expense.

END OF SECTION

SECTION 04 10 00 - MORTAR AND MASONRY GROUT FOR MASONRY

1. Part 1 - GENERAL

1.1. SECTION INCLUDES
   A. Mortar for manufactured stone.

1.2. ENVIRONMENTAL REQUIREMENTS
   A. Cold Weather Requirements: IMIAC - Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.
   B. Hot Weather Requirements: IMIAC - Recommended Practices and Guide Specifications for Hot Weather Masonry Construction

2. PART 2 – PRODUCTS

2.1. MATERIALS
   A. Portland Cement: ASTM C150, Type I gray color.
   B. Premix Mortar: ASTM C387, using gray cement, Normal strength.
   C. Mortar Aggregate: ASTM C144, standard masonry type.
   D. Hydrated Lime: ASTM C207, Type N.
   E. Grout materials and proportions: ASTM C476.
   F. Water: Clean and potable.
   G. Waterproofing Admixture: W.R. Grace Co. “Dry Block”„ application rate as recommended by manufacturer for each specific application.

2.2. MORTAR MIXES
   A. Ready Mixed Mortar: (optional) ASTM C1142, Type S.
   B. Mortar for Non-load Bearing Walls and Partitions: (optional) ASTM C270, Type S or Type N using the Property Method.
   C. Pointing Mortar for Masonry: (optional) ASTM C270, Type S or Type N using the Property Method; with maximum 2 percent ammonium stearate or calcium stearate per cement weight.

2.3. MORTAR MIXING
   A. Thoroughly mix mortar ingredients in quantities needed for immediate use in accordance with ASTM C270.
   B. Add admixtures in accordance with manufacturer’s instructions.
   C. Do not use anti-freeze compounds to lower the freezing point of mortar.

2.4. MIX TESTS
   A. Test mortar and group and submit laboratory report of 3 cube tests.
   B. Testing or Mortar Mix: In accordance with ASTM C780.

3. PART 3 – EXECUTION

3.1. EXAMINATION AND PREPARATION
   A. Examine materials to be set and report irregularities to be corrected before beginning work.

3.2. INSTALLATION
   A. Install mortar in accordance with local code and standard practice.

3.3. SCHEDULES

A. All masonry work = Type S mortar with Type S pointing mortar.

END OF SECTION 04 10 00

SECTION 042113 - BRICK MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Face brick – Match existing face brick, Running/Stack bond. Match existing Face brick, verify at job site.

Match existing mortar color. Verify in field at job site.

1.2 ACTION SUBMITTALS

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

B. Samples: For each type and color of brick and colored mortar.

1.3 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each type and size of product indicated.

1.4 QUALITY ASSURANCE

A. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

B. Sample Panels: Build sample panels to verify selections made under sample submittals and to demonstrate aesthetic effects. Comply with requirements in Section 014000 "Quality Requirements" for mockups.

1. Build sample panels for each type of exposed unit masonry construction in sizes approximately 48 inches long by 48 inches by full thickness. (Sample panels of running bond and sample panels of stacked bond shall be built adjacent to the existing masonry wall construction of each type and are to be approved by Architect/Owner prior to ordering any materials.)

1.5 PROJECT CONDITIONS

A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.

2.2 BRICK

A. General: Provide shapes indicated and as follows.

1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
2. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

B. Face Brick: Facing brick complying with ASTM C 216. Match existing Face brick, verify at job site. (Basis of design – Ragland Clay Products, LLC Modular full range Ragtex)

1. Products: Subject to compliance with requirements, provide the following:

2. Grade: SW.
3. Type: FBS.
4. Initial Rate of Absorption: Less than 30 g/30 sq. in. per minute when tested per ASTM C 67.
5. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
6. Size (Actual Dimensions): Assumed 3-5/8 inches wide by 2-1/4 inches high by 7-5/8 inches long, to be field verify that it matches with existing brick size.

2.3 MORTAR MATERIALS

A. Masonry Cement: ASTM C 91, Type N.

1. Products: Subject to compliance with requirements, provide products by one of the following:

a. Cemex S.A.B. de C.V.

b. Holcim (US) Inc.
c. Lafarge North America Inc.
d. Lehigh Cement Company.
e. National Cement Company, Inc.

B. Aggregate for Mortar: ASTM C 144; Natural sand or crushed stone.

C. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Euclid Chemical Company (The); Accelguard 80.
b. Grace Construction Products; W.R. Grace & Co. -- Conn; Morset.
c. Sonneborn Products; Trimix-NCA.

2.4 REINFORCEMENT

A. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.

B. Masonry Joint Reinforcement for Veneers Anchored with Seismic Masonry-Veneer Anchors: Single 0.187-inch diameter, hot-dip galvanized, carbon-steel continuous wire.

2.5 TIES AND ANCHORS

A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:

1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M; with ASTM A 153/A 153M, Class B-2 coating.
2. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.

B. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches parallel to face of veneer.

C. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch diameter, hot-dip galvanized steel wire.
2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch of masonry face, made from 0.187-inch diameter, hot-dip galvanized steel wire.

D. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. Connector Section: Dovetail tabs for inserting into dovetail slots in concrete and attached to tie section; formed from 0.060-inch thick, steel sheet, galvanized after fabrication.
2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch of masonry face, made from 0.187-inch diameter, hot-dip galvanized steel wire.
3. Corrugated Metal Ties: Metal strips not less than 7/8 inch wide with corrugations having a wavelength of 0.3 to 0.5 inch and an amplitude of 0.06 to 0.10 inch made from 0.060-inch thick, steel sheet, galvanized after fabrication with dovetail tabs for inserting into dovetail slots in concrete and sized to extend to within 1 inch of masonry face.

E. Adjustable Masonry-Veneer Anchors:

1. General: Provide anchors that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs, and as follows:

   a. Structural Performance Characteristics: Capable of withstanding a 100-lbf load in both tension and compression without deforming or developing play in excess of 0.05 inch.

2. Screw-Attached, Masonry-Veneer Anchors: Thermal-Grip MVA – Anchors masonry with minimal thermal bridging.

   a. Basis Of Design products: Provide Prosoco Thermal-Grip MVA masonry anchor or provide products by one of the following.

      1) Dayton Superior Corporation, Dur-O-Wal Division.
      2) Heckmann Building Products, Inc.
      3) Hohmann & Barnard, Inc.

   b. Anchor Section: Barrel: Sabic Lexan 143 Polycarbonate. Wire Tie: ASTM A580 Stainless Steel 304, Tensile 102,500 – 150,000, Yield 70,000 psi. Washer is Polypropylene with carbon black UV stabilizer. Screw is ASTM A510 Carbon Steel. Screw Pull Out Values: 476 lbs. Wood: 662 lbs. 18ga: 694 lbs. 16 ga: 896 lbs.

2.6 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual," Section 076200 "Sheet Metal Flashing and Trim" and as follows:

1. Metal Drip Edge: Fabricate from stainless steel. Extend at least 3 inches into wall and 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.
2. Metal Sealant Stop: Fabricate from stainless steel. Extend at least 3 inches into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch and down into joint 1/4 inch to form a stop for retaining sealant backer rod.

B. Flexible Flashing: Use one of the following unless otherwise indicated:

1. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.030 inch.

    a. Products: Subject to compliance with requirements, provide one of the following:

        1) Advanced Building Products Inc; Strip-N-Flash.
        2) Carlisle Coatings & Waterproofing Inc; CCW-705-TWF Thru-Wall Flashing.
        3) Dayton Superior Corporation, Dur-O-Wal Division; Dur-O-Barrier Thru-Wall Flashing.
        4) Grace Construction Products; W.R. Grace & Co. -- Conn; Perm-A-Barrier Wall Flashing.
        5) Heckmann Building Products, Inc; No. 82 Rubberized-Asphalt Thru-Wall Flashing..
        6) Hohmann & Barnard, Inc; Textroflash.
        7) Meadows, W.R.,Inc; Air-Shield Thru-Wall Flashing.
        8) Williams Products, Inc; Everlastic MF-40.
        9) Termination Bar: Install as needed at wall flashing by each manufacture listed above.

2. EPDM Flashing: Sheet flashing product made from ethylene-propylene-diene terpolymer, complying with ASTM D 4637, 0.040 inch thick.

    a. Products: Subject to compliance with requirements, provide one of the following:

        1) Carlisle Coatings & Waterproofing Inc; Pre-Kleened EPDM Thru-Wall Flashing.
        2) Firestone Specialty Products; FlashGuard.
        3) Heckmann Building Products, Inc; No. 81 EPDM Thru-Wall Flashing.
        4) Hohmann & Barnard, Inc; Epra-Max EPDM Thru-Wall Flashing.

C. Solder and Sealants for Sheet Metal Flashings: As specified in Section 076200 "Sheet Metal Flashing and Trim."

D. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.7 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; formulated from neoprene, urethane or PVC.

B. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

C. Weep/Vent Products:

1. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of joint and depth 1/8 inch less than depth of outer wythe, in color selected from manufacturer's standard.

    a. Products: Subject to compliance with requirements, provide one of the following:

        1) Advanced Building Products Inc; Mortar Maze weep vent.
        2) BLOK-LOK Limited; Cell-Vent.
        3) Dayton Superior Corporation, Dur-O-Wal Division; Cell Vents.
        4) Heckmann Building Products, Inc; No. 85 Cell Vent..
        5) Hohmann & Barnard, Inc; Quadro-Vent.

D. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Advanced Building Products Inc; Mortar Break.
    b. CavClear/Archovations, Inc; Stone Mat.
    c. Dayton Superior Corporation, Dur-O-Wal Division; Polytite MortarStop.
    d. Mortar Net USA, Ltd; Mortar Net.

2. Provide the following configuration:

    a. Strips, full-depth of cavity and 10 inches high, with dovetail shaped notches 7 inches deep.

2.8 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Diedrich Technologies, Inc.
    b. EaCo Chem, Inc.
    c. PROSOCO, Inc.

2.9 MORTAR MIXES

A. General: Do not use admixtures, including air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1. Do not use calcium chloride in mortar.
2. Use masonry cement mortar unless otherwise indicated.
3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

B. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

C. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

3.2 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch or minus 1/4 inch.
2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2-inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch; do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
2. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.

3.3 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs. (Stack-bond masonry to have horizontal joint reinforcement.)

C. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

D. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

3.4 MORTAR BEDDING AND JOINTING

A. Lay hollow brick as follows:

1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
2. With entire units, including areas under cells, fully bedded in mortar at starting course on footings.

B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

3.5 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to structural steel and concrete where masonry abuts or faces structural steel or concrete to comply with the following:

1. Provide an open space not less than 1/2 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.6 ANCHORING MASONRY VENEERS

A. Anchor masonry veneers to wall framing with masonry-veneer anchors to comply with the following requirements:

1. Fasten screw-attached anchors through sheathing to wall framing with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
2. Embed tie sections in masonry joints.
3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
4. Space anchors as indicated, but not more than 16 inches o.c. vertically and 32 inches o.c. horizontally with not less than 1 anchor for each 3.5 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 36 inches, around perimeter.

3.7 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.

B. Install flashing as follows unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
2. At lintels and shelf angles, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
3. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal drip edge.
4. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal flashing termination.

C. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:

1. Use specified weep/vent products to form weep holes.
2. Space weep holes 24 inches o.c. unless otherwise indicated.

D. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.

E. Install vents in head joints in exterior wythes at spacing indicated. Use specified weep/vent products to form vents.

1. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

3.8 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to meet specified requirements shall be done at Contractor's expense.

B. Inspections: Level 1 special inspections according to the "International Building Code."

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.

C. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

3.9 CLEANING

A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes
2. Protect adjacent surfaces from contact with cleaner.
3. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
4. Clean brick by bucket-and-brush hand-cleaning method described in "BIA Technical Notes 20."
5. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
6. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

3.10 MASONRY WASTE DISPOSAL

A. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.

1. Do not dispose of masonry waste as fill within 18 inches of finished grade.

B. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042113

SECTION 042113.13 - BRICK PAVERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Clay brick pavers set on a mortar setting bed over a concrete base.

B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for concrete base slab supporting paving.
2. Section 042113 "Brick Masonry" for face brick and other unit masonry.
3. Section 079200 "Joint Sealants" for sealants in expansion and control joints.

1.2 REFERENCE STANDARDS

A. ASTM International (ASTM):

1. ASTM C67 - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile.
2. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar.
3. ASTM C150 - Standard Specification for Portland Cement.
4. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes.
5. ASTM C270 - Standard Specification for Mortar for Unit Masonry.
6. ASTM C902 - Standard Specification for Pedestrian and Light Traffic Paving Brick.
7. ASTM C979 - Standard Specification for Pigments for Integrally Colored Concrete.

B. Brick Industry Association (BIA):

1. Technical Note 14 - Paving Systems Using Clay Pavers.
2. Technical Note 14C - Paving Systems Using Clay Pavers on a Mortar Setting Bed.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of clay paver and mortar material indicated.

B. Samples for Verification:

1. Full-size units for each clay paver type, color, and texture required; not fewer than four units per selection, showing the full range of color and texture to be expected.
2. Colored mortar samples showing the full range of colors available.

C. Shop Drawings: Show paving layout, laying pattern, joint widths, edge and perimeter conditions, and locations of expansion, control, and construction joints.

1.4 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each type and size of clay paver, signed by the manufacturer, certifying compliance with ASTM C902 for the class, type, and application specified.

B. Product Test Reports: Based on tests performed according to ASTM C67, indicating compliance of clay pavers with the compressive strength, cold water absorption, and freezing-and-thawing requirements specified.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and experienced in installing paving of the same type, pattern, and setting method as this Project, with a record of successful in-service performance.

B. Source Limitations for Clay Pavers: Obtain each color, texture, and size of clay paver through one source from a single manufacturer.

C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup of paving, including setting bed, jointing, and edge conditions, approximately 4 by 4 feet.

2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver clay pavers to Project site in original manufacturer's packaging, on pallets, marked to identify manufacturer, product, and color.

B. Store pavers off the ground, under cover, and protected from contamination, staining, and weather.

C. Store cementitious materials off the ground, under cover, and in a dry location. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

1.7 FIELD CONDITIONS

A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace work damaged by frost or freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

The basis-of-design product below is carried forward from the Owner's design intent. The three approved-equal manufacturers are established producers of ASTM C902 clay pavers in the specified size and are provided to satisfy competitive-bid requirements. See Section 016000 "Product Requirements."

A. Basis-of-Design Product: Subject to compliance with requirements, provide the following, or a comparable product by one of the manufacturers listed under "Approved Equals":

1. Manufacturer: Pine Hall Brick Co., Inc., Winston-Salem, North Carolina 27105; (800) 334-8689; pinehallbrick.com.

2. Product: "English Edge" clay paver, colors to be selected.

B. Approved Equals: Subject to compliance with the requirements of this Section, provide products by one of the following:

1. The Whitacre Greer Company, Alliance, Ohio 44601; (800) 947-2837; wgpaver.com.
2. Endicott Clay Products Company, Fairbury, Nebraska 68352; (402) 729-3315; endicott.com.
3. The Belden Brick Company, Canton, Ohio 44701; (330) 456-0031; beldenbrick.com.

C. Substitutions: Comply with Section 012500 "Substitution Procedures." On this publicly bid Project, products other than the basis-of-design product or the listed approved-equal products shall be submitted in accordance with the Instructions to Bidders and approved by Addendum prior to receipt of bids. Approval of a manufacturer under "Approved Equals" does not relieve the Contractor of the obligation to provide products meeting all requirements of this Section, including color and texture to match the basis of design.

2.2 CLAY BRICK PAVERS

A. Clay Brick Pavers: Solid clay paving brick complying with ASTM C902, of the following characteristics:

1. Class: SX (severe weathering; suitable for exterior freezing-and-thawing exposure).
2. Type: I (pedestrian and light traffic; low abrasion).
3. Application: PX.
4. Freezing and Thawing: Comply with ASTM C67 for freeze-and-thaw durability, with no breakage and no greater than 0.5 percent loss in dry mass.
5. Minimum Compressive Strength: 8,000 psi, average of five units, when tested per ASTM C67.
6. Maximum Cold Water Absorption: 8 percent, average of five units, when tested per ASTM C67.
7. Size (Actual Dimensions): 2-1/4 inches thick by 4 inches wide by 8 inches long, including spacer nibs on the sides.
8. Edges: Chamfered on both bed surfaces for reversibility.
9. Features: Molded spacer nibs on unit sides to control joint size and reduce chippage; through-body color to eliminate color fading.
10. Color and Texture: To match basis-of-design product (Pine Hall Brick "English Edge," colors as selected by Architect from manufacturer's full range of colors and textures.)

2.3 MORTAR MATERIALS

A. Portland Cement: ASTM C150, Type I or Type II. Provide natural color or white cement as required to produce required mortar color.

B. Hydrated Lime: ASTM C207, Type S.

C. Aggregate for Mortar: ASTM C144.

1. For joint widths less than 1/4 inch, use aggregate graded with 100 percent passing the No. 16 sieve.
2. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

D. Coloring Pigment: ASTM C979, mineral-oxide pigment compatible with other mortar materials; not exceeding 10 percent of portland cement by weight (2 percent maximum for carbon black).

E. Water: Potable.

2.4 ACCESSORY MATERIALS

A. Bond Coat: Neat portland cement slurry, or latex-portland cement bond coat as recommended by paver manufacturer for setting pavers on a mortar bed over a concrete base.

B. Compressible Filler / Expansion-Joint Material: Pre-molded filler strips complying with ASTM D1056, Grade 2A1, compressible up to 35 percent, formulated from neoprene, urethane, or PVC.

C. Joint Sealant: As specified in Section 079200 "Joint Sealants," for expansion and control joints in paving.

D. Proprietary Cleaner: Manufacturer's standard-strength acidic cleaner for masonry, expressly approved for the clay pavers by both the cleaner manufacturer and the paver manufacturer.

2.5 MORTAR AND SETTING-BED MIXES

A. General: Comply with ASTM C270, Proportion Specification. Do not use admixtures, including pigments, accelerators, retarders, water-repellent agents, or antifreeze compounds, unless otherwise indicated. Do not use calcium chloride.

B. Setting-Bed Mortar: 1 part portland cement to not more than 4 parts sand, by volume, mixed to a stiff, workable consistency; comply with BIA Technical Note 14C.

C. Jointing Mortar (Grout): ASTM C270, Type S, for filling joints between pavers.

D. Pigmented Mortar: Use colored cement product or mineral-oxide pigment to match Architect's sample. Use pigmented mortar for exposed joints only. Mix to match Architect's approved sample.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine concrete base and other substrates, with Installer present, for compliance with requirements for installation tolerances, slope, and other conditions affecting performance of the Work.

1. Verify that concrete base is cured, sound, clean, free of laitance and curing compounds, and sloped to drain not less than 1/8 inch per foot (1 percent) unless otherwise indicated.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean the concrete base of dust, debris, oil, and other substances that would impair bond of the setting bed.

B. Apply bond coat to the prepared concrete base immediately ahead of placing the setting-bed mortar.

3.3 INSTALLATION

A. General: Install clay pavers on a mortar setting bed in accordance with BIA Technical Note 14C and paver manufacturer's written instructions.

B. Setting Bed: Place setting-bed mortar over the bond coat and screed to a uniform thickness of not less than 3/4 inch and not more than 2 inches. Place only as much setting bed as can be covered with pavers before the mortar reaches initial set.

C. Laying Pattern: Lay pavers in the pattern indicated on Drawings. Set each paver firmly into the fresh setting bed and beat down to a true, even plane. Provide uniform joint widths as controlled by unit spacer nibs, nominal 3/8 inch unless otherwise indicated.

D. Cut Units: Cut pavers with a motor-driven masonry saw to provide clean, sharp, unchipped edges. Locate cut units where least conspicuous. Avoid using units less than one-half size at edges and corners.

E. Joints: Fill joints with jointing mortar. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than the joint thickness. Remove excess mortar before it sets.

F. Expansion and Control Joints: Provide expansion joints at the perimeter of paving, where paving abuts vertical surfaces, over structural expansion joints, and at intervals indicated on Drawings. Keep expansion joints free of mortar and fill with joint sealant over compressible filler in accordance with Section 079200.

G. Tolerances:

1. Do not vary surface from level or indicated slope by more than 1/4 inch in 10 feet.
2. Do not vary joint width from that indicated by more than plus or minus 1/16 inch. Maximum lippage between adjacent units: 1/16 inch.

3.4 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner may engage a qualified testing agency to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

3.5 CLEANING AND PROTECTION

A. In-Progress Cleaning: Remove mortar fins and smears as work progresses, before mortar sets.

B. Final Cleaning: After mortar has thoroughly set and cured, clean exposed paving. Wet paving with water before applying acidic cleaner; apply cleaner according to manufacturer's written instructions; and rinse thoroughly with clean water. Test cleaning methods on the mockup and leave one-half uncleaned for comparison.

C. Protection: Protect completed paving from traffic and other construction operations. Do not permit foot traffic for a minimum of 3 days and vehicular traffic for a minimum of 7 days after installation, or as recommended by the paver manufacturer.

END OF SECTION 042113.13

SECTION 047200 - CAST STONE MASONRY

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Architectural cast stone.
Indicated on drawings as "cast stone".

1.2 RELATED REQUIREMENTS

A. Section 040511 - Mortar and Masonry Grout: Mortar for setting cast stone.
B. Section 042000 - Unit Masonry: Installation of cast stone in conjunction with masonry.
C. Section 079200 - Joint Sealants: Sealing joints indicated to be left open for sealant.

1.3 REFERENCE STANDARDS

A. ACI 318 - Building Code Requirements for Structural Concrete 2019, with Errata (2021).
B. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement 2020.
C. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement 2019.
D. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement 2019, with Editorial Revision (2020).
E. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete 2018a.
F. ASTM C33/C33M - Standard Specification for Concrete Aggregates 2018.
G. ASTM C150/C150M - Standard Specification for Portland Cement 2021.
H. ASTM C270 - Standard Specification for Mortar for Unit Masonry 2019a, with Editorial Revision.
I. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete 2019.
J. ASTM C642 - Standard Test Method for Density, Absorption, and Voids in Hardened Concrete 2021.
K. ASTM C1364 - Standard Specification for Architectural Cast Stone 2019.

1.4 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.
B. Shop Drawings: Include elevations, dimensions, layouts, profiles, cross sections, reinforcement, exposed faces, arrangement of joints, anchoring methods, anchors, and piece numbers.
C. Mortar Color Selection Samples.

D. Verification Samples: Pieces of actual cast stone components not less than 6 inches (152 mm) square, illustrating range of color and texture to be anticipated in components furnished for

E. project.

F. Source Quality Control Test Reports.

G. Manufacturer's Qualification Data: Documentation showing compliance with specified requirements.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications:
   1. Adequate plant capacity to furnish quality, sizes, and quantity of cast stone required without delaying progress of the work.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience

1.6 MOCK-UP

A. See Section 014000 - Quality Requirements for additional requirements.

B. Approved mock-up will become standard for appearance and workmanship.

C. Mock-up may remain as part of the completed work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver cast stone components secured to shipping pallets and protected from damage and discoloration. Protect corners from damage.

B. Number each piece individually to match shop drawings and schedule.

C. Store cast stone components and installation materials in accordance with manufacturer's instructions.

D. Store cast stone components on pallets with nonstaining, waterproof covers. Ventilate under covers to prevent condensation. Prevent contact with dirt.

E. Protect cast stone components during handling and installation to prevent chipping, cracking, or other damage.

F. Store mortar materials where contamination can be avoided.

G. Schedule and coordinate production and delivery of cast stone components with unit masonry work to optimize on-site inventory and to avoid delaying the work.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Architectural Cast Stone:
   1. Any current producer member of the Architectural Precast Association.
   2. Any current producer member of the Cast Stone Institute.
   3. Substitutions: See Section 016000 - Product Requirements.

2.2 ARCHITECTURAL CAST STONE

A. Cast Stone: Architectural concrete product manufactured to simulate appearance of natural granite, complying with ASTM C1364.

1. Compressive Strength: As specified in ASTM C1364; calculate strength of pieces to be field cut at 80 percent of uncut piece.
2. Freeze-Thaw Resistance: Demonstrated by laboratory testing in accordance with ASTM C1364.
3. Surface Texture: Fine grained texture, with no bugholes, air voids, or other surface blemishes visible from distance of 20 feet (6 meters).
4. Color: **To be selected by Architect**
5. Remove cement film from exposed surfaces before packaging for shipment.

B. Shapes: Provide shapes indicated on drawings.
1. Variation from Any Dimension, Including Bow, Camber, and Twist: Maximum of plus/minus 1/8 inch (3 mm) or length divided by 360, whichever is greater, but not more than 1/4 inch (6 mm).
2. Unless otherwise indicated on drawings, provide:
a. Wash or slope of 1:12 on exterior horizontal surfaces.
b. Drips on projecting components, wherever possible.
c. Raised fillets at back of sills and at ends to be built in.

C. Reinforcement: Provide reinforcement as required to withstand handling and structural stresses; comply with ACI 318.

1. Pieces More than 24 inches (610 mm) in Any Dimension: Provide full length two-way reinforcement of cross-sectional area not less than 0.25 percent of unit cross-sectional area

23 MATERIALS

A. Portland Cement: ASTM C150/C150M.
1. For Units: Type I, white or gray as required to match Architect 's sample.
2. For Units: Type I or II, white.
3. For Mortar: Type I or II, except Type III may be used in cold weather.

B. Coarse Aggregate: ASTM C33/C33M, except for gradation; granite, quartz, or limestone.

C. Fine Aggregate: ASTM C33/C33M, except for gradation; natural or manufactured sands.

D. Admixtures: ASTM C494/C494M.

E. Water: Potable.

F. Reinforcing Bars: ASTM A615/A615M, Grade 40 (40,000 psi) (280 MPa), deformed bars, galvanized.
1. Galvanized in accordance with ASTM A767/A767M, Class I.

G. Steel Welded Wire Reinforcement: ASTM A1064/A1064M, galvanized or ASTM A884/A884M, epoxy coated.

H. Embedded Anchors, Dowels, and Inserts: Type 304 stainless steel, of type and size as required for conditions.

I. Mortar: Portland cement-lime, as specified in Section 040511 ; do not use masonry cement.

J. Cleaner: General-purpose cleaner designed for removing mortar and grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or damaging masonry surfaces; approved for intended use by cast stone manufacturer and by cleaner manufacturer for use on cast stone and adjacent masonry materials.

2.4 SOURCE QUALITY CONTROL

A. Test compressive strength and absorption of specimens selected at random from plant production.
   1. Test in accordance with ASTM C642.
   2. Select specimens at rate of 3 per 500 cubic feet (3 per 14 cubic m), with a minimum of 3 per production week.
   3. Submit reports of tests by independent testing agency, showing compliance with requirements.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine construction to receive cast stone components. Notify Architect if construction is not acceptable.

B. Do not begin installation until unacceptable conditions have been corrected.

3.2 INSTALLATION

A. Install cast stone components in conjunction with masonry, complying with requirements of Section 042000.

B. Mechanically anchor cast stone units indicated; set remainder in mortar.

C. Setting:
   1. Drench cast stone components with clear, running water immediately before installation.
   2. Set units in a full bed of mortar unless otherwise indicated.
   3. Fill vertical joints with mortar.
   4. Fill dowel holes and anchor slots completely with mortar or non-shrink grout.

3.3 TOLERANCES

A. Joints: Make all joints 3/8 inch (9.5 mm), except as otherwise detailed.
   1. Rake mortar joints 3/4 inch (19 mm) for pointing.
   2. Remove excess mortar from face of stone before pointing joints
   3. Point joints with mortar in layers 3/8 inch (9.5 mm) thick and tool to a slight concave profile.
   4. Leave the following joints open for sealant:
      a. Head joints in top courses, including copings, parapets, cornices, sills, and steps.
      b. Joints in projecting units.
      c. Joints between rigidly anchored units, including soffits, panels, and column covers.
      d. Joints below lugged sills and stair treads.
      e. Joints below ledge and relieving angles.
      f. Joints labeled "expansion joint".

B. Installation Tolerances:
   1. Variation from Plumb: Not more than 1/8 inch in 10 feet (3 mm in 3 m) or 1/4 inch in 20 feet (6 mm in 6 m) or more.
   2. Variation from Level: Not more than 1/8 inch in 10 feet (3 mm in 3 m) or 1/4 inch in 20 feet (6 mm in 6 m), or 3/8 inch (9 mm) maximum.
   3. Variation in Joint Width: Not more than 1/8 inch in 36 inches (3 mm in 900 mm) or 1/4 of nominal joint width, whichever is less.
   4. Variation in Plane Between Adjacent Surfaces (Lipping): Not more than 1/16 inch (1.5 mm) difference between planes of adjacent units or adjacent surfaces indicated to be flush with units.

3.4 REPAIR

A. Repair chips and other surface damage noticeable when viewed in direct daylight at 20 feet (6 m).

B. Repair with matching touch-up material provided by the manufacturer and in accordance with manufacturer's instructions.

C. Repair methods and results subject to Architect 's approval.

3.5 CLEANING

A. Keep cast stone components clean as work progresses.

B. See Section 017419 - Construction Waste Management and Disposal, for additional requirements.

3.6 PROTECTION

A. Protect completed work from damage.

B. Clean, repair, or restore damaged or mortar-splashed work to condition of new work.

END OF SECTION 047200

SECTION 047300 – INTERIOR MANUFACTURED STONE VENEER

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Interior Adhered Manufactured Stone Veneer Cladding.

B. Surface preparation.

C. Mortar setting materials.

D. Corner and trim units.

E. Cleaning and prep..

1.02 RELATED REQUIREMENTS

A. Section 061000 - Rough Carpentry: Wood stud backup for masonry veneer.

B. Section 079200 - Joint Sealants: Sealing control and expansion joints.

C. Section 09216 – Gypsum Board, backer board

1.03 REFERENCE STANDARDS

A. ASTM C270 - Standard Specification for Mortar for Unit Masonry 2019a, with Editorial Revision.

B. ASTM C1780 - Standard Practice for installation methods for adhered manufactured stone masonry veneer.

C. ASTM C1670 – Standard specification for adhered manufactured stone veneer units.

D. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures 2016.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.

B. Coordinate installation with completion of framing, substrate preparation, electrical devices, and any wall penetrations.

1.05 SUBMITTALS

A. See Section 013300 – Submittal Procedures.

B. Product Data: Provide manufacturer's data for stone veneer units, setting mortar, grout materials if applicable, sealants, and accessories.

C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Section 016000 - Product Requirements, for additional provisions.

D. Minimum 12" x 12" sample panels indicating color, texture, and patterns.

1.06 QUALITY ASSURANCE

A. Comply with provisions of ASTM C1780 and manufacturer's installation instructions.

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

C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.07 MOCK-UP

A. Construct a complete 4' x 4' mock-up panel including stone style and color, inside and outside corners, typical transitions/terminations for Architect's approval prior to installation.

B. Locate where directed.

C. Mock-up may remain as part of the Work if approved.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means of that will prevent mechanical damage and contamination by other materials.

B. Protect materials from contamination, moisture, and any damage.

1.09 FIELD CONDITIONS

A. Maintain appropriate ambient and substrate temperatures in accordance with specific manufacturer's instructions or applicable building code, whichever is more stringent.

PART 2 PRODUCTS

2.01 MANUFACTURED STONE VENEER

Basis of design: ProVia, LLC – Precision fit dry stack manufactured stone veneer system; or approved equal.

1. Adhered manufactured stone veneer units installed in a dry-stack configuration.
2. Non-structural, lightweight concrete units formed to resemble natural stone.
3. Precision fit configuration designed to minimize field trimming and maintain a tight fitting dry stack apprance.
4. Non-load bearing architectural veneer.

5. Color and style as selected by architect from manufacturer's standard offerings.
6. Dimensions (Nominal)
1. Flats:
   a. Width: 5 inches to 21-1/2 inches
   b. Height: 1 inch to 5-1/2 inches
   c. Depth: 1 inch to 2 inches
2. 90-Degree Corners:
   a. Long Tails: 9 inches to 10-1/2 inches
   b. Medium Tails: 5-1/2 inches to 6-1/2 inches
   c. Short Tails: 1-1/2 inches to 2-1/4 inches

2.02 MORTAR MATERIALS

A. Polymer-modified stone veneer setting mortar meeting manufacturer's requirements.

B. Color – as selected by architect.

2.03 ACCESSORIES

A. Metal Lath: Galvanized expanded metal lath where required by substrate conditions compling with ASTM C10-63.

B. Scratch Coat Materials: As required /recommended by stone veneer manufacturer.

C. Cementitious Backer Board: Must be compatible with the adhered stone veneer system.

D. Sealants: As specified in section 079200.

E. Cleaning Materials: Must be Manufacturer approved and non-acidic.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive stone veneer.

B. Install metal lath and scratch coat as directed by manufacturer.

C. Verify that related items provided under other sections are properly sized and located.

D. Verify that built-in items are in proper location, and ready for roughing into stone veneer work.

3.02 PREPERATION

A. Install moisture resistant cement backer-board.

B. Install metal lath and scratch coat.

C. Allow scratch coat to fully cure prior to adhered stone installation.

3.03 INSTALLATION

A. Install adhered stone veneer in strict accordance with ASTM C1780 and manufacturer's current published installation instructions.

B. Install Precision fit dry stack stone to achieve tight-fitting joints and consistent coursing.

C. Blend units from multiple cartons during installation to achieve uniform color distribution.

D. Maintain level coursing and proper alignment.

E. Install corner units first then alternate short and long returns.

3.04 JOINT TREATMENT

A. Dry stack system shall be installed without conventional mortar joints.

B. Maintain a tight-fitting stone-to-stone appearance consistent with the approved mock-up panel.

C. Fill all visible voids as recommended by the manufacturer.

3.05 TOLERANCES

A. Install stone veneer true to line and level.

B. Variation from plumb: Maximum 1/4 inch in 10 feet & 3/8 inch overall.

3.06 CUTTING AND FITTING

A. Cut and fit for pipes and conduit. Coordinate with other sections of work to provide correct size, shape, and location. Cut around any switches, outlets, or millwork. All cuts must be neat in appearance and unobtrusive.

B. Any rough/cut edge must be located in a less visible location whenever possible.

3.07 CLEANING

A. Remove excess mortar and mortar smears as work progresses.

B. Clean all finished surfaces using a manufacturer approved cleaning method.

C. Remove and replace any damaged or stained units that cannot be cleaned.

3.08 PROTECTION

A. Protect completed stone veneer from any damage during construction activity.

B. Protect from any staining due to paints, sealants, adhesives, & any other construction materials.

C. Replace any damaged work to match adjacent construction.

END OF SECTION

SECTION 05 12 00 - STRUCTURAL STEEL

1. PART 1 GENERAL

1.1. DESCRIPTION

A. Perform all work required to complete the Structural Steel work indicated by the Contract Documents and furnish all supplementary items necessary for its proper installation.

1.2. RELATED WORK SPECIFIED ELSEWHERE

A. Test and Laboratory Control - Section 01 45 00.
B. Steel Joists - Section 05 21 00.
C. Metal Decking - Section 05 31 00.

1.3. REFERENCES

A. ASTM A36 - Structural Steel.
B. ASTM A53 - Hot-Dipped, Zinc-coated Welded and Seamless Steel Pipe.
C. ASTM A123 - Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed and Forged Steel Shapes, Plates, Bars, and Strip.
D. ASTM A153-Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
E. ASTM A283 - Carbon Steel Plates, Shapes, and Bars.
F. ASTM A307-Carbon Steel Externally Threaded Standard Fasteners.
G. ASTM A325-High Strength Bolts for Structural Steel Joints.
H. ASTM A386-Zinc-Coating (Hot-Dip) on Assembled Steel Products.
I. ASTM A500-Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.
J. ASTM A501-Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
K. ASTM B177-Chromium Electroplating on Steel for Engineering Use.
L. AWS A2.0-Standard Welding Symbols.
M. AWS D1.1-Structural Welding Code.
N. SSPC - Steel Structures Painting Council..

1.4. QUALITY ASSURANCE

A. The testing laboratory approved by the Architect and Engineer shall inspect high-strength bolted connections and welds and perform all tests in the shop and in the field and submit test reports to the Architect as hereinafter specified. The testing laboratory shall be responsible for conducting and interpreting the test, shall state in each report whether or not test specimens conform to all requirements of the Contract Documents, and shall specifically note any deviations therefrom. Corrective measures, including additional testing, which result from these tests shall be the Contractor's responsibility.
B. The testing agency shall furnish to the Architect five (5) certified copies of all test reports.

1.5. REQUIREMENTS OF REGULATORY AGENCIES

A. Building Code shall mean 2021 International Building Code.
B. AISC Specifications for Structural Steel shall mean ANSI/AISC 360-16 Specification for Structural Steel Buildings, July 7, 2016.
C. Specification for Structural Joints shall mean Specification for Structural Joints using High-Strength Bolts approved by the Research Council on Structural Connections of the

Engineering Foundation, June 11, 2020.

D. AWS Building Code shall mean AWS "Code for Welding in Building Construction," latest edition.
E. ASTM shall mean the appropriate specification of the American Society of Testing and Materials.

1.6. QUALIFICATIONS

A. Steel Fabricator: Fabricator shall have not less than 10 years experience in the fabrication of structural steel.
B. Steel Erector: Erector shall have not less than 10 years experience in the erection of Structural steel.
C. Welding procedures, welders, welding operations and tackers shall be qualified in accordance with the AWS Building Code. Certification of welders by the testing laboratory shall not be more than six months old at the time of welding in the erection period.

1.7. SUBMITTALS

A. Submit under provisions of Section 01300.
B. Meet requirements of applicable portions of "Structural Shop Drafting" by AISC.
C. Shop Drawings:
    1. Submit shop drawings, indicating all shop and erection details, including cuts, copes, connections, holes, threaded fasteners, rivets, and welds.
    2. Contractor shall be responsible for all connection design.
    3. Shop drawings and calculations shall be submitted, signed and sealed by a Louisiana Professional Engineer.
    4. All welds, both shop and field, shall be indicated by AWS Welding Symbols. Indicate net weld lengths.
    5. Shop drawings shall not be made by using reproductions of contract drawings.
    6. Any fabrication of material before approval of drawings will be at the risk of the Contractor.
    7. Note and mark sufficiently to indicate compliance with requirements of these specifications.
D. Erection Procedure: Submit descriptive data to illustrate the structural steel erection procedure, including sequence of erection and temporary staying and bracing.
E. Welding Procedure: Submit qualification of flux-cored arc welding procedures in accordance with Article 502, AWS D1-1.
F. Welders Certificates: Submit under provisions of Section 01300, certifying welders employed on the Work, verifying AWS qualification within the previous 12 months.
G. Proof of Compliance for Materials:
    1. Report of ladle analysis of all steel.
    2. Report of tensile properties for:
        a. Steel shapes
        b. Steel bars
        c. Steel plates
    3. Mill Certifications.

1.8. PROPOSED SUBSTITUTIONS

A. Substitutions of sections or modification of details, if proposed by the Contractor, shall be submitted for approval in sketch form prior to submission of shop drawings, and such

substitutions shall be made only when approved by the Architect and Engineer.

1.9. 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 and other devices.
   3. The General Contractor shall check the correct positioning of anchor bolts before concrete is placed. Subsequent displacement of the anchor bolts will be the responsibility of the General Contractor.
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 material shall be stored in their original unbroken package or container.

2. PART 2 PRODUCTS

2.1. MATERIALS

A. Steel Wide Flange Shapes: ASTM A992-50
B. Steel Hollow Structural Shapes, ASTM A500-Grade C.
C. Steel, Shapes, Bars and Plates other than wide flanges ASM A36 or ASTM A992
D. Headed Stud Type Shear Connectors:
   1. Cold finished carbon steel, ASTM A108.
   2. Dimensions of shear connectors shall conform to Figure M-1 of AWS Building Code.
E. Anchor Rods: ASTM F1554 grade 36.
F. High-Strength Threaded Fasteners: ASTM A325 or ASTM A490.
G. Filler Metal for Welding.
   1. Shielded metal - arc welding - AWS A5.1 or A5.5.
   2. Submerged - arc welding - AWS A5.17.
   3. Flux-cored arc welding - AWS A5.20.
H. Grout: Non-shrink grout "Embeco Pre-mixed Grout" by Master Buildings or approved equal. The material shall be ready-to-use metallic aggregate product requiring only the addition of water at the job site, and shall produce a flowable grouting material having no drying shrinkage at any age. Compressive strength of grout (2" x 2" cubes) shall be not less than 4000 psi at 7 days and 7500 psi at 28 days.
I. Paint: Fabricators standard conforming to SSPC Specifications.

2.2. FABRICATION

A. Fabricate Structural Steel in accordance with the AISC Specification for Structural Steel.
   1. All work shall be shop-assembled in so far as possible and delivered to the site ready for erection. Material shall be properly marked and match-marked where field assembly is required. The sequence of shipments shall be such as to expedite erection and minimize field handling of material.
   2. Members to be milled shall be completely assembled before milling.

3. Beams, girders, and trusses shall be cambered as indicated on the drawings. Specified camber shall be within a tolerance of minus zero to plus 1/8 inch per 10 feet of beam length. Members without specified camber shall be fabricated so that after erection any minor camber due to rolling or fabrication shall be upward.
4. Shop connections shall be high-strength bolted or welded, as indicated on the structural drawings or as required.

B. Field connections shall be high-strength bolted or welded, as indicated on the structural drawings or as required.

C. High-strength Bolted Construction Assembly: Tightening shall be done by the calibrated wrench method or the turn-of-the-nut method in accordance with Section 8 (d) of the Specifications for Structural Joints for all friction connections. For all bearing type bolted connections, bolts shall be installed to a snug tight fit with all plies in a joint in firm contact.

D. Welded Construction
1. All welding done in accordance with AWS D1.1.
2. Welding process shall be limited to one or more of the following:
a. Manual shielded-arc.
b. Submerged-arc.
c. Flux-cored arc.
3. Preheat and interpass temperature shall conform Table 4.2, AWS D1.1.
4. Welds not specified shall be continuous fillet welds, using minimum fillet as specified by AWS D1.1.

E. No combination of bolts and welds shall be used for stress transmission in the same faying face of any connections.

F. Bearing Plates:
1. Bearing plates shall be provided under beams, girders, and trusses resting on footings, piers, and walls.
2. Bearing plates shall be either attached or loose.

2.3. SOURCE QUALITY CONTROL - The Steel fabricator shall provide certification of the following to the Testing Agency for their review.

A. Check steel plates and shapes for conformation to specifications.

B. Check high-strength threaded fasteners for conformance to the specifications.

C. Check filler metal for conformance to the specifications.

D. Determine chemical composition of all steel.

E. Determine mechanical properties, in accordance with ASTM A370, of the following materials:
1. Steel shapes.
2. Bars and plates.
3. Headed stud type shear connectors.
4. Anchor bolts.
5. High-strength threaded fasteners.
6. Filler metal for welding.

F. Qualification of shop bolting, welding, and stud welding and personnel.

G. Inspection of shop welds shall be in accordance with Section 6 of AWS Building Code and as follows:
1. Visual inspection of all shop welds in accordance with Article 605.
2. Ultrasonic testing in accordance with ASTM E164 of all penetration welds.

3. PART 3 EXECUTION

3.1. EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.
B. Beginning of installation means erector accepts existing conditions.

3.2. PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.
B. Supply items required to be cast into concrete or embedded in masonry with setting templates, to appropriate sections.

3.3. ERECTION

A. Erect structural steel in accordance with the AISC Specifications for Structural Steel, and the Code of Standard Practice for Steel Buildings and Bridges.
B. Column Bases and Bearing Plates:
   1. Attached column bases and bearing plates for beams and similar structural members shall be aligned with wedges and shims.
   2. Loose column bases which are too heavy to be placed without a derrick or crane shall be set and wedged or shimmed or as noted on the structural drawings.

C. Erection Tolerances:
   1. Individual pieces shall be erected so that deviation from plumb, level and alignment shall not exceed that specified in the AISC Code of Standard Practice, nor the following:
      a. The displacement of the center-line of columns adjacent to elevator shaft, from the established column line, shall be not more than 1 inch at any point.
      b. The displacement of the center-line of exterior columns, from the established column line, shall be not more than 1 inch toward, nor 2 inches away from the building line at any point.

D. Field Assembly:
   1. Structural steel frames shall be accurately assembled to the lines and elevations indicated, within the specified erection tolerances.
   2. The various members forming parts of a complete frame or structure after being assembled shall be aligned and adjusted accurately before being fastened.
   3. Fastening of splices of compression members shall be done after the abutting surfaces have been brought completely into contact.
   4. Bearing surfaces and surfaces which will be in permanent contact shall be cleaned before the members are assembled.
   5. Splices shall be permitted only where indicated.
   6. Drift pins shall not be used to enlarge unfair holes in main material. Holes that must be enlarged to admit bolts shall be reamed. Burning and drifting may be used to align unfair holes in secondary members only upon approval of the Architect.
   7. Erection bolts used in welded construction may be either tightened securely and left in place or removed and the holes filled with plug welds.

E. 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 and Engineer.

F. Grouting of Base Plates and Bearing Plates: Plates shall be set and anchored to the proper line and elevation. Metal wedges, shims, and/or setting nuts shall be used for leveling and plumbing the structural members, including plumbing of columns. Concrete surfaces shall be rough, surfaces shall be clean and free of oil, grease, and rust. The addition of water and mixing shall be in conformance with the material manufacturer's instructions. Grout shall be mixed by using a mortar mixer. Batches shall be of size to allow continuous placement of freshly mixed grout. Placing shall be quick and continuous. Exposed surfaces shall have smooth, dense finish.

G. Shop Painting:
   1. Apply shop coat of gray paint on steel surfaces except:
      a. Surfaces of members to be field welded, in immediate area of welds.
      b. Surfaces of members to receive sprayed-on fireproofing.
   2. Prepare surfaces by solvent cleaning (SPI-63) and hand or power tool spatters and other foreign matter.

H. Field Touch-Up Painting: After erection of structural steel, prime welds, abrasions and surfaces not shop primed, touch-up field welds and abrasions in shop paint coating with same paint used for shop painting.

3.4. FIELD QUALITY CONTROL: Testing agency shall perform the following:

A. Check bracing.

B. Check location and set of anchor bolts and other inserts.

C. Prior to attaching steel, check adjustments to fit accuracies.

D. Qualification of field bolting, welding, and stud welding procedures and personnel.

E. Inspection of the erected structural framework for conformance with the requirements specified, including alignment, plumbness, camber, etc.

F. Inspection of Field Welds shall be in accordance with Section 6 of the AWS Building Code as follows:
   1. Visual inspection of all welds in accordance with Article 605.
   2. In addition to visual inspection, field-welded connections will be inspected and tested according to AWS D1.1 and the inspection procedures listed below, at testing agency's option.
      a. Liquid Penetrant Inspection: ASTM E 165.
      b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
      c. Radiographic Inspection: ASTM E 94 and ASTM E 142; minimum quality level "2-2T."
      d. Ultrasonic Inspection: ASTM E 164.
   3. All column-to-base plate field welds shall be inspected by ultrasonic testing in accordance with ASTM E164.
   4. All welds that fail shall be rewelded and retested until they pass the test. The cost of the initial test and all further testing on welds that fail shall be borne by the

Contractor. All initial weld tests that pass will be paid by the Owner.

G. Inspection of high-strength bolted construction shall be in accordance with Section 9, AISC Specifications for Structural Joints, and as follows:
   1. Friction Connections
      a. All high-strength bolted connections shall be visually inspected.
      b. At least two bolts of every third connection between floor beams and girders shall be checked with a calibrated torque wrench for proper torque.
      c. At least two bolts of every connection between girders and columns shall be checked as above.
      d. All bolted connections that fail shall be corrected and all bolts in that connection tests that fail shall be paid by the Owner. The cost of retests on connections that fail shall be borne by the contractor.
      e. Direct-tension indicator gaps will be verified to comply with ASTM F 959, Table 2.
   2. Bearing Connections
      a. All high-strength bolted connections shall be visually inspected to ensure that all plies of the connected elements have been brought into snug contact.

H. Field testing of welded stud shear connectors shall be in accordance with sections 4.29 and 4.30 of the AWS Structural Welding Code, and as follows:
   1. Visual inspection shall be made for all studs for proper number and quality of welds. Any studs that do not have a full 360 degree filled weld shall be tested.
   2. In addition to defective studs visually observed, a prescribed pattern of selecting studs for testing shall be followed.
      a. Any member having more than 20 studs shall have at least two studs tested.
      b. Members having less than 20 studs shall be tested as a group. Select two studs randomly from each sample of 100 studs to be tested.
   3. Testing shall consist of bending the stud to an angle of 30 degrees from its original axis by striking the stud with a hammer.
   4. If failure occurs during testing, inspector shall test adjacent studs as required to determine extent of poor welding.
   5. Stud replacement or repair shall be in accordance with AWS Structural Welding Code sections 4.29 and 4.30.

END OF SECTION 05 12 00

SECTION 05 21 00 - STEEL JOISTS AND JOIST GIRDERS

PART 1 GENERAL

1.1. SECTION INCLUDES

A. Open web steel joists, with bridging, attached seats and anchors.
B. Loose bearing plates and anchor bolts for site placement.
C. Framed roof openings greater than 18 inches.
D. Open web steel joists girders, with bridging, attached seats and anchors.

1.2. RELATED SECTIONS

A. Section 05 12 00 - Structural Steel: Superstructure framing.
B. Section 05 31 00 - Steel Roof Deck: Support framing for openings less than 18 inches in decking.
C. Section 05 50 00 - Metal Fabrications: Non-framing steel fabrications attached to joists.

1.3. REFERENCES

A. ASTM A36/A36M - Structural Steel.
B. ASTM A992 – Standard Specification for Structural Steel Shapes.
C. ASTM A108 - Steel Bars, Carbon, Cold-Finished, Standard Quality.
D. ASTM A123 - Zinc (Hot Dipped Galvanized) Coatings on Iron and Steel Products.
E. ASTM A153 - Zinc Coating (Hot Dip) on Iron and Steel Hardware.
F. ASTM A307 - Carbon Steel Threaded Standard Fasteners.
G. ASTM A325 - High Strength Bolts for Structural Steel Joints.
H. AWS D1.1 - Structural Welding Code.
I. FM - Roof Assembly Classifications.
J. SJI (Steel Joist Institute) - Specifications, Load tables, and Weight Tables for Steel Joists and Joist Girders.
K. SSPC (Steel Structures Painting Council) - Steel Structures Painting Manual.
L. UL - Fire Resistance Directory.
M. Warnock Hersey - Certification Listings.

1.4. SUBMITTALS FOR REVIEW

A. Section 01 33 00 - Submittals: Procedures for submittals.
B. Shop Drawings:
    1. Indicate standard designations, configuration, sizes, spacing, locations of joists.
    2. Joist coding, bridging, connections, and attachments.
    3. Cambers.

1.5. SUBMITTALS FOR INFORMATION

A. Section 01 33 00 - Submittals: Procedures for submittals.
B. Welders' Certificates: Submit manufacturer's certificates, certifying welders employed on the Work, verifying AWS qualification within the previous 12 months.

1.6. QUALITY ASSURANCE

A. Perform Work in accordance with SJI, Load Tables, and Weight Tables, including headers and other supplementary framing.
B. Maintain one copy copies of each document on site.
C. Fabricator: Steel Joist Institute Company specializing in performing the work of this

section with minimum 10 years documented experience.

D. Erector: Company specializing in performing the work of this section with minimum 10 years documented experience.

E. Design connections not detailed on the Drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the state where the Project is located.

1.7. REGULATORY REQUIREMENTS

1.8. DELIVERY, STORAGE, AND PROTECTION

A. Section 01 60 00 - Material and Equipment: Transport, handle, store, and protect products and to SJI requirements.

2. PART 2 - PRODUCTS

2.1. MATERIALS

A. Open Web Joists Members: SJI Type K and LH Longspan.

B. Anchor Bolts, Nuts and Washers: ASTM F1554, grade 36.

C. Shear Stud Connectors: ASTM A108 Grade 1010, 1015, 1017, or 1020.

D. Structural Steel For Supplementary Framing and Joist Leg Extensions: ASTM A36/A36M.

E. Welding Materials: AWS D1.1; type required for materials being welded.

F. Shop and Touch-Up Primer: SSPC 15, Type 1, red oxide.

2.2. FABRICATION

A. Provide bottom chord extensions for ceiling support and top chord extensions as indicated.

B. Fabricate to achieve end bearing of:

1. 2-1/2 inches on steel
2. 4 inches on masonry.

C. Frame special sized openings in joist web framing as detailed.

2.3. FINISH

A. Prepare joist component surfaces in accordance with SSPC SP 2.

B. Shop prime joists. Do not prime surfaces that will be fireproofed, field welded, and in contact with concrete.

2.4. SOURCE QUALITY CONTROL AND TESTS

A. Provide shop testing and analysis of steel sections.

3. PART 3 EXECUTION

3.1. EXAMINATION

A. Section 01 03 90 - Coordination and Meetings: Verification of existing conditions prior to beginning work.

3.2. ERECTION

A. Erect and bear joists on supports.

B. Allow for erection loads. Provide sufficient temporary bracing to maintain framing safe, plumb, and in true alignment.

C. Coordinate placement of anchors in concrete and masonry construction for securing

bearing plates.

D. After joist alignment and installation of framing, field weld joist seat to bearing plates.
E. Position and field weld joist chord extensions and wall attachments as detailed.
F. Frame roof floor and roof openings greater than 12 inches with supplementary framing.
G. Do not permit erection of decking until joists are braced, bridged, and secured or until completion of erection and installation of permanent bridging and bracing.
H. Do not field cut or alter structural members without approval of joist manufacturer.
I. After erection, prime welds, abrasions, and surfaces not shop primed except surfaces to be in contact with concrete.

3.3. ERECTION TOLERANCES

A. Maximum Variation From Plumb: ¼ inch.
B. Maximum Offset From True Alignment: ¼ inch.

3.4. FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Assurance: Field inspection and testing of welds.

END OF SECTION 05 21 00

SECTION 05 31 00 - STEEL DECK

PART 1 GENERAL

1.1. SECTION INCLUDED

A. Wide rib steel roof deck.
B. Composite steel floor deck.
C. Dovetail steel roof deck.

1.2. RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
B. Section 03 30 00 - Cast-in-Place Concrete for concrete fill and reinforcing steel.
C. Section 05 50 00 - Metal Fabrications for framing openings with miscellaneous steel shapes.

1.3. SUBMITTALS FOR REVIEW

A. Section 01 33 00 – Submittals: Procedures for submittals.
B. Product data for each type of deck, accessory, and product specified.
C. Shop drawings showing layout and types of deck panels, anchorage details, reinforcing channels, pans, deck openings, special jointing, accessories, and attachments to other construction.
D. For steel deck indicated to comply with certain design loadings, include structural analysis data sealed and signed by the qualified professional engineer who was responsible for its preparation.
E. Product certificates signed by manufacturers of steel deck certifying that their products comply with specified requirements.
F. Welder certificates signed by Contractor certifying that welders comply with requirements specified under the "Quality Assurance" Article.
G. Product test reports from qualified independent testing agencies evidencing compliance with requirements of the following based on comprehensive testing:
    1. Mechanical fasteners.
H. Research reports or evaluation reports of the model code organization acceptable to authorities having jurisdiction that evidence steel deck's compliance with the building code in effect for the Project.

1.4. QUALITY ASSURANCE

A. Steel Deck Supplier: Must be a member of the Steel Deck Institute.
B. Installer Qualifications: Engage an experienced Installer who has completed steel deck similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
C. Testing Agency Qualifications: To qualify for acceptance, an independent testing agency must demonstrate to Architect's satisfaction, based on evaluation of agency-submitted criteria conforming to ASTM E 699, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.
D. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code--Steel" and AWS D1.3 "Structural Welding Code--Sheet Steel."
    1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

E. Fire-Test-Response Characteristics: Where indicated, provide steel deck panels identical to those tested as part of an assembly for fire resistance per ASTM E 119 by a testing and inspection agency performing testing and follow-up services, that is acceptable to authorities having jurisdiction.
F. Fire-Resistance Ratings: As indicated by design designations listed in UL "Fire Resistance Directory," or by Warnock Hersey or another testing and inspecting agency.
G. Labeling: Identify steel deck with appropriate markings of applicable testing and inspecting agency.
H. Electrical Raceway Panels: Provide UL-labeled, cellular metal floor deck panels conforming to UL 209 and listed in UL "Electrical Construction Materials Directory" as approved for use with standard header ducts and outlets for electrical distribution systems.
I. FM Listing: Provide steel roof deck evaluated by Factory Mutual and listed in Factory Mutual "Approval Guide" for Class 1 fire rating and Class 1-60 windstorm ratings.
J. Engineer Qualifications: A professional engineer legally authorized to practice in the jurisdiction where Project is located and experienced in providing engineering services of the kind indicated that have resulted in the installation of steel deck similar to this Project in material, design, and extent and that have a record of successful in-service performance.

1.5. DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

2. PART 2 – PRODUCTS

2.1. MANUFACTURERS

A. Manufacturers: Member of Steel Deck Institute. Subject to compliance with requirements, provide products by one of the following:
1. New Millennium Joist and Deck.
2. Vulcraft Div. of Nucor Corp.
3. Wheeling Corrugating Co., Div. of Wheeling-Pittsburgh Steel Corp.

2.2. ROOF DECK

A. Steel Roof Deck: Fabricate panels without top-flange stiffening grooves conforming to SDI Publication No. 28 "Specifications and Commentary for Steel Roof Deck" and the following:
1. Galvanized-Steel Sheet: ASTM A 446, Grade A, G 60 (ASTM A 446M, Grade A, Z 180) zinc coated according to ASTM A 525 (ASTM A 525M).
2. Deck Profile: 1.5B Wide Rib
3. Profile Depth: 1-1/2 inches
4. Design Uncoated-Steel Thickness: 0.0295 inch (22 gage).
5. Span Condition: Three span or more.
6. Side Joints: Overlapped or interlocking seam at Contractor's option.
B. Dovetail Steel Roof Deck: Fabricate panels without top-flange stiffening grooves conforming to SDI Publication No. 28 "Specifications and Commentary for Steel Roof

Deck" and the following:

1. Galvanized-Steel Sheet: ASTM A 563 SS, Grade 40, G 60 with coil coated wood-grain finish. Color by Architect.
2. Deck Profile: Versa-Deck 3.5 ES.
3. Profile Depth: 3.5 inches
4. Design Uncoated-Steel Thickness: 0.0359 inch (20 gauge).
5. Span Condition: Three span or more.
6. Side Joints: Overlapped or interlocking seam at Contractor's option.

C. Steel Floor Deck

1. Composite Steel Deck: Fabricate ribbed-steel sheet composite form deck panels conforming to ANSI/SDI C-2017 “Standard for Composite Steel Floor Deck – Slabs,” the minimum section properties indicated, and the following:
2. Galvanized-Steel Sheet: ASTM A 446, Grade E, G 60 (ASTM A 446M, Grade E, Z 180) zinc coated according to ASTM A 525 (ASTM A 525M).
3. Profile Depth: 2 inch.
4. Design Uncoated-Steel Thickness: 20 gage.
5. Span Condition: Three span or more.
6. Side Joints: Overlapped or interlocking seam at Contractor's option.

2.3. ACCESSORIES

1. General: Provide accessory materials for steel deck that comply with requirements indicated and recommendations of the steel deck manufacturer.
2. Mechanical Fasteners: Manufacturer's standard, corrosion-resistant, low-velocity, powder-actuated or pneumatically driven carbon steel fasteners; or self-drilling, self-threading screws.
3. Side Lap Fasteners: Manufacturer's standard, corrosion-resistant, hexagonal washer head; self-drilling, carbon steel screws, No. 10 (4.8 mm) minimum diameter.
4. Miscellaneous Roof Deck Accessories: Steel sheet, 0.0359 inch thick minimum ridge and valley plates, finish strips, and reinforcing channels, of same material as roof deck.
5. Pour Stops and Girder Fillers: Steel sheet, of same material as deck panels, and of thickness and profile indicated.
6. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material and thickness as deck panels, unless otherwise indicated.
7. Hanger Tabs: Manufacturer's standard piercing steel sheet hanger attachment devices for floor deck panels.
8. Weld Washers: Manufacturer's standard uncoated-steel sheet weld washers, shaped to fit deck rib, 0.0598 inch thick with 3/8-inch minimum diameter prepunched hole.
9. Recessed Sump Pans: Manufacturer's standard size, single piece steel sheet 0.071 inch thick minimum, of same material as deck panels, with 1-1/2 inch minimum deep level recessed pans and 3 inch wide flanges. Cut holes for drains in the field.
10. Flat Receiver Pan: Manufacturer's standard size, single piece steel sheet, 0.071 inch thick minimum units, of same material as deck panels. Cut holes for drains in the field.
11. Steel Sheet Accessories: ASTM A 446, G 60 (ASTM A 446M, Z 180) coating class, galvanized according to ASTM A 525 (ASTM A 525M).
12. Galvanizing Repair Paint: SSPC Paint 20 or DOD P 21035, with dry film containing a minimum of 94 percent zinc dust by weight.
13. Preset Inserts: Manufacturer's standard, UL labeled single piece preset inserts, fabricated from either steel sheet galvanized according to ASTM A 525, G 60 (ASTM A 525M, Z 180) coating class, or zinc sheet, with removable covers.

3. PART 3 – EXECUTION

3.1. EXAMINATION

A. Examine supporting framing and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of steel deck.

3.2. PREPARATION

A. Do not place deck panels on concrete supporting structure until concrete has cured and is dry.
B. Locate decking bundles to prevent overloading of supporting members.

3.3. INSTALLATION, GENERAL

A. Install deck panels and accessories according to applicable specifications and commentary of SDI Publication No. 28, manufacturer's recommendations, and requirements of this Section.
B. Install temporary shoring before placing deck panels when required to meet deflection limitations.
C. Place deck panels on supporting framing and adjust to final position with ends accurately aligned and bearing on supporting framing before being permanently fastened. Do not stretch or contract side lap interlocks.
D. Place deck panels flat and square and fasten to supporting framing without warp or deflection.
E. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to the decking.
F. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of decking, and support of other work.
G. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work.
H. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's instructions.

3.4. ROOF DECK INSTALLATION

A. Fasten roof deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter, but not less than 1-1/2 inches long, and as follows:
B. Weld Diameter: 5/8 inch, nominal.
C. Weld Spacing: Weld edge ribs of panels at each support. Space welds an average of 12 inches apart, with a minimum of two welds per unit at each support.
D. Weld Washers: Install weld washers at each weld location.
E. Side Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding 36 inches, using one of the following methods:
    1. Mechanically fasten with self-drilling No. 10 diameter or larger carbon steel screws.
    2. Mechanically clinch or button punch.
    3. Fasten with 1-1/2 inch long minimum welds.
F. End Bearing: Install deck ends over supporting framing with a minimum end bearing of 1-1/2 inches, with end joints as follows:
    1. End Joints: Lapped 2 inches minimum or butted at Contractor's option.

G. Roof Sump Pans and Sump Plates: Install over openings provided in roof decking, and weld flanges to top of deck. Space welds not more than 12 inches apart with at least one weld at each corner.

H. Miscellaneous Roof Deck Accessories: Install ridge and valley plates, finish strips, cover plates, end closures, and reinforcing channels according to deck manufacturer's recommendations. Weld to substrate to provide a complete deck installation.

3.5. FLOOR DECK INSTALLATION

A. Fasten floor deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:

1. Weld Diameter: 5/8 inch, nominal.
2. Weld Spacing: Weld edge ribs of panels at each support. Space additional welds an average of 12 inches apart, but not more than 18 inches apart.
3. Weld Washers: Install weld washers at each weld location.
4. Side Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, or at intervals not exceeding 36 inches, using one of the following methods:
   1. Mechanically fasten with self-drilling No. 10 diameter or larger carbon steel screws.
   2. Mechanically clinch or button punch.
   3. Fasten with 1-1/2 inch long minimum welds.
5. End Bearing: Install deck ends over supporting framing with a minimum end bearing of 1-1/2 inches, with end joints as follows:
   1. End Joints: Lapped or butted at Contractor's option.
6. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations, unless otherwise indicated.

3.6. Floor Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck according to SDI recommendations to provide tight-fitting closures at open ends of ribs and sides of decking. Weld cover plates at changes in direction of floor deck panels, unless otherwise indicated.

3.7. FIELD QUALITY CONTROL

A. Testing Agency: A qualified independent testing agency employed and paid by Owner will perform field quality control testing.

B. Field welds will be subject to inspection.

C. Testing agency will report test results promptly and in writing to Contractor and Architect.

D. Remove and replace work that does not comply with specified requirements.

E. Additional testing will be performed to determine compliance of corrected work with specified requirements.

3.8. REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces with galvanized repair paint according to ASTM A 780 and the manufacturer's instructions.

B. Touchup Painting: Wire brush, clean, and paint scarred areas, welds, and rust spots on both surfaces of installed deck panels.

C. Touch up painted surfaces with same type of shop paint used on adjacent surfaces.

D. Where shop painted surfaces are exposed in service, apply touchup paint to blend into adjacent surfaces.

E. Provide final protection and maintain conditions to ensure steel decking is without

damage or deterioration at time of Substantial Completion.

END OF SECTION 05 31 00

SECTION 05 40 00 - COLD-FORMED METAL STUDS

1. PART 1 GENERAL

1.1. RELATED DOCUMENTS

A. Dawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2. SUMMARY

A. This Section includes the following:
   1. Interior and exterior bearing and non-bearing steel-stud walls.

1.3. PERFORMANCE REQUIREMENTS

A. AISI "Specifications": Calculate structural characteristics of cold-formed metal framing according to AISI's "Specification for the Design of Cold-Formed Steel Structural Members" and the following:
   1. Center for Cold-Formed Steel Structures (CCFSS) Technical Bulletin, Vol. 2, No. 1, February 1993 "AISI Specification Provisions for Screw Connections."
B. Structural Performance: Engineer, fabricate and erect cold-formed metal framing with the following minimum physical and structural properties:
   1. Physical and Structural Properties: As indicated.
C. Structural Performance: Engineer, fabricate, and erect cold-formed metal framing to withstand design loads within limits and under conditions required.
   1. Design framing systems to withstand design loads without deflections greater than the following:
      a. Interior Load-Bearing Walls: Lateral deflection of 1/360 of the wall height.
      b. Roof Joists: Vertical deflection of 1/360 of the span.
D. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change (range) of 120 deg F.
E. Design framing system to accommodate deflection of primary building structure and construction tolerances, and to maintain clearances at openings.

1.4. SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
B. Product data for each type of cold-formed metal framing, accessory, and product specified.

1.5. QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed cold-formed metal framing similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

1.6. DELIVERY, STORAGE, AND HANDLING

A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

2. PART 2 – PRODUCTS

2.1. MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering cold-formed metal framing that may be incorporated in the Work include, but are not limited to, the following:
   1. Alabama Metal Industries Corp.
   2. American Studco, Inc.
   3. Angeles Metal Systems.
   4. California Metal Systems, Inc.
   5. Clark, Inc.
   6. Consolidated Fabricators Corp.
   7. Consolidated Systems, Inc.
   8. Dale//Incor Industries.
   9. Dale Industries, Inc.
   10. Design Shapes in Steel.
   11. Dietrich Industries, Inc.
   12. Incor Plant Dale Industries.
   13. MarinoWare; Div. of Ware Industries, Inc.
   14. Super Stud Building Products, Inc.
   15. Unimast, Inc.
   16. United Construction Supply.
   17. United States Steel.
   18. Western Metal Lath Co.

2.2. MATERIALS

A. Galvanized-Steel Sheet: ASTM A 446, zinc coated according to ASTM A 525, and as follows:
   1. Coating Designation: G 60 (Z 180).
   2. Grade: As required by structural performance.

B. Prime-Painted Steel Sheet: ASTM A 570 or ASTM A 611, cleaned, pretreated, and primed with manufacturer's baked-on, lead- and chromate-free, rust-inhibitive primer conforming to the performance requirements of FS TT-P-664.

C. Grade: As required by structural performance.

2.3. WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs of web depths indicated, with lipped flanges, and complying with the following:
   1. Gauge: 16 ga. or as per plan.
   2. Flange Width: Minimum 1-5/8 inches.
   3. Web: Punched.

B. Steel Track: Manufacturer's standard U-shaped steel track, unpunched, of web depths indicated, with straight flanges, and complying with the following:
   1. Design Uncoated-Steel Thickness: 1 gauge heavier than steel studs.

2.4. JOIST FRAMING

A. Steel Joists: Manufacturer's standard C-shaped steel joists, unpunched, of web depths indicated, with lipped flanges, and complying with the following:
   1. Gauge: 16 ga. or as per plans.
   2. Flange Width: 1-5/8 inches minimum.
B. Steel Joist Track: Manufacturer's standard U-shaped steel joist track, unpunched, of web depths indicated, with straight flanges, and complying with the following:
   1. Design Uncoated-Steel Thickness: 1 gauge heavier than steel joists.

2.5. FRAMING ACCESSORIES

A. Fabricate steel-framing accessories of the same material and finish used for framing members, with a minimum yield strength of 33,000 psi.
B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
   1. Supplementary framing.
   2. Bracing, bridging, and solid blocking.
   3. Web stiffeners.
   4. Gusset plates.
   5. Deflection track and vertical slide clips.
   6. Stud kickers and girts.
   7. Joist hangers and end closures.
   8. Reinforcement plates.

2.6. ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36, zinc coated by the hot-dip process according to ASTM A 123.
B. Cast-in-Place Anchor Bolts and Studs: ASTM A 307, Grade A; carbon-steel hex-head bolts and studs; carbon-steel nuts; and flat, unhardened-steel washers. Zinc coated by the hot-dip process according to ASTM A 153.
C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times the design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
D. Powder-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times the design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.
E. Mechanical Fasteners: Corrosion-resistant coated, self-drilling, self-threading steel drill screws.
   1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.
F. Welding Electrodes: Comply with AWS standards.

2.7. MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight.
B. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.

C. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, with fluid consistency and a 30-minute working time.

2.8. FABRICATION

A. Fabricate cold-formed metal framing and accessories plumb, square, true to line, and with connections securely fastened, according to manufacturer's recommendations and the requirements of this Section.
   1. Cut framing members by sawing or shearing; do not torch cut.
   2. Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.
      a. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
      b. Locate mechanical fasteners and install according to cold-framed metal framing manufacturer's instructions with screw penetrating joined members by not less than 3 exposed screw threads.
   3. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to manufacturer's recommendations.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or distortion.

C. Fabrication Tolerances: Fabricate assemblies to a maximum allowable tolerance variation from plumb, level, and true to line of 1/8 inch in 10 feet and as follows:
   1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
   2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch.

3. PART 3 – EXECUTION

3.1. EXAMINATION

A. Examine supporting substrates and abutting structural framing for compliance with requirements, including installation tolerances and other conditions affecting performance of cold-formed metal framing. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2. PREPARATION

A. Grout bearing surfaces uniform and level to ensure full contact of bearing flanges or track webs on supporting concrete or masonry construction.

3.3. INSTALLATION, GENERAL

A. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed metal framing and accessories plumb, square, true to line, and with connections securely fastened, according to manufacturer's recommendations and the requirements of this Section.
   1. Cut framing members by sawing or shearing; do not torch cut.

2. Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.
   a. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
   b. Locate mechanical fasteners and install according to cold-framed metal framing manufacturer's instructions with screw penetrating joined members by not less than 3 exposed screw threads.

C. Install framing members in one-piece lengths, unless splice connections are indicated for track or tension members.
D. Provide temporary bracing and leave in place until framing is permanently stabilized.
E. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.
F. Install insulation in built-up exterior framing members, such as headers, sills, boxed joists, and double studs, inaccessible upon completion of framing work.
G. Fasten reinforcement plate over web penetrations that exceed size of manufacturer's standard punched openings.
H. Erection Tolerances: Install cold-formed metal framing to a maximum allowable tolerance variation from plumb, level, and true to line of 1/8 inch in 10 feet and as follows:
   1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.4. LOAD-BEARING WALL INSTALLATION

A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends, and at spacings recommended by the manufacturer, but not greater than the following:
   1. Spacing: 24 inches for nail or power-driven anchors.
   2. Spacing: 32 inches for cast-in-place or expansion anchors.
B. Squarely seat studs against webs of top and bottom tracks. Fasten both flanges of studs to top and bottom track. Space studs as follows:
   1. Stud Spacing: 16 inches.
C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
D. Align studs vertically where wall-framing continuity is interrupted by floor framing. Where studs cannot be aligned, continuously reinforce track to transfer loads.
E. Align joists over studs. Where joists cannot be aligned, continuously reinforce track to transfer loads.
F. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure as indicated.
G. Install headers over wall openings wider than the stud spacing. Locate headers above openings as indicated. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.
   1. Frame wall openings with not less than a double stud at each jamb of frame as indicated or required by manufacturer.

2. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.

H. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.
   1. Where type of supplementary support is not indicated, comply with stud manufacturer's recommendations and industry standards in each case, considering weight or load resulting from item supported.

I. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5. JOIST INSTALLATION

A. Install perimeter joist track sized to match joists. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated or as recommended by the manufacturer.

B. Install joists bearing on supporting framing, level, straight, and plumb, adjust to final position, brace, and reinforce. Fasten joists to both flanges of joist track.
   1. Install joists over supporting framing with a minimum end bearing of 1-1/2 inches.
   2. Reinforce ends of joists with web stiffeners, end clips, joist hangers, steel clip angles, steel-stud sections, or as otherwise recommended by manufacturer.

C. Space joists not more than 2 inches from abutting walls, and as follows:
   1. Joist Spacing: 16 inches.

D. Frame openings with built-up joist headers consisting of joist and joist track, nesting joists, or another combination of connected joists where indicated.

E. Install joist reinforcement at interior supports with single, short length of joist section located directly over interior support, with lapped joists of equal length to joist reinforcement, or by other method recommended by joist manufacturer.
   1. Install web stiffeners to transfer axial loads of walls above.

F. Install bridging at each end of joists and at intervals indicated. Fasten bridging at each joist intersection as follows:
   1. Bridging: Cold-rolled steel channel, fastened to bottom flange of joists.

G. Secure joists to load-bearing interior walls to prevent lateral movement of bottom flange.

H. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-framing assembly.

3.6. REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanizing repair paint according to ASTM A 780 and the manufacturer's instructions.

B. Touchup Painting: Wire brush, clean, and paint scarred areas, welds, and rust spots on fabricated and installed prime-painted, cold-formed metal framing.
   1. Touchup painted surfaces with same type of shop paint used on adjacent surfaces.

C. Protect gypsum sheathing that will be exposed to weather for more than one month as follows:
   1. Protect cutouts, corners, and joints in the sheathing by filling with a flexible sealant or by applying tape recommended by sheathing manufacturer at the time sheathing is applied.
D. Provide final protection and maintain conditions in a manner acceptable to manufacturer and Installer to ensure that cold-formed metal framing is without damage or deterioration at the time of Substantial Completion.

END OF SECTION 05 40 00

SECTION 05 50 00 - METAL FABRICATIONS

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A Shop fabricated ferrous metal items, galvanized and prime painted.

1.2 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

A Section 03 30 00 - Cast-In-Place Concrete: Placement of metal fabrications in concrete.

1.3 RELATED SECTIONS

1.4 REFERENCES

A ASTM A36 - Structural Steel.
B ASTM A53 - Hot-Dipped, Zinc-coated Welded and Seamless Steel Pipe.
C ASTM A123 - Zinc (Hot-Galvanized) Coatings on Products Fabricated From Rolled, Pressed and Forged Steel Shapes, Plates, Bars, and Strip.
D ASTM A153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
E ASTM A283 - Carbon Steel Plates, Shapes, and Bars.
F ASTM A307 - Carbon Steel Externally Threaded Standard Fasteners.
G ASTM A325 - High Strength Bolts for Structural Steel Joints.
H ASTM A386 - Zinc-Coating (Hot-Dip) on Assembled Steel Products.
I ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.
J ASTM A501 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
K ASTM B177 - Chromium Electroplating on Steel for Engineering Use.
L AWS A2.0 - Standard Welding Symbols.
M AWS D1.1 - Structural Welding Code.
N SSPC - Steel Structures Painting Council.
O OSHA/ANSI A14.3 Standards for fixed wall ladders.

1.5 DESIGN REQUIREMENTS

A Meet requirements and recommendations of applicable portions of the Standards listed.

i	Architectural Aluminum Manufacturers Association	AAMA
ii	American Hot Dip Galvanizers Association	AHDGA
iii	American Institute of Steel Construction	AISC
iv	American Society for Testing and Materials	ASTM
v	American National Standards Institute	ANSI
vi	American Welding Society	AWS
vii	National Association of Architectural Metal Manufacturers	NAAMM

1.6 SUBMITTALS

A Submit under provisions of Section 01 33 00.
B Meet requirements of applicable portions of "Structural Shop Drafting" by AISC.
C Shop Drawings: Indicate materials, shapes, profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Show Locations and Markings. Include erection drawings, elevations, and details where applicable. Note and mark sufficiently to indicate compliance with requirements of these specifications.
D Indicate welded connections using standard AWS A2.0 welding symbols. Indicate net

weld lengths.

1.7 QUALIFICATIONS

A Prepare Shop Drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the state where the Project is located.

B Welders Certificates: Submit under provisions of Section 01 33 00, certifying welders employed on the Work, verifying AWS qualification within the previous 12 months.

1.8 FIELD MEASUREMENTS

A Verify that field measurements are as indicated on Drawings.

2 PART 2 PRODUCTS

2.1 MATERIALS

A Steel Sections: ASTM A36 and ASTM A440 having a minimum yield strength not less than 36,000 psi.

B Steel Tubing: ASTM A500, Grade B, and ASTM A501.

C Plates: ASTM A283

D Pipe: ASTM A53, Grade B Schedule 40.

E Cast Steel - ASTM A27, Grade 65 - 35; and ASTM A140, Grade 80-50.

F Steel Forginigs - ASTM A235 and ASTM A237.

G Cast Iron - ASTM A48, Class 30, min. 30,000 PSI tensile.

H Malleable Iron - ASTM A47 and ASTM A197.

I Bolts, Nuts, and Washers: ASTM A307, ASTM A325 and ASTM A195 [galvanized to ASTM A153 for galvanized components].

J Fasteners:

i Fasteners shall be of the type required for the purpose intended and particular application and shall be of a recognized industry standard for the type of components. Fasteners shall include:

a Masonry Sleeve Anchors - Molly "Parasleeve", Ramset "Dyna Bolt", or approved equal.

b Concrete Expansion Bolts - Hilti "Kwik Bolt" or approved equal.

c Hollow Wall Fasteners - Hilti "Kwik Tog" or approved equal.

d Plaster and Drywall Fasteners - Plastic insert wedges.

e Adhesive anchors - Hilti "HVA Adhesive Anchor" or approved equal.

K Pipe Connection Fittings

i Clamp-on Tee Fittings:

a Kee Industrial Products; Product: No. 16 Clamp-on Tee - 16-7 (1-1/4 to 1-1/4 inch pipe size).

b R&B Wagner, Inc.; Product: No. 16 Clamp-on Tee - 16-7 (1-1/4 to 1-1/4 inch pip size).

L Welding Materials: AWS D1.1; type required for materials being welded.

M Welding Electrodes: Electrodes shall be of the type required for the purpose intended. Use E70 series for manual arc welding.

N Filler Metal - ASTM A233, E60 or R70 series.

O Paint - F.S. TT-P636 Red Oxide.

P Shop and Touch-Up Primer: SSPC 15, Type 1, red oxide.

Q Galvanizing: Galvanized metals shall conform to ASTM A-123 and ASTM A-386.

R Touch-Up Primer for Galvanized Surfaces: SSPC 20 Type I Inorganic zinc rich.

2.2 FABRICATION

A Meet requirements specified under Structural Steel for fabricating items of a structural nature or use.
B Fit and shop assemble in largest practical sections, for delivery to site.
C Fabricate items with joints tightly fitted and secured.
D Weld permanent shop connections.
E Continuously seal joined members by continuous welds.
F Grind exposed joints and welds flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
G Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
H Supply components required to complete the work and for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
I Furnish all bolts, nuts, clip angles, etc. as shown on Drawings and as required to complete the work.
J Punch or drill for temporary field connections and for attachment of work by other trades.
K Form materials to shapes indicated with straight lines, sharp angles and smooth curves. Drill or punch holes and smooth edges.
L Form bends smooth without wrinkles, kinks or flat spots.
M Galvanize all exterior assemblies after fabrication, including all masonry shelf angles and lintels.

2.3 PIPE HANDRAILS FOR CAST - IN- PLACE CONCRETE STAIRS

A Fabricate handrails of standard weight black steel pipe of sizes indicated.
B Form bends smooth without wrinkles, kinks, or flat spots.
C Weld all joints and grind smooth.
D Fabricate handrails of one continuous piece in each run with no joints within a stair run.
E Support handrails with wall supported brackets anchored into brick as detailed on Drawings. Brackets placed at 5' - 0" o.c. maximum.
F Secure handrails as detailed. Exterior handrails shall be galvanized after fabrication.

2.4 FABRICATED PRODUCTS

A Exterior Roof Ladder
  i System Includes
    a Caged exterior ladder with intermediate rest platform, walk-through roof over extensions and security doors.
  ii Manufacturers
    a Alaco Ladder Co.; Product: Series 560 Fixed Wall Ladders.
    b Precision Stairs Corp.; Product: Model FL.
    c Royalite Manufacturing, Inc.; Product: CL Cage Ladders.
  iii Fabrication
    a Material: Aluminum 6061-T6 or 6063T-5 alloy with mill finishes.
    b Treads: Extruded aluminum either 2-1/4 inch wide channel or 1-1/8 inch round x 20 inches long with serrated surface. Connect treads to side rails with solid rivets rated 934 pounds shear strength each minimum. Space treads at 12 inch o.c. Treads shall be rated to withstand 1,000 pound load.

c Siderails: 0.125 inch thick x 2 1/2 inch wide secured to wall with 1/8 inch thick brackets at 6 foot on center.
d Safety Cage: 1/4 x 2 inch bars at 4 foot on center maximum. Vertical bars; 3/16 x 1 1/2 inch. Cage connections shall be riveted or gas shielded metal arc welded. Cage shall be bolted to siderails.
e Rest Platform: Grip strut floor with .063 inch thick x 4 inch wide toe boards and 42 inch high transfer guard rail.
f Walk-through Roofover Extensions: Extend 42 inches above landing with grab rails extending perpendicular to plane of roof ladder over the roof.
g Security Doors: Minimum .063 inch thick secured to side rails with aluminum piano hinges and hasps.
h Provide roof ladder as a complete assembly with all required components, fasteners and accessories.

2.5 FINISHES

A Prepare surfaces to be primed in accordance with SSPC SP 2. Clean ferrous metal of scale, rust, oil, moisture and dirt before [applying paint.]
B Apply two shop prime coats to all work after fabrication except galvanized metal, stainless steel, aluminum, copper, brass, bronze and metals to receive special coatings unless noted otherwise. Do not prime surfaces in direct contact with concrete or where field welding is required. Use asphalt paint on metals anchored into masonry, and concrete.
C Apply three shop prime coats to ferrous metals that will be inaccessible after erection.
D Painting specified here does not count as a coat for finish painting.
E Galvanize in accordance with ASTM A123, structural steel members. Provide minimum 1.25 oz/sq ft galvanized coating] as scheduled.
F Chrome Plating: ASTM B177, weight, nickel-chromium alloy, [satin] [polished] finish.

3 PART 3 EXECUTION

3.1 EXAMINATION

A Verify that field conditions are acceptable and are ready to receive work.
B Beginning of installation means erector accepts existing conditions.

3.2 PREPARATION

A Clean and strip primed steel items to bare metal where site welding is required.
B Supply items required to be cast into concrete or embedded in masonry with setting templates, to appropriate sections.

3.3 INSTALLATION

A Install items plumb and level, accurately fitted, free from distortion or defects and true to line. Shim bearing plates with metal and grout solid.
B Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
C Field weld components indicated on shop drawings and grind smooth where practicable, conceal fastenings where practicable.
D Perform field welding in accordance with AWS D1.1.
E Obtain Architect/Engineer approval prior to site cutting or making adjustments not scheduled.
F After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

G Secure metal to wood with lag screws, of adequate size, with appropriate washers.
H Secure metal to masonry with embedded anchors, setting compound, lead caulking and sleeves, or cement-sand grouting.
I Expansion bolts, toggle bolts, and screws are permitted for light duty service only.
J Meet requirements specified for structural steel for erecting items of structural nature and use.
K Metal work, in place, shall be reviewed before being covered.

3.4 PAINTING

A Retouch, in field, all scrapped, abraded and unpainted surfaces. Painting as specified for shop coats.

3.5 CLEANING

A Refer to Section 01 70 00 – Cleaning.
B Clean items prior to final inspection in accordance with the recommendations of the fabricator.

3.6 ERECTION TOLERANCES

A Maximum Variation From Plumb: ¼ inch per story, non-cumulative.
B Maximum Offset From True Alignment: ¼ inch.

END OF SECTION 05 50 00

SECTION 055133.13 – ALUMINUM FIXED VERTICAL LADDERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Aluminum Fixed Vertical Ladders.

1.2 RELATED SECTIONS

A. Section 05550 - Metal Fabrications: Miscellaneous metal supports.

1.3 REFERENCES

A. ANSI A14.3: Ladders - Fixed - Safety Requirements.
B. OSHA 1910.23: Ladders.
C. OSHA 1910.28: Duty to have fall protection and falling object protection.
D. OSHA 1910.29: Fall protection systems and falling object protection-criteria and practices.

1.4 SUBMITTALS

A. Submit under provisions of Section 01300.
B. Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
C. Shop Drawings for Ladders:
   1. Plan and section of ladder installation.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.
B. Store products until installation inside under cover. If stored outside, under a tarp or suitable cover.

1.6 WARRANTY

A. Limited Warranty: Five years against defective material and workmanship, covering parts only, no labor or freight. Defective parts, if deemed so by the manufacturer, will be replaced at no charge, freight excluded, upon inspection at manufacturer's plant which warrants same.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Subject to compliance with requirements, provide Precision Ladders, LLC, which is located at: P. O. Box 2279 ; Morristown, TN 37816-2279; Toll Free Tel: 800-225-7814; Tel: 423-586-2265; or comparable products by one of the following.

1. O’Keeffe’s Inc.

B. info@PrecisionLadders.com; Web: www.PrecisionLadders.com
C. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 ALUMINUM FIXED VERTICAL LADDER

A. Aluminum Fixed Vertical Ladder and Components: Ladder, fall arrest system, floor mounting brackets, and finishes.

1. Aluminum Fixed Vertical Ladder as manufactured by Precision Ladders LLC. Height see drawings.
2. Capacity: Unit shall support a 1,500 lb (680 kg) loading without failure.
3. Performance Standard: Units designed and manufactured to meet or exceed ANSI A14.3, OSHA 1910.23, OSHA 1910.28 and OSHA 1910.29.

B. Components:

1. Ladder Stringer: 2-1/2 inch by 1-1/16 inch by 1/8 inch (64 mm by 27 mm by 3 mm) extruded 6005-T5 aluminum channel. Pitch: 90 degrees.
2. Ladder Tread: 2-1/4 inch by 3/4 inch by 1/4 inch (57 mm by 19 mm by 6 mm) extruded 6005-T5 aluminum with deeply serrated top surface.
3. Ladder Mounting Bracket: 8-1/2 inch by 2 inch by 3 inch by 1/4 inch thick (216 mm by 51 mm by 76 mm by 6 mm) aluminum angle. Secure to CMU wall.
4. Fall Arrest System: Complete system with rail, sleeves, and harness to limit any fall to 6 inches (152 mm). Removeable Post for Hatch Access Ladders with Fall Arrest System. Harness by others.

2.3 FABRICATION

A. Completely fabricate ladder ready for installation before shipment to the site.

PART 3 EXECUTION

3.1 EXAMINATION

A. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
B. Examine materials upon arrival at site. Notify the carrier and manufacturer of any damage.

3.2 INSTALLATION

A. Install in accordance with approved submittals.

3.3 PROTECTION

A. Protect installed products until completion of project.
B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 055213 - PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Steel pipe and tube railings.

B. Related Requirements:

1. Section 055100 "Metal Stairs" for steel tube railings associated with metal pan stairs.

1.2 ACTION SUBMITTALS

A. Product Data: For the following:

1. Manufacturer's product lines of mechanically connected railings.
2. Railing brackets.
3. Grout, anchoring cement, and paint products.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For each type of exposed finish required.

D. Delegated-Design Submittal: For railings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.3 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For pipe and tube railings, for tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Steel Pipe and Tube Railings: See performance requirements.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design railings, including attachment to building construction.

B. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails and Top Rails of Guards:

a. Uniform load of 50 lbf/ ft. applied in any direction.
b. Concentrated load of 200 lbf applied in any direction.
c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Infill of Guards:

a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.
b. Infill load and other loads need not be assumed to act concurrently.

2.3 METALS, GENERAL

A. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

1. Provide type of bracket with flange tapped for concealed anchorage to threaded hanger bolt and that provides 1-1/2-inch clearance from inside face of handrail to finished wall surface.

2.4 STEEL AND IRON

A. Tubing: ASTM A 500 (cold formed) or ASTM A 513.

B. Pipe: ASTM A 53/A 53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.

1. Provide galvanized finish for exterior installations and where indicated.

C. Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.5 FASTENERS

A. General: Provide the following:

1. Ungalvanized-Steel Railings: Plated steel fasteners complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5 for zinc coating.
2. Hot-Dip Galvanized Railings: Type 304 stainless-steel or hot-dip zinc-coated steel fasteners complying with ASTM A 153/A 153M or ASTM F 2329 for zinc coating.

B. Post-Installed Anchors: Torque-controlled expansion anchors capable of sustaining, without failure, a load equal to 6 times the load imposed when installed in unit masonry and 4 times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.

1. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.6 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Etching Cleaner for Galvanized Metal: Complying with MPI#25.

C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

D. Shop Primers: Provide primers that comply with Section 099600 "High-Performance Coatings."

E. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.

F. Intermediate Coat: Complying with Section 099600 "High-Performance Coatings."

G. Topcoat: Complying with Section 099600 "High-Performance Coatings."

H. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

I. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.7 FABRICATION

A. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

B. Form work true to line and level with accurate angles and surfaces.

C. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove flux immediately.
4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

D. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

E. Form changes in direction by bending.

F. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

G. Close exposed ends of railing members with prefabricated end fittings.

H. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated.

I. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.

J. Picket Infill: Fabricate pickets from 3/4 inch square tube.

1. Install at 4 inches o.c., welded to railings .

2.8 STEEL AND IRON FINISHES

A. Galvanized Railings:

1. Hot-dip galvanize exterior steel railings, including hardware, after fabrication.
2. Comply with ASTM A 123/A 123M for hot-dip galvanized railings.
3. Comply with ASTM A 153/A 153M for hot-dip galvanized hardware.

B. Preparing Galvanized Railings for Shop Priming: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.

C. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."

D. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

1. Do not apply primer to galvanized surfaces.

E. High-Performance Coating: Apply intermediate and topcoats to prime-coated surfaces. Comply with coating manufacturer's written instructions and with requirements in SSPC-PA 1, "Shop, Field, and Maintenance Painting of Steel," for shop painting. Apply at spreading rates recommended by coating manufacturer.

1. Color: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

1. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1. Coat, with a heavy coat of bituminous paint, concealed surfaces of aluminum that are in contact with grout, concrete, masonry, wood, or dissimilar metals.

3.2 ANCHORING POSTS

A. Use metal sleeves preset and anchored into concrete for installing posts. After posts are inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.

B. Form or core-drill holes not less than 4 inches deep or to full depth of concrete, whichever is lesser, and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.

C. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members.

3.3 ATTACHING RAILINGS

A. Attach railings to wall with wall brackets, except where end flanges are used. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

B. Secure wall brackets and railing end flanges to building construction as follows:

1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
2. For hollow masonry anchorage, use toggle bolts.
3. For steel-framed partitions, use hanger or lag bolts set into wood backing between studs. Coordinate with stud installation to locate backing members.
4. For steel-framed partitions, use self-tapping screws fastened to steel framing or to concealed steel reinforcements.

5. For steel-framed partitions, use toggle bolts installed through flanges of steel framing or through concealed steel reinforcements.

3.4 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up shop-painted surfaces.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and repair galvanizing to comply with ASTM A 780/A 780M.

END OF SECTION 055213

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wood blocking, cants and nailers.
2. Wood furring and grounds.
3. Plywood backing panels.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product.

1. Include data for wood preservative treatment from chemical treatment manufacturers and certification by treating plants that treated materials comply with requirements
2. Include data for fire-retardant treatment from chemical treatment manufacturers and certification by treating plants that treated materials comply with requirements.

1.3 INFORMATIONAL SUBMITTALS

A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.

B. Evaluation Reports: For the following, from ICC-ES:

1. Wood-preservative-treated wood.
2. Fire-retardant-treated wood.
3. Engineered wood products.
4. Shear panels.
5. Power-driven fasteners.
6. Powder-actuated fasteners.
7. Expansion anchors.
8. Metal framing anchors.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency

certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.
3. Provide dressed lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content of Lumber: 15 percent for 2-inch nominal thickness or less, 19 percent for more than 2-inch nominal unless otherwise indicated.

C. Engineered Wood Products: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.

1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

D. Application: Treat items indicated on Drawings, and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, furring, stripping and similar concealed members in contact with masonry or concrete.
3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
4. Wood framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.
5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.

C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.

D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.

E. Application: Treat items indicated on Drawings, and the following:

1. Lumber located in Roof construction.

2.4 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.
3. Cants.
4. Furring.
5. Grounds.

B. For items of dimension lumber size, provide Construction or No. 2 grade lumber of any species.

C. For concealed boards, provide lumber with 15 percent maximum moisture content and any of the following species and grades:

1. Mixed southern pine; No. 2 grade; SPIB.
2. Eastern softwoods; No. 2 Common grade; NeLMA.
3. Northern species; No. 2 Common grade; NLGA.

4. Western woods; Construction or No. 2 Common grade; WCLIB or WWPA.

2.5 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: DOC PS 1, Exterior, AC in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.

2.6 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners of Type 304 stainless steel.

B. Power-Driven Fasteners: NES NER-272.

C. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

2.7 METAL FRAMING ANCHORS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Cleveland Steel Specialty Co.
2. KC Metals Products, Inc.
3. Phoenix Metal Products, Inc.
4. Simpson Strong-Tie Co., Inc.
5. USP Structural Connectors.

B. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those of products of manufacturers listed. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

C. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.

1. Use for interior locations unless otherwise indicated.

D. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A 653/A 653M; structural steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.

1. Use for wood-preservative-treated lumber and where indicated.

2.8 MISCELLANEOUS MATERIALS

A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds and similar supports to comply with requirements for attaching other construction.

B. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

C. Do not splice structural members between supports unless otherwise indicated.

D. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

E. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

F. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.

3.2 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes sufficiently wet that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061000

SECTION 061600 - SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wall sheathing.
2. Sheathing joint and penetration treatment.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory." or GA-600, "Fire Resistance Design Manual."

2.2 WALL SHEATHING

A. Glass-Mat Gypsum Wall Sheathing: ASTM C 1177/1177M.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Georgia-Pacific Gypsum LLC; 5/8” DensGlass exterior sheathing or comparable product by one of the following:

a. Certainteed.
b. James Hardie Building Products, Inc.
c. National Gypsum Company.
d. United States Gypsum Company.+

2.3 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. For wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

2.4 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

A. Sealant for Glass-Mat Gypsum Sheathing: Elastomeric, medium-modulus, neutral-curing silicone joint sealant compatible with joint substrates formed by gypsum sheathing and other materials, recommended by sheathing manufacturer for application indicated and complying with requirements for elastomeric sealants specified in Section 079200 "Joint Sealants."

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."

D. Coordinate wall sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

3.2 GYPSUM SHEATHING INSTALLATION

A. Comply with GA-253 and with manufacturer's written instructions.

1. Fasten gypsum sheathing to cold-formed metal framing with screws.
2. Install boards with a 3/8-inch gap where non-load-bearing construction abuts structural elements.
3. Install boards with a 1/4-inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.

B. Seal sheathing joints according to sheathing manufacturer's written instructions.

1. Apply elastomeric sealant to joints and fasteners and trowel flat. Apply sufficient amount of sealant to completely cover joints and fasteners after troweling. Seal other penetrations and openings.
2. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing joints and apply and trowel silicone emulsion sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.

END OF SECTION 061600

SECTION 062023 - INTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior plywood paneling.
2. Closet shelving and clothes rods.
3. Interior wood railings.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product.

B. Samples: For each type of paneling.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Lumber: DOC PS 20.

1. Factory mark each piece of lumber with grade stamp of inspection agency indicating grade, species, moisture content at time of surfacing, and mill.

a. For exposed lumber, mark grade stamp on end or back of each piece.

B. Softwood Plywood: DOC PS 1.

2.2 PANELING

A. Hardwood Veneer Plywood Paneling: Manufacturer's stock hardwood plywood panels complying with HPVA HP-1, made without urea-formaldehyde adhesive.

1. Manufacturers: Subject to compliance with requirements, provide products by one manufacturer:
1. Face Grade: HPVA grade AA.
2. Back Grade: HPVA grades 1 or 2.
3. Face Veneer Cut: Rotary-cut white birch, Rotary-cut red oak or Rotary-cut white oak, as selected by Architect.
4. Panel Face Veneer Matching: Whole piece veneer.
5. Thickness: 1/2 inch.
6. Finish: Stain as per Section 099000 “Staining and Transparent Finishing.”

7. Metal Reveal Trim: As manufactured by Fry Reglet or equal.
   a. Vertical Trim: Fry Reglet MWR5050
   b. Inside Corner Trim: Fry Reglet MWCISC50
   c. Outside Corner Trim: Fry Reglet MWCK50
   d. Mounting Accessories: Provide all mounting accessories, as necessary for a complete installation and as recommend by manufacturer.
   e. Finish: Clear anodized or color anodized, as selected by Architect from manufacturer's full range of standard colors.

2.3 CLOSET SHELVING AND CLOTHES RODS

A. Shelving: Made from the following material, 3/4 inch thick.

1. Softwood Boards: Douglas fir-larch, Douglas fir south, or hem-fir; Superior or C & Btr finish; NLGA, WCLIB, or WWPA; or southern pine, B & B finish; SPIB; kiln dried.

B. Shelf Cleats: 3/4-by-5-1/2-inch boards with hole and notch to receive clothes rods, as specified above for shelving.

C. Shelf Brackets with Rod Support: BHMA A156.16, B04051; prime-painted formed steel.

D. Shelf Brackets without Rod Support: BHMA A156.16, B04041; prime-painted formed steel.

E. Clothes Rods: 1-1/2-inch diameter, clear, kiln-dried Douglas fir or southern pine.

2.4 WOOD RAILINGS

A. Interior Railings: Clear, kiln-dried red oak.

1. Finish: Stain as per Section 099000 "Staining and Transparent Finishing."

2.5 MISCELLANEOUS MATERIALS

A. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.

1. Wood glue shall have a VOC content of 30 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Paneling Adhesive: Comply with paneling manufacturer's written recommendations for adhesives.

1. Adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours, unless longer conditioning is recommended by manufacturer.

3.2 INSTALLATION, GENERAL

A. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.

1. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
2. Countersink fasteners, fill surface flush, and sand unless otherwise indicated.
3. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining interior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.

3.3 STANDING AND RUNNING TRIM INSTALLATION

A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. [Cope] [Miter] at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints.

3.4 PANELING INSTALLATION

A. Plywood Paneling: Select and arrange panels on each wall to minimize noticeable variations in grain character and color between adjacent panels. Leave 1/4-inch gap to be covered with trim at top, bottom, and openings. Install with uniform tight joints between panels.

1. Attach panels to supports with manufacturer's recommended panel adhesive and fasteners. Space fasteners and adhesive as recommended by panel manufacturer.
2. Conceal fasteners to greatest practical extent.

B. Hardboard Paneling: Install according to manufacturer's written recommendations. Leave 1/4-inch gap to be covered with trim at top, bottom, and openings. Butt adjacent panels with moderate contact. Use fasteners with prefinished heads matching paneling color.

C. Board Paneling: Arrange in random-width pattern suggested by manufacturer unless boards or planks are of uniform width.

1. Install in full lengths without end joints.
2. Stagger end joints in random pattern to uniformly distribute joints on each wall.

3. Select and arrange boards on each wall to minimize noticeable variations in grain character and color between adjacent boards. Install with uniform tight joints between boards.
4. Fasten paneling by face nailing, setting nails, and filling over nail heads.
5. Fasten paneling with trim screws, set below face and filled.
6. Fasten paneling by blind nailing through tongues.

3.5 SHELVING AND CLOTHES ROD INSTALLATION

A. Cut shelf cleats at ends of shelves about 1/2 inch less than width of shelves and sand exposed ends smooth.

B. Install shelf cleats by fastening to framing or backing with finish nails or trim screws, set below face and filled. Space fasteners not more than 16 inches o.c.

C. Install shelf brackets according to manufacturer's written instructions, spaced not more than 32 inches o.c. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors.

D. Cut shelves to neatly fit openings with only enough gap to allow shelves to be removed and reinstalled. Install shelves, fully seated on cleats, brackets, and supports.

3.6 RAILING INSTALLATION

A. Railings: Secure wall rails with metal brackets. Fasten freestanding railings to newel posts and to trim at walls with countersunk-head wood screws or rail bolts, and glue. Assemble railings at goosenecks, easements, and splices with rail bolts and glue.

END OF SECTION 062023

SECTION 064116 - PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Plastic-laminate-faced architectural cabinets.
2. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-faced architectural cabinets unless concealed within other construction before cabinet installation.

B. Related Requirements:

1. Section 123661 "Solid Surface Countertops."

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product, including panel products, high-pressure decorative laminate, adhesive for bonding plastic laminate and cabinet hardware and accessories.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

C. Samples:

1. Plastic laminates, for each color, pattern, and surface finish.
2. Thermoset decorative panels, for each color, pattern, and surface finish.

1.3 QUALITY ASSURANCE

A. Fabricator Qualifications: 5 years documented experience in the successful fabrication of plastic-laminate-faced architectural cabinets for commercial building projects.

B. Installer Qualifications: Fabricator of products.

1.4 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 ARCHITECTURAL CABINET FABRICATORS

A. Fabricators: Subject to compliance with requirements, provide products by one of the following:

1. Insight Inc. Cooktown Road, Ruston, LA 318-255-8789
2. Tippen's Specialty Millwork 211 Hood Street, West Monroe, LA 318-387-5973
3. Bayou Wood Products 1315 Hwy 15, West Monroe, LA 318-397-0000
4. Douglas Cabinet Company.
5. All Builders Millwork Inc. 758 Burgessville Rd, Ruston, LA 71270. (318) 381-2586

2.2 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural plastic-laminate cabinets indicated for construction, finishes, installation, and other requirements.

B. Grade: Custom.

C. Type of Construction: Frameless.

D. Cabinet, Door, and Drawer Front Interface Style: Flush overlay.

E. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by woodwork quality standard.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Abet Laminati, Inc.
b. Formica Corporation.
c. Lamin-Art, Inc.
d. Panolam Industries International, Inc.
e. Wilsonart International; Div. of Premark International, Inc.
f. Nevamar.

F. Laminate Cladding for Exposed Surfaces:

1. Horizontal Surfaces: Grade HGS.
2. Postformed Surfaces: Grade HGP.
3. Vertical Surfaces: Grade HGS.
4. Pattern Direction: As requested by Architect.

G. Materials for Semiexposed Surfaces:

1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, NEMA LD 3, Grade VGS.
2. Drawer Sides and Backs: Thermoset decorative panels with PVC or polyester edge banding.
3. Drawer Bottoms: Thermoset decorative panels.

H. Dust Panels: 1/4-inch (6.4-mm) plywood or tempered hardboard above compartments and drawers unless located directly under tops.

I. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. As indicated by laminate manufacturer's designations.
2. Match Architect's sample.
3. As selected by Architect from laminate manufacturer's full range in the following categories:

    a. Solid colors, [gloss] or [matte] finish.
    b. Solid colors with core same color as surface, [gloss] or [matte] finish.
    c. Wood grains, [gloss] or [matte] finish.
    d. Patterns, [gloss] or [matte] finish.
    e. Several colors and finishes will be selected by Architect. See interior elevations on drawings.

2.3 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.

1. Wood Moisture Content: 5 to 10 percent.

B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.

1. Medium-Density Fiberboard: ANSI A208.2, Grade 130, made with binder containing no urea formaldehyde.
2. Softwood Plywood: DOC PS 1, medium-density overlay.
3. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1, made with adhesive containing no urea formaldehyde.
4. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.

2.4 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets.

B. Butt Hinges: 2-3/4-inch, five-knuckle steel hinges made from 0.095-inch thick metal, and as follows:

1. Semiconcealed Hinges for Flush Doors: BHMA A156.9, B01361.
2. Semiconcealed Hinges for Overlay Doors: BHMA A156.9, B01521.

C. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, [170] degrees of opening[, self-closing].

D. Back-Mounted Pulls: BHMA A156.9, B02011.

E. Wire Pulls: Back mounted, solid metal, 4 inches long, 5/16 inch in diameter.

F. Catches: Magnetic catches, BHMA A156.9, B03141.

G. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081.

H. Shelf Rests: BHMA A156.9, B04013; metal, two-pin type with shelf hold-down clip.

I. Drawer Slides: BHMA A156.9.

1. Grade 1 and Grade 2: Side mounted and extending under bottom edge of drawer; [full-extension type; zinc-plated steel with polymer rollers.
2. Grade 1HD-100 and Grade 1HD-200: Side mounted; full-extension type; zinc-plated-steel ball-bearing slides.
3. For drawers not more than 3 inches high and not more than 24 inches wide, provide Grade 1.
4. For drawers more than 3 inches high but not more than 6 inches high and not more than 24 inches wide, provide Grade 1.
5. For drawers more than 6 inches high or more than 24 inches wide, provide Grade 1HD-100.
6. For computer keyboard shelves, provide Grade 1.
7. For trash bins not more than 20 inches high and 16 inches wide, provide Grade 1HD-100.

J. Door Locks: BHMA A156.11, E07121.

K. Drawer Locks: BHMA A156.11, E07041.

L. Door and Drawer Silencers: BHMA A156.16, L03011.

M. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.

1. Dark, Oxidized, Satin Bronze, Oil Rubbed: BHMA 613 for bronze base; BHMA 640 for steel base; match Architect's sample.
2. Bright Brass, Clear Coated: BHMA 605 for brass base; BHMA 632 for steel base.
3. Bright Brass, Vacuum Coated: BHMA 723 for brass base; BHMA 729 for zinc-coated-steel base.
4. Satin Brass, Blackened, Bright Relieved, Clear Coated: BHMA 610 for brass base; BHMA 636 for steel base.
5. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.

6. Bright Chromium Plated: BHMA 625 for brass or bronze base; BHMA 651 for steel base.
7. Satin Stainless Steel: BHMA 630.

2.5 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

C. Adhesives: Do not use adhesives that contain urea formaldehyde.

D. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement.

1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.6 FABRICATION

A. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

B. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition cabinets to average prevailing humidity conditions in installation areas.

3.2 INSTALLATION

A. Grade: Install cabinets to comply with same grade as item to be installed.

B. Install cabinets level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.

C. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

D. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork.

E. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
2. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood framing, blocking, or hanging strips, No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish or No. 10 wafer-head, self-drilling screws sized for not less than 1-1/2-inch penetration into concrete masonry units, blocking, or hanging strips

END OF SECTION 064116

SECTION 066400 - PLASTIC PANELING

PART 1 - GENERA

1.1 SUMMARY

A. Section includes plastic sheet paneling.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For plastic paneling and trim accessories.

1.3 QUALITY ASSURANCE

A. Testing Agency: Acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 PLASTIC SHEET PANELING

A. Glass-Fiber-Reinforced Plastic Paneling: Gelcoat-finished, glass-fiber-reinforced plastic panels complying with ASTM D 5319. Panels shall be USDA accepted for incidental food contact.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Crane Composites, Inc.
    b. Glasteel.
    c. Marlite.

2. Surface-Burning Characteristics: As follows when tested by a qualified testing agency according to ASTM E 84. Identify products with appropriate markings of applicable testing agency.

    a. Flame-Spread Index: 25 or less.
    b. Smoke-Developed Index: 450 or less.

3. Basis of Design:
    a. Marlite Symmetric Smart Seam FRP

4. Nominal Thickness: Not less than 0.075 inch.
5. Surface Finish: 4”x8” Tile.
6. Color: As selected by Architect from manufacturer's full range.

2.2 ACCESSORIES

A. Trim Accessories: Manufacturer's standard one-piece vinyl extrusions designed to retain and cover edges of panels. Provide division bars, inside corners, outside corners and caps as needed to conceal edges.

1. Color: As selected by Architect from manufacturer's full range.

B. Adhesive: As recommended by plastic paneling manufacturer and with a VOC content of 50 g/L or less.

C. Sealant: Mildew-resistant, single-component, neutral-curing silicone sealant recommended by plastic paneling manufacturer and complying with requirements in Section 079200 "Joint Sealants."

1. Sealant shall have a VOC content of 250 g/L or less.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that could impair adhesive bond, including oil, grease, dirt, and dust.

B. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.

C. Lay out paneling before installing. Locate panel joints to provide equal panels, at ends of walls and panel runs, not less than half the width of full panels.

3.2 INSTALLATION

A. Install plastic paneling according to manufacturer's written instructions.

B. Install panels in a full spread of adhesive.

C. Install trim accessories with adhesive.

D. Fill grooves in trim accessories with sealant before installing panels, and bed inside corner trim in a bead of sealant.

E. Maintain uniform space between panels and wall fixtures. Fill space with sealant.

F. Remove excess sealant and smears as paneling is installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths until no residue remains.

END OF SECTION 066400

SECTION 071900 - WATER REPELLENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes penetrating water-repellent treatments for the following vertical and horizontal surfaces:

1. Clay brick masonry (face brick).

1.2 ACTION SUBMITTALS

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

B. Samples: For each type of water repellent and substrate indicated.

1.3 INFORMATIONAL SUBMITTALS

A. Product certificates.

1.4 QUALITY ASSURANCE

A. Preinstallation Conference: Conduct conference at Project site.

PART 2 - PRODUCTS

2.1 PENETRATING WATER REPELLENTS

A. Silane/Siloxane-Blend, Penetrating Water Repellent: Clear, silane and siloxane blend with 400 g/L or less of VOCs.

1. Products: Subject to compliance with requirements, provide one of the following:

a. BASF Construction Chemicals, LLC; MasterProtect H 177.
b. Euclid Chemical Company (The), an RPM company; Chemstop WB Regular/Heavy Duty.
c. PROSOCO, Inc.; Siloxane PD or Siloxane WB Concentrate.
d. SaverSystems; MasonrySaver Water Repellent for Brick.
e. Sika Corporation, Inc.; Sikagard 701W.
f. Tnemec Inc.; Dur A Pell 10.

PART 3 - EXECUTION

3.1 General

A. Apply water repellent to all vertical and horizontal surfaces of the following materials, exposed to the exterior:

1. Clay brick masonry (face brick/thin brick)

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements and conditions affecting performance of the Work.

1. Verify that surfaces are clean and dry according to water-repellent manufacturer's requirements. Check moisture content in representative locations by method recommended by manufacturer.
2. Inspect for previously applied treatments that may inhibit penetration or performance of water repellents.
3. Verify that there is no efflorescence or other removable residues that would be trapped beneath the application of water repellent.
4. Verify that required repairs are complete, cured, and dry before applying water repellent.

B. Test pH level according to water-repellent manufacturer's written instructions to ensure chemical bond to silica-containing or siliceous minerals.

3.3 PREPARATION

A. Cleaning: Before application of water repellent, clean substrate of substances that could impair penetration or performance of product according to water-repellent manufacturer's written instructions.

B. Coordination with Mortar Joints: Do not apply water repellent until pointing mortar for joints adjacent to surfaces receiving water-repellent treatment has been installed and cured.

C. Coordination with Sealant Joints: Do not apply water repellent until sealants for joints adjacent to surfaces receiving water-repellent treatment have been installed and cured.

1. Water-repellent work may precede sealant application only if sealant adhesion and compatibility have been tested and verified using substrate, water repellent, and sealant materials identical to those required.

3.4 APPLICATION

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect the substrate before application of water repellent and to instruct Applicator on the product and application method to be used.

B. Apply a heavy-saturation coating of water repellent, on surfaces indicated for treatment, using low-pressure spray to the point of saturation. Remove excess material; do not allow material to puddle beyond saturation. Comply with manufacturer's written instructions for application procedure unless otherwise indicated.

1. Precast Concrete and Cast Stone: At Contractor's option, first application of water repellent on units may be completed before installing them. Mask mortar and sealant bond surfaces to prevent water repellent from migrating onto joint surfaces.

C. Apply a second saturation coating, repeating first application. Comply with manufacturer's written instructions for limitations on drying time between coats and after rainstorm wetting of surfaces between coats. Consult manufacturer's technical representative if written instructions are not applicable to Project conditions.

3.5 CLEANING

A. Immediately clean water repellent from adjoining surfaces and surfaces soiled or damaged by water-repellent application as work progresses. Correct damage to work of other trades caused by water-repellent application.

B. Comply with manufacturer's written cleaning instructions.

END OF SECTION 071900

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Glass-fiber blanket insulation.
2. Mineral-wool blanket insulation.
3. 1 ½” extruded polystyrene unfaced insulation bd.

1.2 ACTION SUBMITTALS

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

1.3 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Research/evaluation reports.

PART 2 - PRODUCTS

2.1 RIGID INSULATION BOARD

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following.

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

B. Extruded Polystyrene (XPS) Cavity Wall Insulation Board: Complies with ASTM C578, and manufactured using carbon black technology.

Type and Compressive Resistance: Type IV, 25 psi (173 kPa), minimum.
Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
Type and Thermal Resistance, R-value (RSI-value): Type IV, 5.6 (0.98), minimum, per 1 inch (25.4 mm) thickness at 75 degrees F (24 degrees C) mean temperature.
Complies with fire resistance requirements indicated on drawings as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.

Board Size: 15-3/4 inches by 96 inches.

Board Thickness: 1 1/2 inches.

Board Edges: Square.

Type and Water Absorption: Type IV, 0.3 percent by volume, maximum, by total immersion.

2.2 GLASS-FIBER BLANKET INSULATION

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. CertainTeed Corporation.
2. Guardian Building Products, Inc.
3. Johns Manville.
4. Knauf Insulation.
5. Owens Corning.

B. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

1. Interior Partitions: Provide in unfaced, glass-fiber blanket insulation in stud cavity of interior partitions, as indicated by Drawings.
2. Exterior Walls: Provide in unfaced, glass-fiber blanket insulation in stud cavity of all exterior stud wall, as follows:

   a. 3-5/8 inch Studs: 3-1/2 inches thick, R-13.
   b. 6 inch Studs: 5-1/2 inches thick, R-19.

3. Ceiling insulation: Provide above all ceilings 6” R-19 unfaced Batt insulation.

2.3 SPRAY POLYURETHANE FOAM INSULATION

A. Closed-Cell Polyurethane Foam Insulation: ASTM C 1029, Type II, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. BASF Corporation.
   b. BaySystems North America, LLC.
   c. Dow Chemical Company (The).
   d. Gaco Western Inc.

2. Minimum density of 1.5 lb/cu. ft., thermal resistivity of 6.2 deg F x h x sq. ft./Btu x in. at 75 deg F.

3. Provide polyurethane foam insulation manufacturer’s standard Thermal Barrier coating, complying with the 2021 edition International Building Code.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.2 INSTALLATION OF INSULATION BELOW STEEL DECK

A. Spray-Applied Insulation: Apply spray-applied insulation according to manufacturer's written instructions. Do not apply insulation until installation of pipes, ducts and conduits scheduled to be surface mounted to deck is completed, electrical boxes, and other items not indicated to receive insulation are masked.

B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

1. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

3.3 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Glass-Fiber Insulation: Install in cavities formed by framing members according to the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.

4. Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
5. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.

C. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

1. Loose-Fill Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft..

END OF SECTION 072100

SECTION 072200

ROOF INSULATION

PART 1 GENERAL

1.01 SUMMARY

A. Work shall include, but is not limited to, the following:
   1. Preparation of new flat and sloped steel roof deck and all flashing substrates.
   2. Insulation
   3. Cover-board
   4. All related materials and labor required to complete specified roofing necessary to receive specified manufacturer's warranty.

1.02 RELATED SECTIONS

A. Division 010000 – General Requirements
B. Division 011000 – Summary of Work
C. Division 071416 – Cold Fluid-Applied Waterproofing
D. Division 075423 – Thermoplastic Polyolefin (TPO) Roofing
E. Division 076200 – Sheet Metal Flashing and Trim

1.03 DEFINITIONS

A. ASTM D 1079-Definitions of Term Relating to Roofing and Waterproofing.
B. The National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual, Fifth Edition Glossary.

1.04 REFERENCES

A. AMERICAN SOCIETY OF CIVIL ENGINEERS - Reference Document ASCE 7, Minimum Design Loads for Buildings and Other Structures.
B. AMERICAN STANDARD OF TESTING METHODS (ASTM):
   1. ASTM C 726 - Standard Specification for Mineral Wool Roof Insulation Board.
   2. ASTM C 728 - Standard Specification for Perlite Thermal Insulation Board.
   3. ASTM C 1177/C 1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
   4. ASTM C 1278 - Standard Specification for Fiber-Reinforced Gypsum Panel.
   5. ASTM C 1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Insulation Board.
   6. ASTM C 1325 – Standard Specification for Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units.
   7. ASTM D 41 - Standard Specification for Asphalt Primer Used in Roofing, Damp proofing, and Waterproofing.
C. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)::

1. ANSI/SPRI FX-1, Standard Field Test Procedure for Determining the Withdrawal Resistance of Roofing Fasteners.
2. ANSI/SPRI IA-1, Standard Field Test Procedure for Determining the Mechanical Uplift Resistance of Insulation Adhesives over Various Substrates.
3. ANSI/FM 4474- American National Standard for Evaluating the Simulated Wind Resistance of Roof Assemblies Using Static Positive and/or Negative Differential Pressures.

D. CANADIAN GENERAL STANDARDS BOARD (CGSB):
1. CGSB 37-GP 56M- Standard for: Modified Bituminous, Prefabricated, and Reinforced for Roofing.

E. FACTORY MUTUAL (FM):
1. FM 4450 - Approval Standard - Class I Insulated Steel Roof Decks.
2. FM 4470 - Approval Standard - Class I Roof Covers.

F. INTERNATIONAL CODES COUNCIL (ICC):
1. 2021 International Building Code (IBC).

G. NATIONAL ROOFING CONTRACTORS' ASSOCIATION (NRCA).

H. UNDERWRITERS LABORATORY (UL):
1. UL 790 Standard Test Methods for Fire Tests of Roof Coverings.
2. UL 1256 – Fire Test of Roof Deck Constructions.

1.05 ACTION SUBMITTALS

A. Product Data Sheets: Submit manufacturer's product data sheets, installation instructions and/or general requirements for each component.
B. Safety Data Sheets: Submit manufacturer's Safety Data Sheets (SDS) for each component.
C. Sample/Specimen Warranty from the manufacturer and contractor.
D. Shop Drawings: Provide roof plan and applicable roof system detail drawings.

1.06 INFORMATIONAL SUBMITTALS

A. Contractor Certification: Submit written certification from roofing system manufacturer certifying that the applicator is authorized by the manufacturer to install the specified materials and system.

1.07 CLOSEOUT SUBMITTALS

A. Warranty: Provide manufacturers and contractor's warranties upon substantial completion of the roofing system.

1.08 QUALITY ASSURANCE

A. MANUFACTURER QUALIFICATIONS:
1. Manufacture shall have 20 years of experience manufacturing roofing materials.
2. Trained Technical Field Representatives, employed by the manufacturer, independent of sales.
3. Provide reports in a timely manner of all site visit reports.

4. Provide specified warranty upon satisfactory project completion.

B. CONTRACTOR QUALIFICATIONS:
   1. Contractor shall be authorized by the manufacturer to install specified materials prior to the bidding period through satisfactory project completion.
   2. Applicators shall have completed projects of similar scope using same materials as specified herein.
   3. Contractor shall provide full time, on-site superintendent or foreman experienced with the specified roof system through satisfactory project completion.
   4. Applicators shall be skilled in the application methods for all materials.
   5. Contractor shall maintain a daily record, on-site, documenting material installation and related project conditions.
   6. Contractor shall maintain a copy of all submittal documents, on-site, available always for reference.

1.09 DELIVERY, STORAGE AND HANDLING

A. Refer to each product data sheet or other published literature for specific requirements.
B. Deliver materials and store them in their unopened, original packaging, bearing the manufacturer's name, related standards, and any other specification or reference accepted as standard.
C. Protect and store materials in a dry, well-vented, and weatherproof location. Only materials to be used the same day shall be removed from this location.
D. When materials are to be stored outdoors, store away from standing water, stacked on raised pallets or dunnage, at least 4 in or more above ground level. Carefully cover storage with “breathable” tarpaulins to protect materials from precipitation and to prevent exposure to condensation.
E. Properly dispose of all product wrappers, pallets, cardboard tubes, scrap, waste, and debris. All damaged materials shall be removed from job site and replaced with new, suitable materials.

1.10 SITE CONDITIONS

A. SAFETY:
   1. The contractor shall be responsible for complying with all project-related safety and environmental requirements.
   2. Refer to NRCA CERTA recommendations, local codes and building owner’s requirements for hot work operations.
   3. The contractor shall review project conditions and determine when and where conditions are appropriate to utilize the specified liquid-applied, or semi-solid roofing materials. When conditions are determined by the contractor to be unsafe or undesirable to proceed, measures shall be taken to prevent or eliminate the unsafe or undesirable exposures and conditions, or equivalent approved materials and methods shall be utilized to accommodate requirements and conditions.
   4. The contractor shall review project conditions and determine when and where conditions are appropriate to utilize the specified hot asphalt-applied materials. When conditions are determined by the contractor to be unsafe or undesirable to proceed, measures shall be taken to prevent

or eliminate the unsafe or undesirable exposures and conditions, or equivalent approved materials and methods shall be utilized to accommodate requirements and conditions.

5. The contractor shall refer to product Safety Data Sheets (SDS) for health, safety, and environment related hazards, and take all necessary measures and precautions to comply with exposure requirements.

B. ENVIRONMENTAL CONDITIONS:

1. Monitor substrate temperature and material temperature, as well as all environmental conditions such as ambient temperature, moisture, sun, cloud cover, wind, humidity, and shade. Ensure conditions are satisfactory to begin work and ensure conditions remain satisfactory during the installation of specified materials. Materials and methods shall be adjusted as necessary to accommodate varying project conditions. Materials shall not be installed when conditions are unacceptable to achieve the specified results.
2. Precipitation and dew point: Monitor weather to ensure the project environment is dry before, and will remain dry, during the application of roofing materials. Ensure all roofing materials and substrates remain above the dew point temperature as required to prevent condensation and maintain dry conditions.
3. Mopping asphalt application: Primer, where used, shall be fully dry before applying hot asphalt. Take all necessary measures and monitor all conditions, to ensure the specified asphalt temperature is no less than 400°F (204°C) at the point of contact with the specified membrane as it is rolled into the hot asphalt.

1.11 PERFORMANCE REQUIREMENTS

A. FIRE CLASSIFICATION:

1. Roof construction performance testing shall be in accordance with UL 1256, FM 4450, or FM 4470 to meet the specified requirements for interior flame spread and fuel contribution.
   a. Roof construction meets requirements of UL 1256, or FM Class 1.

B. ROOF SLOPE:

1. Finished roof slope shall be ¼-inch per foot minimum for roof drainage.
2.

C. ENERGY CONSERVATION REQUIREMENTS:

1. Polyisocyanurate Insulation "R" Value: Long-term thermal resistance (LTTR) values of the specified foam insulation shall be determined in accordance with CAN/ULC-S770.
2. Polyisocyanurate Insulation "R" Value: Shall be determined in accordance with ASTM C1289-11a.
3. Thermal Resistance ‘R’ for the specified roof insulation system shall include the continuous insulation (ci) above the roof deck.
   a. Total Thermal Resistance R Value, continuous insulation (ci) above-deck: minimum R-25.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. SINGLE SOURCE MANUFACTURER: All roofing materials shall be provided by a single supplier with 20 years or more manufacturing history in the US.
   1. Comply with the Manufacturer's requirements as necessary to provide the specified warranty.
B. PRODUCT QUALITY ASSURANCE PROGRAM: Manufacturer shall be an ISO 9001 registered company.
C. ACCEPTABLE MANUFACTURER:
   1. Soprema
   2. Siplast
   3. Prior Approved Equal

2.02 ROOFING SYSTEM

2.03 THERMAL INSULATION SYSTEM

A. RIGID INSULATION
   1. POLYISOCYANURATE INSULATION:
      a. Closed cell polyisocyanurate foam core bonded on each side to a glass fiber-reinforced felt facer.
         i Thickness: 1.5 in minimum board thickness. Total thickness to meet specified insulation system thermal resistance 'R' value (2 layers of 2.2 on sloped Steel Deck)
         ii Dimensions: 4 x 8 foot boards
         iii Meets or exceeds ASTM C1289, Type II, Class 1, Grade 2 (20 psi)
      b. Tapered: Closed cell polyisocyanurate foam core bonded on each side to a glass fiber-reinforced felt facer, tapered to provide slope.
         i Taper: ¼ in with 1/2 in crickets per foot. Insulation, crickets, and saddles provided with taper as required for positive roof slope.
         ii Dimensions: 4 x 4 ft boards
         iii Meets or exceeds ASTM C1289, Type II, Class 1, Grade 2 (20 psi)
B. COVER-BOARD
   1. GYPSUM ROOF BOARD
      a. National Gypsum Company, DEXcell FA Glass Mat Roof Board:
         i Gypsum core, glass fiber-faced, roof board:
         ii Thickness: 1/2 in
         iii Dimensions: 4 x 8 ft boards
         iv Facer: Glass fiber.
         v Meets or exceeds ASTM C1177/C1177M.
      b. Georgia Pacific Gypsum LLC, DensDeck Prime Roof Board:
         i Gypsum core, glass fiber-faced, factory primed, roof Cover-board.
         ii Thickness: 1/2 in
         iii Dimensions: 4 x 8 ft boards
         iv Facer: Factory primed, glass fiber.

v Meets or exceeds ASTM C1177/C1177M.

C. INSULATION TAPERED STRIP
1. TAPERED EDGE STRIP AND BOARDS:
a. Expanded perlite, blended with binders and fibers.
i Dimensions: Size as required.
ii Meets or exceeds ASTM C728.

D. INSULATION AND COVER BOARD ADHESIVE
1. POLYURETHANE FOAM INSULATION ADHESIVE
a. Two-component, polyurethane foam insulation adhesive, applied in ribbons from cartridges or two-component bulk packaging with pump-driven delivery system.
i Ribbon size: 1/2 in to 3/4 in wide.
ii Ribbon spacing: As required to meet specified wind uplift resistance performance.
a) Field of Roof (Zone 1'): 12 in on-centers
b) Field of Roof (Zone 1): 12 in on-centers
c) Perimeter of Roof (Zone 2): 6 in on-centers
d) Corners of Roof (Zone 3): 4 in on-centers
b. Two-component, polyurethane foam insulation adhesive, applied in ribbons from two-component compressed cylinders.
i Ribbon size: 2-1/2 to 3-1/2 in wide.
ii Ribbon spacing: As required to meet specified wind uplift resistance performance.
a) Field of Roof (Zone 1'): 12 in on-centers
b) Field of Roof (Zone 1): 12 in on-centers
c) Perimeter of Roof (Zone 2): 6 in on-centers
d) Corners of Roof (Zone 3): 4 in on-centers

2.04 ACCESSORIES

A. INSULATION FASTENERS AND PLATES
1. #14 FASTENER and 3 IN INSULATION PLATE: Insulation system fasteners and metal stress plates.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination includes visual observations, qualitative analysis, and quantitative testing measures as necessary to ensure conditions remain satisfactory throughout the project.
B. Conduct qualitative insulation adhesive adhesion tests, or quantitative bonded pull tests as necessary to ensure satisfactory adhesion is achieved.
C. The contractor shall examine all roofing substrates including, but not limited to: insulation materials, roof decks, walls, curbs, rooftop equipment, fixtures, and wood blocking.
D. The applicator shall not begin installation until conditions have been properly examined and determined to be clean, dry and, otherwise satisfactory to receive specified roofing materials.
E. During the application of specified materials, the applicator shall continue to examine all project conditions to ensure conditions remain satisfactory to

complete the specified roofing system.

3.02 PREPARATION

A. Before commencing work each day, the contractor shall prepare all roofing substrates to ensure conditions are satisfactory to proceed with the installation of specified roofing materials. Preparation of substrates includes, but is not limited to, substrate repairs, securement of substrates, eliminating all incompatible materials, and cleaning.
B. Where conditions are found to be unsatisfactory, work shall not begin until conditions are made satisfactory to begin work. Commencing of work shall indicate contractor's acceptance of conditions.

3.03 INSULATION FASTENER APPLICATION

A. Fasten Insulation Base Layer to the deck using specified insulation fasteners and plates.
B. Evenly distribute fasteners as required by the board manufacturer's published requirements.
C. Fasten the insulation to meet the specified wind uplift resistance performance requirements and warranty requirements.
D. Minimum insulation fastening requirement:
   1. Field of Roof (Zone 1'): 16 fasteners per 4x8 ft board.
   2. Field of Roof (Zone 1): 16 fasteners per 4x8 ft board.
   3. Perimeter of Roof (Zone 2): 24 fasteners per 4x8 ft board.
   4. Corners of Roof (Zone 3): 32 fasteners per 4x8 ft board.
E. For insulation and Cover-boards located partially within the defined perimeter and/or corners, install fastening for the entire board as specified herein.

3.04 INSULATION ADHESIVE APPLICATION

1. Apply the specified two-component insulation adhesive to adhere Insulation Layers and Cover-board to the deck and insulation substrate(s).
2. Follow insulation adhesive product data sheets and published general requirements for installation requirements.
3. Apply insulation adhesive in uniform ribbons, 1/2 in to 3/4 in wide.
4. Immediately install insulation components into insulation adhesive and apply weight to ensure the materials maintain full contact with all ribbons for complete adhesion. Do not allow insulation adhesive to skin-over before placing the insulation materials into the adhesive.
5. Adhere the insulation system to meet the specified wind uplift resistance performance and specified warranty requirements.
6. Minimum insulation adhesive ribbon spacing:
   a. Field of Roof (Zone 1'): 12 in on-centers.
   b. Field of Roof (Zone 1): 12 in on-centers.
   c. Perimeter of Roof (Zone 2): 6 in on-centers.
   d. Corners of Roof (Zone 3): 4 in on-centers.

INSULATION ADHESIVE PRESSURIZZED CANNISTERS

7. Apply the specified two-component insulation adhesive to adhere Insulation Layers and Cover-board to the deck and insulation

substrate(s).

8. Follow insulation adhesive product data sheets and published general requirements for installation requirements.
9. Apply insulation adhesive in uniform ribbons, 2-1/2 to 3-1/2 in wide.
10. Install insulation components into insulation adhesive and apply weight to ensure the materials maintain full contact with all ribbons for complete adhesion. Do not allow insulation adhesive to skin-over before placing the insulation materials into the adhesive.
11. Adhere the insulation system to meet the specified wind uplift resistance performance and specified warranty requirements.
12. Minimum insulation adhesive ribbon spacing:
    a. Field of Roof (Zone 1'): 12 in on-centers.
    b. Field of Roof (Zone 1): 12 in on-centers.
    c. Perimeter of Roof (Zone 2): 6 in on-centers.
    d. Corners of Roof (Zone 3): 4 in on-centers.

3.05 INSULATION SYSTEM APPLICATION

A. Follow insulation system component product data sheets, published general requirements and, approvals.
B. Install all insulation system components on clean, dry, uniform and, properly prepared substrates.
C. All insulation system boards shall be carefully installed and fitted against adjoining sheets to form tight joints.
D. Insulation system boards that must be cut to fit shall be saw-cut or knife-cut in a straight line, not broken. Chalk lines shall be used to cut insulation components. Uneven or broken edges shall not be accepted. Remove dust and debris that develops during cutting operations.
E. Stagger successive layers of insulation 12 in vertically and laterally to ensure board joints do not coincide with joints from the layers above and below.
F. Crickets, saddles, and tapered edge strips shall be installed before installing Cover-boards.
G. Install tapered insulation, saddles and crickets as required to ensure positive slope for complete roof drainage.
H. Cover-boards shall be installed to fit tight against adjacent boards. When required by the Cover-board manufacturer, a uniform gap shall be provided between Cover-boards using a uniform guide placed between board joints to form a gap between all boards during installation.
I. The finished insulation system surface shall be tight to, and flush with, adjacent substrates to form a satisfactory substrate to install specified roof membrane and flashings.
J. Install specified cants where required for membrane flashing transitions.

3.06 CLEAN-UP

A. Clean-up and properly dispose of waste and debris resulting from these operations each day as required to prevent damages and disruptions to operations.

END OF SECTION

SECTION 072419 - WATER-DRAINAGE EXTERIOR INSULATION AND FINISH SYSTEM (EIFS)

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. EIFS-clad drainage-wall assemblies that are field applied over substrate.
2. Water-resistive coatings.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each EIFS component, trim, and accessory, including water-resistive coatings.

B. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

A. Manufacturer certificates.

B. Product certificates.

C. Product test reports.

D. Field quality-control reports.

E. Evaluation reports.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An installer who is certified in writing by EIFS manufacturer as qualified to install manufacturer's system using trained workers.

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, to set quality standards for materials and execution, and to set quality standards for fabrication and installation.

1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. BASF Wall Systems.
2. Dryvit Systems, Inc.
3. Parex USA, Inc.
4. Sto Corp.

B. Source Limitations: Obtain EIFS from single source from single EIFS manufacturer and from sources approved by EIFS manufacturer as compatible with EIFS components.

2.2 PERFORMANCE REQUIREMENTS

A. EIFS Performance: Comply with ASTM E 2568 and with the following:

1. Weathertightness: Resistant to uncontrolled water penetration from exterior, with a means to drain water entering EIFS to the exterior.
2. Impact Performance: ASTM E 2568, Standard impact resistance, unless otherwise indicated.
3. Bond Integrity: Free from bond failure within EIFS components or between EIFS and substrates, resulting from exposure to fire, wind loads, weather, or other in-service conditions.

2.3 EIFS MATERIALS

A. Primer/Sealer: EIFS manufacturer's standard substrate conditioner designed to protect substrates from moisture penetration and to improve the bond between substrate and insulation adhesive.

B. Water-Resistive Coatings: EIFS manufacturer's standard formulation and accessories for use as water-resistive barriers; compatible with substrate and complying with physical and performance criteria of ASTM E 2570.

C. Flexible-Membrane Flashing: Cold-applied, self-adhering, self-healing, rubberized-asphalt and polyethylene-film composite sheet or tape and primer; EIFS manufacturer's standard or product recommended in writing by EIFS manufacturer.

D. Insulation Adhesive: EIFS manufacturer's standard formulation designed for indicated use; specifically formulated to be applied to back side of insulation in a manner that creates open vertical channels designed to serve as an integral part of the water-drainage system of the EIFS-clad drainage-wall assembly, compatible with substrate.

E. Molded, Rigid Cellular Polystyrene Board Insulation: Comply with ASTM C 578, Type I.

1. Foam Build-Outs: Provide with profiles and dimensions indicated on Drawings.

F. Reinforcing Mesh: Balanced, alkali-resistant, open-weave, glass-fiber mesh treated for compatibility with other EIFS materials, made from continuous multiend strands with retained mesh tensile strength of not less than 120 lbf/in. (21 dN/cm) according to ASTM E 2098.

G. Base-Coat Materials: EIFS manufacturer's standard mixture.

H. Waterproof Adhesive/Base-Coat Materials: EIFS manufacturer's standard waterproof formulation.

I. Primer: EIFS manufacturer's standard factory-mixed, elastomeric-polymer primer for preparing base-coat surface for application of finish coat.

J. Finish-Coat Materials: EIFS manufacturer's standard acrylic-based coating with enhanced mildew resistance.

1. Colors: As selected by Owner from manufacturer's full range.
2. Textures: As indicated by Drawings and listed below:

a. Standard “Fine:” Provide texture equivalent to Sto Corp; standard Fine texture.
b. Specialty “Limestone:” Provide texture equivalent to Sto Corp: specialty Limestone texture.

K. Trim Accessories: Type as designated or required to suit conditions indicated and to comply with EIFS manufacturer's written instructions; manufactured from UV-stabilized PVC; and complying with ASTM D 1784, manufacturer's standard cell class for use intended, and ASTM C 1063.

PART 3 - EXECUTION

3.1 EIFS INSTALLATION

A. Comply with ASTM C 1397, ASTM E 2511, and EIFS manufacturer's written instructions for installation of EIFS as applicable to each type of substrate indicated.

B. Trim: Apply trim accessories at perimeter of EIFS, at expansion joints, at windowsills and elsewhere as indicated. Coordinate with installation of insulation.

C. Board Insulation: Adhere insulation to substrate in compliance with ASTM C 1397 and the following:

1. Apply adhesive to insulation by notched-trowel method, with notches oriented vertically to produce drainage channels that remain functional after the insulation is adhered to substrate.
2. Coordinate installation of flashing and insulation to produce wall assembly that does not allow water to penetrate behind flashing and water-resistive barrier.

D. Expansion Joints: Install at locations indicated and where required by EIFS manufacturer.

E. Waterproof Adhesive/Base Coat: To exposed surfaces of insulation, apply in minimum thickness recommended in writing by EIFS manufacturer over [loped surfaces, windowsills , foam build-outs and where indicated on Drawings.

F. Base Coat: Apply to exposed surfaces of insulation and foam build-outs in minimum thickness recommended in writing by EIFS manufacturer.

G. Reinforcing Mesh: Embed reinforcing mesh in wet base coat to produce wrinkle-free installation with mesh continuous at corners, overlapped not less than 2-1/2 inches or otherwise treated at joints to comply with ASTM C 1397 and EIFS manufacturer's written instructions. Do not lap reinforcing mesh within 8 inches of corners. Completely embed mesh, applying additional base-coat material if necessary, so reinforcing-mesh color and pattern are invisible.

H. Double-Layer Reinforcing-Mesh Application: Where indicated or required, apply second base coat and second layer of reinforcing mesh, overlapped not less than 2-1/2 inches or otherwise treated at joints to comply with ASTM C 1397 and EIFS manufacturer's written instructions in same manner as first application. Do not apply until first base coat has cured.

I. Additional Reinforcing Mesh: Apply strip reinforcing mesh around openings, extending 4 inches beyond perimeter. Apply additional 9-by-12-inch strip reinforcing mesh diagonally at corners of openings (re-entrant corners). Apply 8-inch wide, strip reinforcing mesh at both inside and outside corners unless base layer of mesh is lapped not less than 4 inches on each side of corners.

J. Foam Build-Outs: Fully embed reinforcing mesh in base coat.

K. Primer: Apply over dry base coat according to EIFS manufacturer's written instructions.

L. Finish Coat: Apply over dry, primed base coat, maintaining a wet edge at all times for uniform appearance, in thickness required by EIFS manufacturer to produce a uniform finish of color and texture matching approved sample and free of cold joints, shadow lines, and texture variations.

END OF SECTION 072419

SECTION 072726 - FLUID-APPLIED AIR & WATER-RESISTIVE 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 as indicated on the drawings.

B. Related work:
   1. Concrete.
   2. Masonry.
   3. Sheathing.
   4. Exterior wall finish materials.
   5. Flashings.
   6. Joint sealants.
   7. Doors and frames.
   8. Storefronts.
   9. Curtain walls.
   10. Windows.
   11. Stucco.

1.2 PERFORMANCE REQUIREMENTS:

C. Performance requirements: Comply with the specified performance requirements and characteristics as herein specified.

D. 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 air-tight and flexible manner, allowing for the relative movement of systems due to thermal and moisture variations.

1.3 SUBMITTALS:

E. 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.

F. Shop Drawings: Provide Installation Guideline Illustrations. Submittals shall be submitted to the Architect electronically.

1.4 QUALITY ASSURANCE:

G. Applicable standards, as referenced herein: ASTM International (ASTM).

H. Manufacturer's qualifications: Air and water-resistive barrier systems shall be manufactured and marketed by a firm with a minimum of ten (10) years experience in the production and sales of air and water-resistive barrier system. Manufacturers 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.

I. 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.

J. 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.

K. Sole source: Obtain materials from a single manufacturer.

L. This material shall be installed behind all exterior finishes such as brick, block, EIFS, and metal panels, etc.

M. Product shall be installed by a Louisiana Licensed Waterproofing Contractor.

N. Regulations: Provide products which comply with all state and local regulations controlling use of volatile organic compounds (VOC).

O. Install mock-up using approved weather barrier system including membrane, flashing, joint and detailing compound and related weather barrier accessories according to weather barrier manufacture's current printed instructions and recommendations.

1. Mock-up shall be 10 feet by 10 feet and shall be inspected by the architect prior to continuing any related work.
2. Mock-up substrate: Match wall assembly construction, including window opening.
3. Mock-up may remain as part of the final work.

P. 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 of the conference.
3. Contractor shall record minutes of meeting and distribute them 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.

1.5 DELIVERY, STORAGE, AND HANDLING:

Q. 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.

R. Protect air and water-resistive barrier components from freezing and extreme heat.

S. Sequence deliveries to avoid delays, and to minimize on-site storage.

1.6 PROJECT CONDITIONS:

T. 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:

U. 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.

V. Warranty period: Ten (10) years from Date of Substantial Completion.

PART 2 – PRODUCTS

2.1 MANUFACTURER:

A. **PROSOCO, Inc.**
B. **Sto Corp.**
C. **DuPont Building Innovations.**
D. **Carlisle Coatings & Waterproofing.**
E. **Parex USA.**

2.2 WATER BASED PRIMER FOR RAW GYPSUM BOARD EDGES:

A. Acceptable product: PROSOCO R-GUARD Primer or approved equal

B. Description: Primer consolidates and seals the cut edges of gypsum wall boards where they are exposed in rough openings for windows and doors. The sealed edge makes a compatible surface for easy application of Joint & Seam Filler fiber-reinforced fill coat and seam treatment for through-wall components. Primer brushes or sprays on easily and is usually dry in 30 minutes.

C. Characteristics:

1. Form: milky blue liquid, mild odor
2. Specific Gravity: 1.01
3. pH: 8.5
4. Weight per Gallon: 8.41 pounds
5. Active Content: 18 percent
6. Total Solids: 18 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: 1 year in tightly sealed, unopened container

2.3 JOINT & SEAM FILLER FIBER REINFORCED FILL COAT AND SEAM FILLER:

A. Acceptable product: PROSOCO R-GUARD Joint & Seam Filler or approved equal

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
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 LIQUID-APPLIED FLASHING MEMBRANE

A. Acceptable product: PROSOCO R-GUARD Flashing or approved equal

B. Description: Flashing 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 SPRAY WRAP AIR AND WATER-RESISTIVE BARRIER

A. Acceptable product: PROSOCO R-GUARD Spray Wrap or approved equal

Note: All Air & Water Resistive Barriers must be installed by a waterproofing.

B. Description: Spray Wrap 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.

C. Characteristics:

1. Thickness: Apply according to 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 E-2357.
4. Water vapor permeability: 10.5 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. Flexibility: No cracking or de-lamination using 1/8 inch mandrel at 14 degrees Fahrenheit before and after aging when tested in accordance with ASTM D522.
8. Tensile strength: Greater than 15 psi or exceeds strength of substrate when tested in accordance with ASTM C297.
9. Nail Sealability: pass when tested in accordance with ASTM D1970.
10. Surface burning: pass when tested in accordance with ASTM E84.
11. Form: light red viscous liquid, mild odor
12. Specific gravity: less than 1.0
13. pH: 7.5 to 10.0
14. Weight per gallon: 12.7 pounds
15. Active content: no data
16. Total solids: 62 percent by volume, ASTM-D-2369

17. Volatile organic content (VOC): less than 100 grams per Liter
18. Flash point: greater than 200 degrees Fahrenheit (greater than 93 degrees Celsius)
19. Freeze point: 32 degrees Fahrenheit (0 degrees Celsius)
20. Shelf life: 1 year in tightly sealed, unopened container

2.6 AIR AND WATERPROOF SEALANT FOR WINDOWS AND DOORS:

A. Acceptable product: PROSOCO R-GUARD Weather Barrier or approved equal

B. Description: Weather Barrier 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. Weather Barrier® 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
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 Joint & Seam Filler as necessary to ensure continuity.

1. Surfaces to receive Spray Wrap, MVP, TMVP 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, Joint & Seam Filler, and Weather Barrier 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.

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.
5. The 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 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 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 Joint & Seam Filler fiber-reinforced coat and seam treatment.

D. Masonry and concrete substrates:

1. Masonry head and bed joints should be fully filled and tooled.
2. Mechanically remove loose mortar fins, mortar accumulations and protrusions, and debris.

3.3 INSTALLATION OF JOINT TREATMENT (PREPARE):

A. Apply 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 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 FLASHING AT WINDOWS, DOORS, OPENINGS AND PENETRATIONS (PREPARE):

A. Apply Flashing over surfaces prepared with Joint & Seam Filler to seal and waterproof rough openings:

1. Apply a thick bead of Flashing 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 Flashing 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 Flashing within temperature and weather limitations as required by manufacturer.
8. Apply Flashing to perimeters, sills and adjacent sheathing and building face, in accordance with manufacturer's product data sheet and 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 AIR & WATER-RESISTIVE BARRIER INSTALLATION (PROTECT)

A. Apply appropriate air and water-resistive barrier to a clean, dry substrate (clean, dry, and/or damp substrates use waterproofing air-barrier membrane), 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 FLASHING TRANSITIONS (TRANSITION)

A. Apply Joint & Seam Filler and Flashing 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 Flashing 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 AIR AND WEATHER BARRIER SEALANT FOR WINDOWS AND DOORS INSTALLATION

A. Install Weather Barrier with professional grade caulking gun in continuous beads without air gaps or air pockets.

1. Apply Weather Barrier to a clean, dry or damp surface
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 Weather Barrier 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 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.

END OF SECTION

SECTION 074213.23 - METAL COMPOSITE MATERIAL WALL PANELS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Cladding Panels fabricated from:

1. Aluminum Composite Material (ACM)

B. Accessories including Karrier Rails, Light Gauge Metal Framing outboard of the wall sheathing, Cladding Rails, fasteners, flashings, and perimeter trim.

C. RELATED SECTIONS

1. Section 05 40 00 – Cold Formed Metal Framing
   Supporting Steel: Minimum Gauge Requirement of 18 for all structural supports required for installation of panels. Support members shall be installed within the following tolerances and requirements:
   a. Plus, or minus 1/8 inch in 5 feet in any direction along plane of framing.
   a. Plus or minus 1/4 inch cumulative in 20 feet in any direction along plane of framing.
   b. Plus, or minus 1/2 inch from framing plane on any elevation.
   c. Plumb or level within 1/8 inch at all changes of transverse for pre-formed corner panel applications.
   d. Installed to L/240 stiffness criteria required to suit ACM/MCM applications.
   e. Provide bearing support behind vertical joints of horizontal panel systems and horizontal joints of vertical panel systems. Width of support shall be 5 inches minimum, or double stud spaced 6 inches out-to-out.

1.2 REFERENCES

A. American Architectural Manufacturers Association (AAMA)

1. AAMA 501.1: Standard Test Method for Metal Curtain Walls for water penetration using Dynamic Pressure
2. AAMA 501.2: Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls and Sloped Glazing Systems
3. AAMA 508-07: Voluntary Test Method and Specification for Pressure Equalized Rain Screen Wall Cladding Systems
4. AAMA 809.2 Voluntary Specification test for Non-Drying Sealants
5. AAMA 2605: Coating test utilizing 70% reagent grade Nitric Acid vapor for an exposure time of 30 minutes

B. ASTM International

1. ASTM A653: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
2. ASTM A755: Standard Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Pre-painted by the Coil-Coating Process for Exterior Exposed Building Products
3. ASTM A792: Standard Specification for Steel Sheet, 55 percent Aluminum-Zinc Alloy-Coated by the Hot–Dip Process
4. ASTM A924: Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
5. ASMT B117: Method of Salt Spray (Fog) Testing
6. ASTM C273: Standard Test Method for Shear Properties of Sandwich Core Materials.
7. ASTM C518: Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
8. ASTM C591: Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation
9. ASTM C645: Standard Specification for Non-Structural Steel Framing Members
10. ASTM C920: Standard Specification for Elastomeric Joint Sealants
11. ASTM D635: Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position
12. ASTM D822: Practice for Operating Light and Water Exposure Apparatus (Carbon-Arc Type) for Testing Paint, Varnish, Lacquer, and Related Products
13. ASTM D1308: Effect of Household Chemicals on Clear and Pigmented Organic Finishes
14. ASTM D1621: Standard Test Method for Compressive Properties of Rigid Cellular Plastics
15. ASTM D1622: Standard Test Method for Apparent Density of Rigid Cellular Plastics
16. ASTM D1623: Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics
17. ASTM D1735: Method for Water Fog Testing of Organic Coatings.
18. ASTM D1781: Climbing Drum Peel Test for Adhesives
19. ASTM D1929: Standard Test Method for Determining Ignition Temperature of Plastics
20. ASTM D2126: Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
21. ASTM D2244: Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates
22. ASTM D2247: Practice for Testing Water Resistance of Coatings in 100% Relative Humidity
23. ASTM D2794: Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
24. ASTM D3359: Methods for Measuring Adhesion by Tape Test
25. ASTM D3363: Method for Film Hardness by Pencil Test
26. ASTM D4214: Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films
27. ASTM D6226: Standard Test Method for Open Cell Content of Rigid Cellular Plastics.
28. ASTM E72: Standard Test Methods of Conducting Strength Tests of Panels for Building Construction
29. ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials

30. ASTM E283: Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
31. ASTM E330: Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
32. ASTM E331: Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference

C. National Fire Protection Agency (NFPA)

1. NFPA 259: Standard Test Method for Potential Heat of Building Materials.
2. NFPA 268: Standard Test Method for Determining Ignitability of Exterior Wall Assemblies Using a Radiant Heat Source
3. NFPA 285: Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components

D. UL Underwriters Laboratories

1. UL 263: Standard for Fire Tests of Building Construction and Materials

E. ALUMINUM ASSOCIATION
1. AA-C22-A41: Anodized - Clear Coatings.
2. AA-C22-A42: Anodized - Integral Color Coatings

1.3 ADMINISTRATIVE REQUIREMENTS

A. Pre-installation meeting: Conduct a pre-installation meeting at the job site attended by Owner, Architect, Manufacturer's Technical Representative, Panel Installer, and Contractors of related trades. Coordinate structural support requirements in relation to barrier wall panel assembly, installation, coordination of flashing for both barrier wall panel and exterior finish material, treatment of fenestration, and other requirements specific to the project.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer current technical literature for each type of product.

B. Shop Drawings: Submit detailed drawings and panel analysis showing:

1. Profile
2. Gauge of both exterior and interior sheet of barrier wall panel.
3. Location, layout and dimensions of barrier wall panel.
4. Location and type of fasteners
5. Shape and method of attachment of all trim
6. Locations and type of sealants
7. Installation sequence
8. Coordination Drawings: Provide elevation drawings and building sections which show panels in relationship to required locations for structural support as well as exterior wall finish material. Include panel details, details showing attachment to structural support, and details showing flashing and trim that continue through to exterior finish material.

9. Other details as may be required for a weathertight installation

C. Assembly Analysis: Provide wall panel assembly calculations to verify panels will withstand the design wind loads indicated without detrimental effects or deflection exceeding L/180. Include resistance to fastener pullout.

D. Samples: Provide nominal 3 x 5 inch of each color indicated.

E. Miscellaneous Certifications:

1. Submit documentation that products have been certified in accordance with ISO 14025.

F. Quality Assurance Submittals:

1. Design Data, Test Reports: Provide manufacturer test reports indicating product compliance with requirements.
2. Manufacturer Erection Instructions: Provide manufacturer's written installation instructions including proper material storage, material handling, installation sequence, panel location(s), and attachment methods, details and required trim and accessories.

G. Mock-up:

1. Building consisting of complete cladding system, including but not limited to metal furring, panels, securement devices, sealants, and moldings for approval. Cladding finish and moldings to be of finish and color as designated by the architect. Location of mock-up to be as directed by architect. Size to be four panels minimum in a 2 over 2 configuration. Alternate pattern can be requested by architect.
2. Modify mock-up as necessary for architect approval. Mock-up may remain in place as part of completed work. Mock-up to represent standard for completed work.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Manufacturer shall have a minimum of five (5) years experience in the production of metal wall panels. Manufacturer shall demonstrate past experience with examples of projects of similar type and exposure.
2. Manufacturer to be registered with a Program Operator with a Certified, Environmental Product Declaration, in conformance with ISO 14025, for Insulated Metal Panels.

B. Installer Qualifications: Authorized by the manufacturer and the work shall be supervised by a person having a minimum of five (5) years experience installing insulated wall panels on similar type and size projects and installation of ACM MCM systems.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver panel materials and components in manufacturer's original, unopened, undamaged packaging with identification labels intact.

B. Store wall panel materials on dry, level, firm, and clean surface. Stack no more than two bundles high. Elevate one end of bundle to allow moisture run-off, cover and ventilate to allow air to circulate and moisture to escape.

1.7 WARRANTY

A. Limited Warranty: Standard form in which manufacturer agrees to repair or replace items that fail in materials or workmanship within specified warranty period. The items covered by the warranty include structural performance including bond integrity, deflection and buckling.

1. Warranty Period: Two (2) years from date of Substantial Completion.

B. The aluminum composite material manufacturer shall warrant for a period of 30 years against Max 5 fade based on ASTM D2244 and Max 8 chalk based on ASTM D4212 and delamination of the paint finish.

C. The aluminum composite material manufacturer shall warrant for a period of 10 years that the material will be free from defects including delamination.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Cladding System:

1. Basis-of-Design product: Provide Kingspan; Benchmark ACM panels or comparable products by one of the following:

a. Alpolic.
b. Alucobond.
c. Centria.
d. Fabral.
e. John W. McDougall Company, Inc.
f. Petersen Aluminum Corp.
g. Reynabond.
h. SAF.

2.2 PERFORMANCE AND DESIGN CRITERIA

A. Design Criteria:

1. Wind Loads: As required by the International Building Code, 2021 edition.
2. Deflection criteria of supporting structure and Karrier Wall Panels shall be L/240 for application of ACM/MCM system.
3. Deflection criteria shall be L/180 for ACM/MCM exterior cladding panels.

B. Performance Criteria - Insulated Barrier Wall Panel:

1. Structural Test: Structural performance shall be verifiable by witnessed structural testing for simulated wind loads in accordance with ASTM E72 or E330.
2. Fatigue Test: There shall be no evidence of metal/insulation interface delamination when the panel is tested by simulated wind loads (positive and negative loads), when applied for two million alternate cycles of L/180 deflection.
3. Freeze / Heat Cycling Test: Panels shall exhibit no delamination, surface blisters, permanent bowing or deformation when subjected to cyclic temperature extremes of minus 36 deg. F to plus 180 deg. F temperatures for twenty one, eight-hour cycles.
4. Water Penetration: There shall be no uncontrolled water penetration through the panel joints at a pressure differential of 20 psf, when tested in accordance with ASTM E331.
5. Dynamic Water Penetration: There shall be no uncontrolled water penetration through the panel assembly at a pressure difference of 12 psf, when tested in accordance with AAMA 501.1.
6. Air Infiltration: Air infiltration through the panel shall not exceed 0.01 cfm/sf at 20 psf air pressure differential when tested in accordance with ASTM E283.
7. Humidity Test: Panels shall exhibit no delamination or metal interface corrosion when subjected to plus 140 deg. F temperature and 100 percent relative humidity for a total of 1500 hours (62 days).
8. Autoclave Test: Panels shall exhibit no delamination or shrinkage/melting of the foam core from the metal skins after being subjected in an autoclave to a pressure of 2 psig (13.8kPa) at a temperature of plus 218 deg. F (plus 103 deg. C) for a period of 2 1/2 hours.
9. Panel Fire Endurance Tests:

    a. Fire Endurance Test – 10 minutes: Panels remained in place without joint stitch fastening per CAN/ULC-S101.
    b. Fire Endurance Test – 15 minutes: Panels remained in place with joint stitch fastening per CAN/ULC-S101.

10. Flame Spread and Smoke Developed Tests on Exposed Insulating Core:

    a. Flame Spread: Less than 25.
    b. Smoke Developed: Less than 250.
    c. Tests performed in accordance with CAN/ULC-S102 and NFPA 285 complete wall assembly.

11. Fire Test Response Characteristics: Steel-faced panels with polyisocyanurate (ISO) core shall fully comply with Chapter 26 of International Building Code regarding the use of Foam Plastic.

    a. NFPA 259 Potential Heat Content; established for foam core.
    b. NFPA 268 Ignitability Using Radiant Heat Source; successfully passed acceptance criteria.
    c. NFPA 285 Intermediate Scale Multi-story Fire Evaluation; successfully passed acceptance criteria.
    d. UL 263 Fire Resistive Rating; classified as a component of a fire-rated wall assembly for 1-hour, 2-hour, and 3-hour rating Design No. U053 (rated assemblies include appropriate layers of fire-rated Type X gypsum board).
    e. ASTM D1929 Minimum Flash and Self Ignition; established for foam core.
    f. S101, S102, S127, S134 UL Canada fire test standards; successfully passed.

2.3 ENGINEERED FAÇADE CLADDING SYSTEM

A. Aluminum Composite Material (ACM): 4 mm Fire Retardant (0.157 inches thick)

1. Weight: ACM composite sheet, 1.12 lb/sf.

B. Composition: Two sheets of aluminum sandwiching a solid core of extruded thermoplastic material formed in a continuous line process.

C. Facing Thickness (ACM):

1. 0.50 mm (0.0197 inches) Aluminum.

D. System Characteristics:

1. Rout and Return shop formed edges with perimeter extrusions.
2. Horizontal and vertical joint reveals to be a dry design, visible metal spline of same material, thickness, and finish as the base panel.
3. Progressive system using sliding male-female clip components held within the perimeter extrusions without rivets or screws.
4. Design capable of individual panel removal and re-installation without affecting adjacent panels.
5. System must not generally have visible fasteners telegraphing or fastening on the panel faces or any other compromise of a neat and flat appearance.
6. System shall use back side stiffeners as required, spaced per engineering analysis to provide buckling resistance and limit deflection to no greater than L/180.
7. Field fabrication shall be allowed where necessary, but shall be kept to an absolute minimum. All fabrication shall be done under controlled shop conditions when possible.

E. Exterior Finish:

1. Painted Aluminum Systems (ACM):
   a. Coil coated KYNAR® 500 or HYLAR® 5000 based Polyvinylidene Fluoride (70% PVDF) tested in accordance with AAMA 2605.
   b. Color:
      1) Standard color as selected by the Architect from manufacturer's standard color palette
   c. Coating Thickness:
      1) Colors (base coat): 1.0 mil (±0.2 mil)

F. Performance Criteria – ACM Exterior Wall Cladding Panel:

1. Bond Integrity: When tested for bond integrity, in accordance with ASTM D1781, there shall be no adhesive failure of the bond between the core and skin, or cohesive failure of the core itself below the following Peel Strength values:
   1) Greater than 100 N-mm/mm (22.5 in-lb/in) as manufactured
   2) Greater than 100 N-mm/mm (22.5 in-lb/in) after 21 days soaking in water at 70°F

2. Structural Test: Structural performance shall be verifiable by witnessed structural testing for simulated wind loads in accordance with ASTM E330.

a. Panels shall be engineered to withstand the Design Wind Loading based upon the local building code, but in no case less than 20 pounds per square foot (psf).
b. Maximum panel deflection shall not exceed L/180 under the design wind loads. Back side stiffeners shall be added as necessary per engineering calculations.
c. Maximum anchor deflection shall not exceed 1/16 inch.

3. Thermal Movements: Panel system shall be designed to accommodate vertical and horizontal thermal movement of components to prevent buckling, opening of joints, and other detrimental effects when subjected to seasonal temperature cycles.
   a. Temperature Change (Range):
      -20 deg. F, +120 deg. F ambient, +180 deg. F material surfaces

4. Fire Performance:
   a. ASTM E 84:
      Flame Spread = Passed Class A
      Smoke Developed = Passed Class A
   b. NFPA 285: Passed Acceptance Criteria

G. Finish Performance Criteria – Painted Aluminum Systems:

1. Hardness per ASTM D-3363: HB minimum using Eagle Turquoise Pencil.
2. Impact per ASTM D-2794 Gardner Variable Impact Tester with 5/8" mandrel:
   a. Coating shall withstand reverse impact of 1.5 inch-pounds per mil substrate thickness.
   b. Coating shall adhere tightly to metal when subjected to number 600 Scotch Tape pick-off test. Slight minute cracking permissible. No removal of film to substrate.
3. Adhesion per ASTM D-3359:
   a. Coating shall not pick off when subjected to an 1" x 1" x 1/16" grid and taped with number 600 Scotch Tape.
4. Humidity Resistance per ASTM D-2247:
   a. No formation of blisters when subject to condensing water fog at 100% relative humidity and 100°F for 4000 hours.
5. Salt Spray Resistance per ASTM B-117:
      1) Expose coating system to 4000 hours, using 5% NaCl solution.
      2) Corrosion creepage from scribe line: 1/16" max.
      3) Minimum blister rating of 8 within the test specimen field.
6. Weather Exposure (Outdoor):
   a. Ten-year exposure at 45° angle facing south Florida exposure.
   b. Maximum color change of 5 Delta E units as calculated in accordance with ASTM D-2244.
   c. Maximum chalk rating of 8 in accordance with ASTM D-4214.
   d. No checking, crazing, adhesion loss.
7. Chemical Resistance:
   a. ASTM D-1308 utilizing 10% Muriatic Acid for an exposure time of 15 minutes. No loss of film adhesion or visual change when viewed by the unaided eye.
   b. ASTM D-1308 utilizing 20% Sulfuric Acid for an exposure time of 18 hours. No loss of film adhesion or visual change when viewed by the unaided eye.
   c. AAMA 2605 utilizing 70% reagent grade Nitric Acid vapor for an exposure time of 30 minutes. Maximum color change of 5 Delta E units as calculated in accordance with ASTM D-2244.

H. Façade Cladding Accessories:

1. Fasteners:

a. Hex head, self-drilling fasteners as recommended by manufacturer.
b. Material:
   a. Plated carbon steel for galvanized-to-galvanized connections.
   b. 300 series Stainless Steel for aluminum-to-galvanized connections.
c. Size: As recommended by manufacturer.

2.4 ACCESSORIES

A. Exposed Joint Sealant: Compliant with ASTM C920, as recommended by manufacturer.

B. Butyl Sealants: Non-skinning/curing type compliant with AAMA 809.2 as recommended by manufacturer.

C. Butyl Tape: As recommended by manufacturer.

D. Fasteners (concealed/exposed/non-corrosive): As recommended by panel manufacturer. Do not expose fasteners except where unavoidable and then match finish of adjoining metal

E. Accents and reveals recessed: Extruded aluminum sections as indicated on contract drawings, 6063-T6 alloy, spray applied Kynar 500, color as indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Provide field measurements to manufacturer as required to achieve proper fit of the preformed wall panel envelope. Measurements shall be provided in a timely manner so that there is no impact to construction or manufacturing schedule.

B. Supporting Steel: All structural supports required for installation of panels shall be by Section 054000. Support members shall be installed within the following tolerances:

1. Plus or minus 1/8 inch in 5 feet in any direction along plane of framing.
2. Plus or minus 1/4 inch cumulative in 20 feet in any direction along plane of framing.
3. Plus or minus 1/2 inch from framing plane on any elevation.
4. Plumb or level within 1/8 inch at all changes of transverse for pre-formed corner panel applications.
5. Verify that bearing support has been provided behind vertical joints of horizontal panel systems and horizontal joints of vertical panel systems. Width of support shall be 5 inches minimum.

C. Examine individual panels upon removing from the bundle; notify manufacturer of panel defects. Do not install defective panels.

3.2 INSTALLATION – EXTERIOR FAÇADE CLADDING

A. Installation shall be in accordance with manufacturer's installation guidelines and recommendations.

B. Install cavity-wall support framing per the shop drawings.

C. Install exterior panels plumb, level, and true-to-line to dimensions and layout indicated on approved shop drawings. Do not hard-fasten the exterior ACM/MCM cladding. Panels must not be restrained against thermal movement.

D. Install 4.0 pcf density mineral fiber insulation at each intermediate floor level in cavity between Karrier Panel and ACM/MCM cladding compliant with NFPA 285 testing.

E. Do not cut, trim, weld, or braze component parts during erection in a manner which would damage the finish, decrease strength, or result in visual imperfection or a failure in performance. Return component parts which require alteration to shop for re-fabrication, if possible, or for replacement with new parts.

F. Separate dissimilar metals and use gasketed fasteners where needed to eliminate the possibility of corrosive or electrolytic action between metals.

G. Cut panels prior to installing, where indicated on shop drawings, using a power circular saw with fine tooth carbide tip blade per manufacturer's instructions. Personnel should wear respiratory and eye protection devices.

1. Outside corners shall be mitered, inside corners shall be butt jointed, and provide perimeter trim per manufacturers approved shop drawings and standard details.

H. Sealant installation for exposed joints

1. Clean and prime surfaces to receive exterior exposed sealants in accordance with sealant manufacturer's recommendations.
2. Follow sealant manufacturer's recommendations for joint width-to-depth ratio, application temperature range, size and type of backer rod, and compatibility of materials for adhesion.
3. Direct contact between butyl and silicone sealants shall not be permitted.

3.3 TRIM INSTALLATION

A. Place trim and trim fasteners only as indicated per details on the approved shop drawings.

B. Field drill weep holes where appropriate in horizontal trim; minimum 1/4 inch diameter at 24 inches on center.

C. Place a continuous strip of butyl tube sealant or tape between the inside back face of closure trims and interior panel faces for proper vapor seal.

3.4 FIELD QUALITY CONTROL

A. Testing shall be performed on Barrier Wall Panel prior to the installation of the finish wall materials.

B. Testing Agency: Owner shall engage an independent testing and inspection agency acceptable to the architect to perform field tests and inspections and to prepare reports of findings.

C. Field Water Test: After completing portion of barrier wall panel assembly including accessories, test a 2-bay area selected by the architect for water penetration in accordance with AAMA 501.2 or ASTM E1105.

3.5 CLEANING AND PROTECTION

A. Remove protective film immediately after installation.

B. Touch-up, repair or replace metal panels and trim that have been damaged.

C. After metal wall panel and cladding installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

D. Remove and replace panels that have been damaged beyond repair as a direct result of the panel installation.

E. Any additional protection, after installation, shall be the responsibility of the General Contractor.

END OF SECTION

SECTION 074213.53 - METAL SOFFIT and WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes metal soffit panels.

B. Metal wall panels

C. Metal facia panels

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.

C. Samples: For each type of metal panel indicated.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Warranties: Samples of special warranties.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Ten years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Finish Warranty Period: 30 years from date of Substantial Completion. non-prorated finish warranty.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal panel systems capable of withstanding the effects of loads, as required by the International Building Code 2021 edition based on testing according to ASTM E 1592.

B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E 283 at the following test-pressure difference:

1. Test-Pressure Difference: 1.57 lbf/sq. ft.

C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METAL SOFFIT & WALL PANELS

A. General: Provide metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.

B. Flush-Profile, Concealed-Fastener: Solid panels formed with vertical panel edges and a flat pan between panel edges; with flush joint between panels.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Flush Panel – Smooth panel 12” x 1” Pac-Clad Petersen or comparable product by one of the following:

a. Architectural Building Components.
b. AIM Metals, L.L.C.
c. MBCI.
d. Metal Sales Manufacturing Corporation.

2. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A 653/A 653M, G90 coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A 792/A 792M, Class AZ50 coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.

   a. Nominal Thickness: 22 gauge.
   b. Exterior Finish: Two-coat fluoropolymer.

3. Color 1 (Prefinished Metal Panel Color 1): Manufacturer's standard color as selected by Architect from manufacturer's full range of available colors.

2.3 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C 645, cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 coating designation or ASTM A 792/A 792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

1. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Finish flashing and trim with same finish system as adjacent metal panels.

D. Panel Sealants: Provide sealant types recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing; 1/8 inch thick.
2. Joint Sealant: ASTM C 920; as recommended in writing by metal panel manufacturer.
3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.4 FABRICATION

A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

C. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.

D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

2.5 FINISHES

A. Panels and Accessories:

1. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
2. Concealed Finish: White or light-colored acrylic or polyester backer finish.

PART 3 - EXECUTION

3.1 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

1. Soffit Framing: Clip furring channels to supports, as required to comply with requirements for assemblies indicated.

3.2 METAL PANEL INSTALLATION

A. Metal Soffit Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.

1. Apply panels and associated items true to line for neat and weathertight enclosure.
2. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.

B. Watertight Installation:

1. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels and elsewhere as needed to make panels watertight.
2. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
3. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.

C. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

D. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.

3.3 CLEANING

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

END OF SECTION 074213.53

SECTION 075419 - POLYVINYL-CHLORIDE (PVC) ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Adhered polyvinyl-chloride (PVC) roofing system 60 mil nominal (78 mil including fleece)
2. Roof insulation

1.2 DEFINITIONS

A. Roofing Terminology: Definitions in ASTM D 1079 and glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" apply to work of this Section.

1.3 PREINSTALLATION MEETINGS

A. General: Delays in scheduling preinstallation meetings, due to Contractors failure to provide any required documents, shall be the responsibility of the Contractor.

B. Preliminary Roofing Conference: Refer to Sections 011115 “Recommended Agenda for Roofing Conferences” and 013100 “Project Management and Coordination.”

1. The following shall be submitted by a Contractor and approved by Architect, prior to scheduling the Preliminary Roofing Conference:

a. Roofing system manufacturer’s proposed assembly letter, guaranteeing compliance with the contract documents.

C. Roofing Pre-application Conference Refer to Sections 011115 “Recommended Agenda for Roofing Conferences” and 013100 “Project Management and Coordination.”

1. Prior to scheduling the Pre-application Conference, Contractor shall provide written documentation, from the roofing system manufacturer, that the warranty has been paid for, including fees for the normally anticipated inspections, by manufacturer, and that only the physical act of installation and inspections remains toward securing the warranty
2. All roofing materials shall be on-site, at the time of the Roofing Pre-application Conference.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work for all actual field conditions.

C. Samples for Verification: For the following products:

1. Sheet roofing, of color required.
2. Walkway rolls, of color required.

1.5 INFORMATIONAL SUBMITTALS

A. Research/Evaluation Reports: For components of roofing system, from ICC-ES.

B. Sample Warranties: For manufacturer's special warranties.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing system to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty. Roofing Contractor shall have the highest level of certification issued by the roofing system manufacturer, prior to bidding, and shall provide a letter stating such, after bids are received and before a contract is executed.

B. Independent Owner Provided Inspections: Owner may, at their option and expense, select and employ one or all of the following:

1. A roofing systems Consultant to review the Construction Documents and/or perform surveillance, during any installation of substrate, roofing, flashing and any other part of the total roofing system.
2. An independent roofing inspection service, specializing in performing Non-Destructive Evaluations (NDE) for moisture detection purposes, before the final acceptance of the roofing and/or before the end of the roofing Guarantee Period.
3. Have a full-time representative on site, during the roofing installation.

1.8 WARRANTY

A. Special Warranty: State of Louisiana Approved Manufacturer No Dollar Limit (NDL), non-prorated warranty agreeing to repair roofing system, replace components of roofing system or the total replacement of the roofing system(s) that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain components including roof insulation and fasteners for roofing system from same manufacturer as membrane roofing or manufacturer approved by membrane roofing manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.

B. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D 3746 or ASTM D 4272.

C. Roofing System Design: Provide a roofing system designed to resist wind uplift pressures, at corners, perimeters and field-of-roof, as follows:

1. Wind uplift pressures shall be calculated, according to the current edition of the ASCE-7 Specification *Minimum Design Loads for Buildings and Other Structures*.
2. Roofing system design shall meet or exceed all requirements of the International Building Code, 2015 edition.
3. Roofing system design shall meet or exceed all requirements Factory Mutual to achieve a FM Class 1-90 rating.

D. Exterior Fire-Test Exposure: ASTM E 108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

E. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

2.3 PVC ROOFING

A. PVC Sheet: ASTM D 4434/D 4434M, Type III, fabric reinforced.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Duro-Last Fleece Back PVC-60 Mil (78 mil including fleece back) or comparable product by one of the following:

a. Carlisle Syntec Incorporated
b. John Manville
c. GAF Materials Corporation.
d. Mule-Hide Products Co., Inc.
e. Sika Sarnafil Inc.

2. Thickness: 60 mils. + Fleece Back
3. Exposed Face Color: As selected by Architect from manufacturer’s.

2.4 AUXILIARY ROOFING MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing.

1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
2. Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the following limits for VOC content:

a. Plastic Foam Adhesives: 50 g/L.
b. Gypsum Board and Panel Adhesives: 50 g/L.
c. Multipurpose Construction Adhesives: 70 g/L.
d. Fiberglass Adhesives: 80 g/L.
e. Single-Ply Roof Membrane Adhesives: 250 g/L.
f. PVC Welding Compounds: 510 g/L.
g. Adhesive Primer for Plastic: 650 g/L
h. Single-Ply Roof Membrane Sealants: 450 g/L.
i. Nonmembrane Roof Sealants: 300 g/L.
j. Sealant Primers for Nonporous Substrates: 250 g/L.
k. Sealant Primers for Porous Substrates: 775 g/L.
l. Other Adhesives and Sealants: 250 g/L.

B. Sheet Flashing: Manufacturer's standard sheet flashing of same material, type, reinforcement, thickness, and color as PVC sheet.

C. Bonding Adhesive: Manufacturer's standard.

D. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roofing to substrate, and acceptable to roofing system manufacturer.

E. Miscellaneous Accessories: Provide metal termination bars, metal battens, pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

2.5 ROOF INSULATION

A. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2, felt or glass-fiber mat facer on both major surfaces.

1. Basis-of-Design Product: Subject to compliance with requirements, provide the following or equal, as recommended in writing by roofing system manufacturer:

a. Johns Manville; Energy 3.

B. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

C. Polyisocyanurate Insulation Cover Board: ASTM C1289 Type II, Class 4, Grade 1, 1/2 inch thick, having a minimum compressive strength of 80 psi.

2.6 INSULATION ACCESSORIES

A. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.

B. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer.

2.7 WALKWAYS

A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway rolls, approximately 3/16 inch thick and acceptable to roofing system manufacturer.

PART 3 - EXECUTION

3.1 ROOFING INSTALLATION, GENERAL

A. Install roofing system according to roofing system manufacturer's written instructions.

B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at end of workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

C. Install roofing and auxiliary materials to tie in to existing roofing to maintain weathertightness of transition.

3.2 INSULATION INSTALLATION

A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.

B. Install tapered insulation under area of roofing to conform to slopes indicated.

C. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.

D. Adhered Insulation: Install each layer of insulation and adhere to substrate as follows:

1. Set each layer of insulation in insulation adhesive, firmly pressing and maintaining insulation in place.

E. Mechanically Fastened Insulation: Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.

1. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.

3.3 ADHERED ROOFING INSTALLATION

A. Adhere roofing over area to receive roofing according to roofing system manufacturer's written instructions. Unroll roofing and allow to relax before retaining.

1. Install sheet according to ASTM D 5036.

B. Accurately align roofing and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

C. Bonding Adhesive: Apply to substrate and underside of roofing at rate required by manufacturer and allow to partially dry before installing roofing. Do not apply to splice area of roofing.

D. In addition to adhering, mechanically fasten roofing securely at terminations, penetrations, and perimeter of roofing.

E. Seams: Clean seam areas, overlap roofing, and hot-air weld side and end laps of roofing and sheet flashings according to manufacturer's written instructions, to ensure a watertight seam installation.

1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet.
2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
3. Repair tears, voids, and lapped seams in roofing that do not comply with requirements.

F. Spread sealant bed over deck-drain flange at roof drains and securely seal roofing in place with clamping ring.

3.4 BASE FLASHING INSTALLATION

A. Install sheet flashings and performed flashing accessories and adhere to substrates according to roofing system manufacturer's written instructions.

B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply to seam area of flashing.

C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.

D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.

E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.5 WALKWAY INSTALLATION

A. Flexible Walkways: Install walkway products in locations indicated. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.6 PROTECTING AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Manufactured reglets with counter-flashing.
2. Formed wall sheet metal fabrications.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For sheet metal flashing and trim.

1. Include plans, elevations, sections, and attachment details.
2. Distinguish between shop- and field-assembled work.
3. Include identification of finish for each item.
4. Include pattern of seams and details of termination points, expansion joints and expansion-joint covers, direction of expansion, roof-penetration flashing, and connections to adjoining work.

C. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Product test reports.

C. Sample warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

1. For copings and roof edge flashings that are SPRI ES-1 tested, shop shall be listed as able to fabricate required details as tested and approved.

B. Mockups: Build mockups to verify selections made under Sample submittals to demonstrate aesthetic effects and to set quality standards for fabrication and installation.

1. Build mockup of typical roof edge and eave, including fascia and fascia trim, approximately 2 feet long.

1.7 WARRANTY

A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.

C. SPRI Wind Design Standard: Manufacture and install roof edge flashings tested according to SPRI ES-1 and capable of resisting the following design pressure:

1. Design Pressure: As required by the International Building Code.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.

1. Exposed Coil-Coated Finish:

a. Three-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

2. Color: As selected by Architect from manufacturer's full range.

C. Metallic-Coated Steel Sheet: Provide zinc-coated (galvanized) steel sheet according to ASTM A 653/A 653M, G90 coating designation or aluminum-zinc alloy-coated steel sheet according to ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40; prepainted by coil-coating process to comply with ASTM A 755/A 755M.

1. Exposed Coil-Coated Finish:

a. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

2. Color: As selected by Architect from manufacturer’s full range.

2.3 UNDERLAYMENT MATERIALS

A. Synthetic Underlayment: Laminated or reinforced, woven polyethylene or polypropylene, synthetic roofing underlayment; bitumen free; slip resistant; suitable for high temperatures over 220 deg F; and complying with physical requirements of ASTM D 226/D 226M for Type I and Type II felts.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Atlas Roofing Corporation; Summit.
b. Engineered Coated Products; Nova-Seal II.
c. Kirsch Building Products, LLC; Sharkskin Comp.
d. SDP Advanced Polymer Products Inc; Palisade.

B. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. minimum.

2.4 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal[or manufactured item] unless otherwise indicated.

B. Fasteners: Self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

    a. Exposed Fasteners: Heads matching color of sheet metal using factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
    b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
    c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
3. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
4. Fasteners for Zinc-Coated (Galvanized) or Aluminum-Zinc Alloy-Coated Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

C. Solder:

1. For Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.
2. For Zinc-Coated (Galvanized) Steel: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead with maximum lead content of 0.2 percent.

D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

E. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

G. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

2.5 MANUFACTURED REGLETS

A. Reglets: Units of type, material, and profile required, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions and with interlocking counterflashing on exterior face, of same metal as reglet.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Fry Reglet Corporation.
   b. Heckmann Building Products, Inc.
   c. Hickman, W. P. Company.
   d. Hohmann & Barnard, Inc.
   e. Wire-Bond Inc.

2. Material: Stainless steel, 0.019 inch thick, Aluminum, 0.024 inch thick or Galvanized steel, 0.022 inch thick.
3. Finish: With manufacturer's standard color coating. Colors selected by Architect.

2.6 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.

1. Obtain field measurements for accurate fit before shop fabrication.
2. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
3. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

C. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.

D. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

E. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.

F. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.

G. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
3. Space cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
5. Torch cutting of sheet metal flashing and trim is not permitted.

B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.

1. Coat concealed side of uncoated-aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

D. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

F. Seal joints as required for watertight construction. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets with solder to width of 1-1/2 inches; however, reduce pre-tinning where pre-tinned surface would show in completed Work.

1. Do not solder metallic-coated steel and aluminum sheet.
2. Do not use torches for soldering.
3. Heat surfaces to receive solder, and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
4. Stainless-Steel Soldering: Tin edges of uncoated sheets, using solder for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.
5. Copper Soldering: Tin edges of uncoated sheets, using solder for copper.

H. Rivets: Rivet joints in uncoated aluminum where necessary for strength.

3.2 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate.

C. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints minimum of 4 inches.

D. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with butyl sealant and clamp flashing to pipes that penetrate roof.

3.3 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate installation of

wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Opening Flashings in Frame Construction: Install continuous head, sill, jamb and similar flashings to extend 4 inches beyond wall openings.

3.4 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder.

C. Clean off excess sealants.

D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

END OF SECTION 076200

SECTION 077100 - ROOF SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Copings.
2. Roof-edge flashings.
3. Roof-edge drainage systems.
4. Reglets and counterflashings.
5. Down-spout Boots

1.2 PERFORMANCE REQUIREMENTS

A. SPRI Wind Design Standard: Manufacture and install copings and roof-edge flashings tested according to SPRI ES-1 and capable of resisting the following design pressures:

1. Design Pressure: As required by the International Building Code 2021 edition.

1.3 ACTION SUBMITTALS

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

B. Shop Drawings: For roof specialties. Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work. Distinguish between plant- and field-assembled work.

C. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Preinstallation Conference: Conduct conference at Project site.

1.7 WARRANTY

A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 EXPOSED METALS

A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation.

1. Basis of Design: Subject to compliance with requirements, provide products by one of the following:

a. Pac-Clad 800.441.8661

b. Hickman 828.274.4000

2. Surface: Smooth, flat finish.
3. Exposed Coil-Coated Finishes: Prepainted by the coil-coating process to comply with ASTM A 755/A 755M. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

a. Two-Coat Fluoropolymer: AAMA 621. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.

1) Color: As selected by Architect from manufacturer’s full range.

2.2 CONCEALED METALS

A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation.

2.3 UNDERLAYMENT MATERIALS

A. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.

B. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F.
2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F.

C. Polyethylene Sheet: 6-mil thick polyethylene sheet complying with ASTM D 4397.

2.4 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.

B. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:

1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.
2. Fasteners for Copper Sheet: Copper, hardware bronze, or passivated Series 300 stainless steel.
3. Fasteners for Aluminum: Aluminum or Series 300 stainless steel.
4. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
5. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A 153/A 153M or ASTM F 2329.

C. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.

D. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

E. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

F. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.5 COPINGS

A. Copings: Manufactured coping system consisting of formed-metal coping cap in section lengths not exceeding 12 feet, concealed anchorage; corner units, end cap units, and concealed splice plates with same finish as coping caps. **Subject to compliance with requirements, provide products by one of the following.**

a. Pac-Clad 800.441.8661 2. Hickman 828.274.400

1. Coping-Cap Material: Zinc-coated steel, nominal thickness as required to meet performance requirements but not less than 22 gauge.

   a. Finish: Two-coat fluoropolymer.
   b. Color: Selected by Architect from manufactures full range.

2. Corners: Factory mitered and mechanically clinched and sealed watertight.
3. Coping-Cap Attachment Method: Face leg hooked to continuous cleat with back leg fastener exposed, fabricated from coping-cap material.
4. Snap-on-Coping Anchor Plates: Concealed, galvanized-steel sheet, 12 inches wide, with integral cleats.
5. Face Leg Cleats: Concealed, continuous galvanized-steel sheet.

2.6 ROOF-EDGE FLASHINGS

A. Roof-Edge Fascia and: Manufactured, two-piece, roof-edge fascia consisting of compression-clamped metal fascia cover in section lengths not exceeding 12 feet and a continuous formed galvanized-steel sheet, 0.028 inch thick, minimum, with extended vertical leg terminating in a drip-edge cleat. Provide matching corner units.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Pac-Clad. 800.441.8661

b. Hickman 828.274.400

2. Fascia Cover: Fabricated from the following exposed metal:
   a. Zinc-Coated Steel: Nominal thickness as required to meet performance requirements but not less than 22 gauge.

3. Corners: Factory mitered and mechanically clinched and sealed watertight.
4. Splice Plates: Exposed, of same material, finish, and shape as fascia cover.
5. Special Fabrications: Radiussed sections, Arched sections, Bullnose fascia cover, Cornice fascia cover and Cove fascia cover, as indicated by drawings.
6. Fascia Accessories: Fascia extenders with continuous hold-down cleats and Wall cap.

2.7 ROOF-EDGE DRAINAGE SYSTEMS

1. Gutters: Manufactured in uniform section lengths not exceeding 12 feet, with matching corner units, ends, outlet tubes, and other accessories. Elevate back edge at least 1 inch above front edge. Furnish flat-stock gutter straps, gutter brackets, expansion joints, and expansion-joint covers fabricated from same metal as gutters. **Manufacturers: Subject to compliance with requirements, provide products by one of the following:**

   a. Pac-Clad. 800.441.8661

   b. Hickman 828.274.400

2. Fabricate from the following exposed metal:

   a. Zinc-Coated Steel: Nominal 0.028-inch thickness.

3. Gutter Profile: As indicated according to SMACNA's "Architectural Sheet Metal Manual."
4. Corners: Factory mitered and mechanically clinched and sealed watertight.
5. Gutter Supports: Straps.
6. Gutter Accessories: Continuous hinged leaf guard of solid metal designed to shed leaves.

B. Downspouts: Plain rectangular complete with machine-crimped elbows, manufactured from the following exposed metal. Furnish with metal hangers, from same material as downspouts, and anchors.
   1. Zinc-Coated Steel: Nominal 0.034-inch thickness.

2. Boots: Cast iron boot, finish to match down-spout, hinged cover-plate for maintainance,

C. Zinc-Coated Steel Finish: Two-coat fluoropolymer.

1. Color: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. General: Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete roof-specialty systems.

1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
2. Provide uniform, neat seams with minimum exposure of solder and sealant.
3. Install roof specialties to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
4. Torch cutting of roof specialties is not permitted.
5. Install underlayment with adhesive for temporary anchorage. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches. Roll laps of self-adhering sheet underlayment with roller; cover within 14 days.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
1. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of self-adhering, high-temperature sheet underlayment.

C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.

1. Space movement joints at a maximum of 12 feet with no joints within 18 inches corners or intersections unless otherwise shown on Drawings.
2. When ambient temperature at time of installation is between 40 and 70 deg F set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.

D. Fastener Sizes: Use fasteners of sizes that will penetrate wood blocking or sheathing not less than 3/4 inch for wood screws (nails are not acceptable) and substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Seal joints with sealant as required by roofing-specialty manufacturer.

F. Seal joints as required for watertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F.

3.2 COPING INSTALLATION

A. Install cleats, anchor plates, and other anchoring and attachment accessories and devices with concealed fasteners.

B. Anchor copings to meet performance requirements.

1. Interlock face and back leg drip edges of snap-on coping cap into cleated anchor plates anchored to substrate at manufacturer's required spacing that meets performance requirements.
2. Interlock face leg drip edge into continuous cleat anchored to substrate at manufacturer's required spacing that meets performance requirements. Anchor back leg of coping with screw fasteners and elastomeric washers at manufacturer's required spacing that meets performance requirements.

3.3 ROOF-EDGE FLASHING INSTALLATION

A. Install cleats, cants, and other anchoring and attachment accessories and devices with concealed fasteners.

B. Anchor roof edgings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

3.4 ROOF-EDGE DRAINAGE-SYSTEM INSTALLATION

A. General: Install components to produce a complete roof-edge drainage system according to manufacturer's written instructions.

B. Gutters: Join and seal gutter lengths. Allow for thermal expansion. Attach gutters to firmly anchored gutter supports spaced not more than 30 inches apart. Attach ends with rivets and seal with sealant to make watertight. Slope to downspouts.

1. Install gutter with expansion joints at locations indicated but not exceeding 50 feet apart. Install expansion joint caps.
2. Install continuous leaf guards on gutters with noncorrosive fasteners, hinged to swing open for cleaning gutters.

C. Downspouts: Join sections with manufacturer's standard telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls and 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c.

3.5 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder and sealants.

C. Remove temporary protective coverings and strippable films as roof specialties are installed.

END OF SECTION 077100

SECTION 077200 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Roof curbs.
2. Equipment supports.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of roof accessory indicated.

B. Shop Drawings: For roof accessories.

C. Samples: For each exposed product and for each color and texture specified.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items.

B. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 WARRANTY

A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finishes or replace roof accessories that show evidence of deterioration of factory-applied finishes within 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 METAL MATERIALS

A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation.

1. Exposed Coil-Coated Finish: Two-coat fluoropolymer finish; AAMA 621; system consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.

B. Aluminum Extrusions and Tubes: ASTM B 221, manufacturer's standard alloy and temper for type of use, finished to match assembly where used, otherwise mill finished.

2.2 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.

B. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners.

C. Sealants: As recommended by roof accessory manufacturer for installation indicated.

2.3 ROOF CURBS

A. Roof Curbs, General: Provide roof curbs, as specified by this Section, unless otherwise specified by Division 23 “HVAC.”

B. Roof Curbs: Internally reinforced roof-curb units with integral spring-type vibration isolators and capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings; with welded or mechanically fastened and sealed corner joints, stepped integral metal cant raised the thickness of roof insulation and integrally formed deck-mounting flange at perimeter bottom.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. AES Industries, Inc.
b. Curbs Plus, Inc.
c. Custom Solution Roof and Metal Products.
d. Greenheck Fan Corporation.
e. LM Curbs.
f. Metallic Products Corp.
g. Milcor Inc.; Commercial Products Group of Hart & Cooley, Inc.
h. Pate Company (The).
i. Roof Products, Inc.
j. Safe Air of Illinois.
k. Thybar Corporation.
l. Vent Products Co., Inc.

C. Material: Zinc-coated (galvanized) steel sheet, 0.080 inch thick, but not less than required to support superimposed live and dead load, including equipment loads.

1. Finish: Two-coat fluoropolymer.

2. Color: As selected by Architect from manufacturer's full range.

D. Construction:

1. Insulation: Factory insulated with 1-1/2-inch glass-fiber board insulation.
2. Liner: Same material as curb, of manufacturer's standard thickness and finish.
3. Factory-installed wood nailer at top of curb, continuous around curb perimeter.
4. On ribbed or fluted metal roofs, form deck-mounting flange at perimeter bottom to conform to roof profile.
5. Fabricate curbs to minimum height of 8 inches, above finished roof, unless otherwise indicated to be fabricated taller.
6. Top Surface: Level around perimeter with roof slope accommodated by sloping the deck-mounting flange.
7. Sloping Roofs: Where roof slope exceeds 1:48, fabricate curb with perimeter curb height tapered to accommodate roof slope so that top surface of perimeter curb is level. Equip unit with water diverter or cricket on side that obstructs water flow.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Verify dimensions of roof openings for roof accessories. Install roof accessories according to manufacturer's written instructions.

1. Install roof accessories level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil canning, buckling, or tool marks.
2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet, or install a course of polyethylene sheet.

C. Seal joints with sealant as required by roof accessory manufacturer.

3.2 REPAIR AND CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A 780.

B. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 077200

SECTION 077233 - ROOF HATCHES WITH FOLDING ALUMINUM GUARD RAIL SYSTEM

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Metal roof hatches with integral curbs and folding aluminum guard rail system.

1.2 RELATED SECTIONS

A. Section 051200 - Structural Steel Framing: Roof structure and opening support.
B. Section 061000 - Rough Carpentry: Roof framing and opening support.
C. Section 074200 - Wall Panels: Roof curb flashing.
D.

1.3 REFERENCES

A. OSHA 1910.23: Ladders.
B. OSHA 1910.28: Duty to have fall protection and falling object protection.
C. OSHA 1910.29: Fall protection systems and falling object protection-criteria and practices.

1.4 SUBMITTALS

A. Submit under provisions of Section 01300.
B. 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 for Roof Hatches with Folding Aluminum Guard Rail System:
   1. Plan and section of stair installation.
   2. Indicate rough opening dimensions for ceiling and/or roof openings.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store roof hatch with folding aluminum guard rail system until installation inside under cover in manufacturer's unopened packaging. If stored outside, store under a tarp or suitable cover.

1.6 WARRANTY

A. Limited Warranty: Five years against defective material and workmanship, covering parts only. Defective parts, as deemed by the manufacturer, will be replaced at no charge, freight excluded, upon inspection at manufacturer's plant.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis Of Design: Precision Ladders, LLC, located at: P. O. Box 2279; Morristown, TN

37816-2279; Tel: 423-586-2265; Web: www.Precision Ladders.com. Provide Metal Roof Hatch with Curb and Folding Aluminum Guard Rail or comparable products by one of the following.

1. The Bilco Company
2. J.L. Industries
3. O'Keeffe's Inc.

2.2 METAL ROOF HATCHES WITH INTEGRAL CURB AND FOLDING ALUMINUM GUARD RAIL SYSTEM

A. Metal Roof Hatches with Integral Curb and Folding Aluminum Guard Rail System and Components: Curb, cover, pressure control, hardware, finishes and folding aluminum guard rail system.
1. Models: PH-A2630-C [PH-A 2'6" x 3'0" for an aluminum roof hatch. Roof Hatch with Folding Guard Rail System as manufactured by Precision Ladders, LLC.
2. Capacity: Cover shall be reinforced to support a minimum live load of 40 psf (195kg/m²) with a maximum deflection of .67% of the span and a 20 psf (97 kg/m²) wind uplift for aluminum (Model PH-A) roof hatches. Folding Aluminum Guard Rail System shall support a load of 200 lbs applied in any direction.
3. Performance Characteristics: Operation of the cover shall be smooth and easy with controlled operation throughout the entire arc of opening and closing. Operation of the cover shall not be affected by temperature. Entire hatch shall be weather tight with fully welded corner joints on cover and curb.
4. Performance Standard: Unit shall comply with OSHA 1910.23, OSHA 1910.28 and OSHA 1910.29.

B. Components:

1. Curb
   a. Formed from (.090 Aluminum H-14 3003 on aluminum models).
   b. Sheathed with 1" (25 mm) of rigid fiber board insulation.
   c. Height of 12" (305 mm) unless indicated otherwise on drawings.
   d. 4" (102 mm) integral flange for securing to roof.
   e. Hinges connecting curb to door shall be 1/8" (3.175 mm), 2 piece formed steel with 3/8 (9.525 mm) pivot pin.
   f. Extruded rubber gasket within a 20 gauge extruded aluminum track shall be securely attached to the frame to make the unit weathertight.
2. Cover
   a. Formed from 090 Aluminum H-14 3003 on aluminum models.
   b. Liner shall be (.040 Aluminum H-14 3003 on aluminum models).
   c. Insulation between cover and liner to be 1" (25 mm) thick U.L. plain fiberglass 0.75# density.
   d. Lid shall be reinforced as required with (.090 Aluminum H-14 3003 on aluminum models).
   e. A one point cab lock is to be provided with a built-in inside handle on units with a length of 4' 6" (1372 mm) or less. On units of greater length, a 2 point slam lock will be used.
   f. The exterior of cover shall be devoid of hardware with the exception of the outside handle.
   g. Outside handle shall be vinyl coated, steel T-handle.

h. Automatic hold-open device shall be formed from 3/16" (4.76 mm) steel flat bar and 1/2" (12.7 mm) diameter steel round stock with a vinyl grip.
i. Padlock provisions provided on both interior and exterior of unit.
j. Extruded rubber gasket shall be securely attached to the liner, thus providing a weather-tight seal.

3. Pressure Control: Opening/closing assistance/resistance shall be provided with spring-loaded pressure intensifiers consisting of a telescoping tube; the top (outer) tube shall be 1 5/16" (33.34 mm),bottom (inner) tube shall be 1 1/2" (38.1 mm). Tubes shall be cadmium plated and chromate-sealed.
4. Hardware: Corrosion resistant hardware and fasteners is standard.
5. Finish: Mill finish aluminum on the folding aluminum guard rail system.
6. Folding Aluminum Guard Rail System:
a. Vertical and horizontal rails: Aluminum (6005-T5) 1-1/4” (32 mm) schedule 40 pipe with 1-5/8” (42 mm) OD.
b. Brackets: 1-1/4” x 1/8” (32 mm by 4 mm) aluminum square tubing.
c. Self-closing gate: Aluminum (6005-T5) 1-1/4” (32 mm) schedule 40 pipe with 1-5/8” (42 mm) OD hinged on open side.

2.3 FABRICATION

A. Completely fabricate roof hatch with folding aluminum guard rail system ready for installation before shipment to the site.
B. Do Not Disassemble.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until rough opening and structural support have been properly prepared.
B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
C. Examine materials upon arrival at site. Notify the carrier and manufacturer of any damage

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions and approved submittals.

3.3 PROTECTION

A. Protect installed products until completion of project.
B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 078413 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Penetrations in fire-resistance-rated walls.

1.2 ACTION SUBMITTALS

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

B. Product Schedule: For each penetration firestopping system. Include location and design designation of qualified testing and inspecting agency.

1. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping condition, submit illustration, with modifications marked, approved by penetration firestopping manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

1.3 INFORMATIONAL SUBMITTALS

A. Installer Certificates: From Installer indicating penetration firestopping has been installed in compliance with requirements and manufacturer's written recommendations.

B. Product test reports.

1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Penetration firestopping shall comply with the following requirements:

1. Penetration firestopping tests are performed by UL, FM Global or other qualified testing agency acceptable to authorities having jurisdiction.
2. Penetration firestopping is identical to those tested per testing standard referenced in "Penetration Firestopping" Article. Provide rated systems bearing marking of qualified testing and inspection agency.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Hilti, Inc.
2. Johns Manville.
3. Rector Seal Corporation.
4. Specified Technologies Inc.
5. 3M Fire Protection Products.
6. USG Corporation.

2.2 PENETRATION FIRESTOPPING

A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.

B. Penetrations in Fire-Resistance-Rated Walls: Ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.

C. Penetrations in Horizontal Assemblies: Ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

1. F-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated.
2. T-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.

D. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

E. VOC Content: Penetration firestopping sealants and sealant primers shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.

F. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by

penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.

B. Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

C. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestopping.

D. Install fill materials for firestopping by proven techniques to produce the following results:

1. Fill voids and cavities where formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.2 IDENTIFICATION

A. Identify penetration firestopping with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of firestopping edge so labels will be visible to anyone seeking to remove penetrating items or firestopping. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Designation of applicable testing and inspecting agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.3 FIELD QUALITY CONTROL

A. Owner will engage a qualified testing agency to perform tests and inspections.

B. Where deficiencies are found or penetration firestopping is damaged or removed because of testing, repair or replace penetration firestopping to comply with requirements.

C. Proceed with enclosing penetration firestopping with other construction only after inspection reports are issued and installations comply with requirements.

END OF SECTION 078413

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Urethane joint sealants.
3. Preformed joint sealants.

1.2 PRECONSTRUCTION TESTING

A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers eight samples of materials that will contact or affect joint sealants. Use ASTM C 1087 or manufacturer's standard test method to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.

B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates. Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

1.3 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples: For each kind and color of joint sealant required.

C. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Preconstruction compatibility and adhesion test reports.

C. Preconstruction field-adhesion test reports.

D. Field-adhesion test reports.

E. Warranties.

1.5 QUALITY ASSURANCE

A. Preinstallation Conference: Conduct conference at Project site.

1.6 WARRANTY

A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Architectural Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.

B. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

1. Suitability for Immersion in Liquids. Where sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.

C. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

2.2 SILICONE JOINT SEALANTS

A. Mildew-Resistant, Neutral-Curing Silicone Joint Sealant: ASTM C 920.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. BASF Building Systems.
    b. Dow Corning Corporation.
    c. GE Advanced Materials - Silicones.
    d. May National Associates, Inc.
    e. Pecora Corporation.
    f. Polymeric Systems, Inc.
    g. Schnee-Morehead, Inc.
    h. Sika Corporation; Construction Products Division.
    i. Tremco Incorporated.

2. Type: Single component (S).
3. Grade: Nonsag (NS).
4. Class: 2.
5. Uses Related to Exposure: Traffic (T) or Nontraffic (NT), as applicable to exposure.

2.3 URETHANE JOINT SEALANTS

A. Urethane Joint Sealant: ASTM C 920.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. BASF Building Systems.
    b. Bostik, Inc.
    c. Lymtal, International, Inc.
    d. May National Associates, Inc.
    e. Pacific Polymers International, Inc.
    f. Pecora Corporation.
    g. Polymeric Systems, Inc.
    h. Schnee-Morehead, Inc.
    i. Sika Corporation; Construction Products Division.
    j. Tremco Incorporated.

2. Type: Multicomponent (M).
3. Grade: Nonsag (NS).
4. Class: 25.
5. Uses Related to Exposure: Traffic (T) or Nontraffic (NT), as applicable to exposure.

2.4 PREFORMED JOINT SEALANTS

A. Preformed Foam Joint Sealant : Manufacturer's standard preformed, precompressed, open-cell foam sealant manufactured from urethane foam with minimum density of 10 lb/cu. ft. and impregnated with a nondrying, water-repellent agent. Factory produce in precompressed sizes

in roll or stick form to fit joint widths indicated; coated on one side with a pressure-sensitive adhesive and covered with protective wrapping.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Dayton Superior Specialty Chemicals.
    b. EMSEAL Joint Systems, Ltd.
    c. Sandell Manufacturing Co.
    d. Schul International, Inc.
    e. Willseal USA, LLC.

2.5 JOINT SEALANT BACKING

A. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), Type O (open-cell material) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.

2.6 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.

1. Remove laitance and form-release agents from concrete.
2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.2 INSTALLATION

A. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

B. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.

F. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.3 FIELD QUALITY CONTROL

A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:

1. Extent of Testing: Test completed and cured sealant joints as follows:

   a. Perform 10 tests for the first 1000 feet of joint length for each kind of sealant and joint substrate.
   b. Perform 1 test for each 1000 feet of joint length thereafter or 1 test per each floor per elevation.

2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

B. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

END OF SECTION 079200

SECTION 079500 – EXPANSION JOINTS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes:
B. Scope of Work
    1. Interior expansion control systems
    2. Exterior expansion control systems
    3. Expansion Joint accessories including provisions for fire rated assemblies, moisture barriers, waterproofing, acoustic and thermal measures.
C. Provide all labor, materials and services to perform operations in connection with furnishing, delivery, and installation of work related to this section.

1.03 RELATED WORK

A. Related work includes but is not limited to:
    1. Cast-In-Place Concrete: Section 03300.
    2. Unit Masonry: Section 04810.
    3. Structural Steel: Section 05120.
    4. Light Gage Metal Framing: Section 05400.
    5. Roofing and Waterproofing: Section 07500
    6. Roof Expansion Assemblies - 07716
    7. Sheet Metal Flashing and Trim: Section 07620.
    8. Joint Sealants as Weather Seals: Section 07900
    9. Gypsum Wallboard: Section 09260.

1.04 REFERENCES

A. Work shall be performed following applicable Local, State, and Federal codes and regulations.
B. Publications listed herein are part of this specification. See below for standards where applicable to the product listed:
    1. American Society for Testing and Materials (ASTM):
        a. ASTM B221, “Standard Specifications for Aluminum and Aluminum-Alloy Extrusions.”
        b. ASTM B209, “Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate.
        c. ASTM E1399 “Cyclic Movement and Measuring of Minimum/Maximum Joint Widths of Architectural Joint Systems.”
        d. ANSI/U.L. No. 263, UL2079, ULCS115, EN1366-4 Fire Rated Testing fort full rated period. Underwriter’s Laboratories shall classify adjacent substrate assemblies.
        e. ASTM E1612, Standard Specification for Preformed Architectural Compression Seals for Buildings and Parking Structures.
    2. American National Standards Institute (ANSI):

a. ANSI A137.1/A326.3 (2018), “Method for Measuring Dynamic Coefficient of Friction on Hard Flooring Materials”

1.05 DEFINITIONS

A. Product Movement capabilities
   1. Product operating range is defined as a percentage of the nominal joint width.
   2. Industry standard requirements: 25%+- operating range for thermal conditions. 50%+- operating range for seismic and windsway conditions.
   3. 100%+- operating range for seismic and windsway conditions with lateral shear capable systems that allow for movement parallel to joint orientation.

B. Product “Load” descriptions:
   1. Standard Loads: common applications with high volume pedestrian crossing. Applicable for typical office settings or other spaces where occasional rubber wheeled traffic (i.e.- mail carts, trolleys, light weight cleaning equipment and luggage) will be encountered. 500 lb. [230 kg] maximum.
   2. Moderate Loads: suggests applications where occasional heavier maintenance equipment with soft rubber tires (such as gurneys, light duty scissor lifts, motorized cleaning equipment) would be added to the Standard traffic definition. The systems in this category are comprised of heavier aluminum extrusions and thicker walled extruded rubber seals. 1000 lb [450 kg] maximum.
   3. Heavy Duty Concentrated Loads: reserved for project conditions where heavy loads (i.e.- vehicles, mobile medical equipment, coin carts, materials handling equipment) are common. Capable of multi-directional movement and resistance to recurring lateral impact forces. Typical 2000 lb. [910 kg] maximum. *7000 lb. [3175 kg] (*Specific models only).

1.06 SYSTEM DESCRIPTION

A. Joint coverplate systems shall permit daily thermal expansion and contraction of building elements, minor foundation settlement, and common windsway movements of the structure without disengagement.
   1. Joint system details shall clearly indicate X-axis joint movement capabilities (horizontal contraction/ expansion). Y-axis joint movement (in-plane shear), and Z-axis movement (vertical shear) may be requested by the Manufacturer if applicable.
   2. Movement capabilities shall be clearly defined as a percentage of the nominal joint width or with distinct dimensions defined on product details.

B. Joint Systems shall allow for seismic movement (if applicable), matching requirements as defined within the Project Specific Structural Specifications.

C. Fire Rated Assemblies shall be tested by registered Third Party Testing Agencies in accordance with UL2079, ULC S115, EN 1366-4 or BS 476-10 classified systems. Expansion joint assembly fire ratings shall match or exceed the fire rating of adjacent construction.

1.07 QUALITY ASSURANCE

A. Architectural Joint Cover Manufacturer: Furnish horizontal and vertical systems from a Manufacturer with a minimum of ten (10) years of experience in the design, engineering and fabrication of expansion joint systems.

B. Fire Rated Assembly Manufacturer: Furnish horizontal and vertical rated systems from a single Manufacturer to ensure compatibility. Intersection of/ or transition between dissimilar systems is not allowed unless reviewed and approved by AHJ.
C. Installer: Contractor with not less than three (3) years of successful experience in the installation of systems similar to those required by Project.

1.08 ACTION SUBMITTALS
A. Manufacturer's Specifications, technical data, installation instructions, and detail drawings for each proposed system.
B. Listings/ Certifications of all Fire Rated Assemblies secured through Registered Third Party Testing Agency.
C. Representative sample of specified systems 4" [100mm] minimum length (if required by Project Architect)
D. UL Environmental GreenGuard Gold Certification required for any Synthetic Rubber seals to be utilized in project. Ensure low VOC readings are reported by Third Party Registered Testing Agency for building projects with Health Care or Educational intent.

1.09 DELIVERY AND STORAGE
A. Manufacturer to provide protective film on all exposed cover plate components.
B. Deliver joint systems to jobsite in new, clean, unopened cartons or crates of sufficient size and strength to protect materials during transit.
C. Inspect materials upon arrival. Store components in original containers in a clean, dry location. Ensure temperature or moisture sensitive components are stored in a tempered location.
D. Contractor to provide temporary protective covers on all installed finished surfaces. Protection is required to guard against both surface abrasions as well as overloading of horizontal deck components by construction traffic.

1.10 SEQUENCING
A. Submittals shall be completed and remitted to the Project Architect within 4 weeks after award of subcontract.
B. Subcontract for the work of this section shall be planned to allow sufficient time for Manufacturer's production and delivery scheduling.

1.11 WARRANTY
A. Standard JointMaster/InPro Corporation limited warranty against material and manufacturing defects for a period of not less than five (5) years when installed in accordance with Manufacturer's recommendations.

PART 2 – PRODUCTS

2.01 MANUFACTURER
A. Manufacturers must be capable of providing a full range of Interior and Exterior Architectural Joint Cover systems as well as a full complement of expansion joint accessories.
B. Manufacturers must be capable of providing project specific details accurate to the building construction type.
C. Substitutions: To be reviewed by Architect of Record
D. Requests for substitutions will be considered in accordance with Section 016000

2.02 MATERIALS

A. Aluminum: Alloy types of 6061-T6, 6063-T6, 6005A, or 5052-H32 sheet goods
    1. Floor systems: Mill finish standard
    2. Walls and Ceilings: Standard Class II Clear Anodized [Color Anodized, Kynar Painted, Custom Color Painted optional]
B. Stainless Steel: Alloy Type 304 for plates and strips.
    1. Brushed #4 surface finish standard
C. Elastomeric Seals: Synthetic rubber seals comprised of a dual extrusion Santoprene rubber for heat welding of all transitions and seams for a monolithic, weathertight installation. EPDM and Neoprene substitutions are not allowed due to their lack of ability to meet this specific requirement.
    1. All Santoprene seals must be certified as low VOC as certified by UL Environmental GreenGuard Gold Certification
D. Horizontal and Vertical Moisture Barrier (optional accessory): Min. 45 mil thick fabric reinforced EPDM with optional watertight drain assemblies.
E. Horizontal and Vertical Insulated Moisture Barrier (optional accessory):
    1. Min. R Value of 15
    2. Must meet ASTM E1399 Cyclic movement requirements matching movement requirements specific to project.

2.03.02 INTERIOR WALL AND CEILING JOINT SYSTEMS

A. Single Flat Seal joint systems
    1. Recessed and Surface Mount framing systems
    2. Joint range applications 1-3” [25-75mm]
    3. Joint operating range 25%+- of total nominal joint width
    4. New and existing construction applications
    5. Santoprene Seal traits:
        a. Achieves UL Greenguard Gold Certification for low VOC offgassing
        b. Dual durometer extruded Santoprene with Shore Hardness of 60 Shore A and 40 Shore D to ensure longevity of installation. Single durometer seals shall not be allowed.
        c. Flat seal must maintain inherent dimensional stability and include structural spine inserts (where applicable) allowing for additional load resistance.
        d. Seals must be heat welded at butt seams and changes in direction
    6. Surface Mount system 116, 118 Series

2.03.05 EXTERIOR ROOF JOINT SYSTEMS

A. Roof Expansion Joint Bellows System
    1. Standard Joint range applications 2-18” [50-450mm]
    2. Joint operating range 50%+- of total nominal joint width
    3. Flexible roofing membrane, supported by a closed cell foam sheetgood to form positive domed bellows. Afixed to flanges, adhered and mechanically fastened to substrate

a. Bellows: 0.060 in. (1.5 mm) thick non-reinforced EPDM, TPO, or PVC bellows adhered and mechanically combined to metal flanges by bifurcation process.
b. Bellow Supports: Closed cell foam, 3⁄8 in. (9.5 mm) minimum thickness.
c. Flange Metal: Hot dipped Galvanized, Stainless Steel, Aluminum, or Copper or flexible membrane for heatwelded seams.
d. Provide matching factory-fabricated corners, transitions, intersections and terminations.
674 Series

2.03.06 ACCESSORY SYSTEMS

A. Fire Rated Barriers and Blanket Systems
1. Rated Fire Barrier system options ranging from 1-4 Hour Rating requirements with
options meeting the following requirements:
2. Tested by Accredited Third Party Architectural Testing and Listing Agency in accordance with ASTM E814/119, E1966 and UL 2079 at its full rated period.
3. Product selection options:
d. Fireline F140 Series- 2 hour Fire Rated Blanket systems for small joint openings with 50%+- movement for seismic applications on joints 2- 4” [50-100mm] nominal width. Pre-attached flanges and male/female seam configuration. Patented compression installation spring system for non-invasive installation. Prefabricated male/ female seam configuration required for consistent fire protection. No mechanical fastening or continuous firecaulk required.

B. Moisture Barrier for vertical and horizontal applications
1. Reinforced EPDM 45 mil thk membrane with nylon mesh reinforcement. Optional drain fittings available in .375” and 1” inside diameter. On center spacing of drains to be determined by Plumbing Engineer of Record. Seams and directional transitions designed to ensure watertight seal and positive condensation drainage.

C. Insulated Thermal Moisture Barrier for vertical and horizontal applications
1. Reinforced EPDM 45 mil thk membranes sandwiching commercial grade batt insulation adhered and pinned together to resist slump and cyclic movement (movement must match the capabilities of the specified coverplate systems). Maintains R-value equivalent to the exterior and roof assemblies on project. Seams and directional transitions designed to ensure watertight seal and positive condensation drainage.
2. Submittal to include: ASTM test reports created by a certified third party Architectural product testing agency.
a. PRODUCT TEST METHOD
Insulated Moisture Barrier ASTM C1363 Thermal Performance Test ASTM E283 Pressure Test for Rate of Air Leakage
ASTM E330 Dynamic Structural Performance Test

Test ASTM E331 Static Water Penetration
3. IVB Series

2.04 FABRICATION

A. Field assemble components provided in standard lengths with pre-packaged fasteners and accessories whenever possible.
B. Fabricate special transitions and corner fittings as required. Miter and heat weld elastomeric seals for monolithic splices and transitions.

PART 3 – EXECUTION

3.01 INSPECTION

A. Prior to starting work, verify that structural gap and blockout dimensions are in conformance with manufacturer's submittal data. Do not begin work until all unsatisfactory substrate conditions are resolved. See manufacturer for recommended tolerances.
B. Carefully inspect installed work of other Trades and verify that such work is complete to allow the work of this section to commence.
C. Schedule inspection of all Waterproofing measures and Fire Rated life safety product prior to installation of coverplate systems –or- provide allowance for removal of 10% of coverplate
systems for inspection before final acceptance.

3.02 INSTALLATION

A. Joint systems: Install in accordance with manufacturer's instructions.
B. Align work plumb, level and flush with adjacent surfaces. Allowances should be made where actual structural gap at time of installation varies from nominal design gap. No shimming of frames is permitted.
C. Coordinate with work of other Sections.
D. If concrete blockouts (rebates) are required, ensure continuous support equal to surrounding substrate structural values.
E. Fire Rated Assemblies: Where required, install to manufacturer's instructions.
F. Moisture Barrier: Where required, install to manufacturer's instructions.

3.03 PROTECTION AND CLEANING

A. Protect the completed Expansion Control system work from damage during construction.
Damage protection includes surface abrasion and overloading of coverplate by materials
handling equipment and construction waste/debris,
B. Protection from environmental factors required throughout installation process until Project
Closeout. Protection includes but is not limited to rain events, moisture protection, exposure to temperature fluctuations or direct sunlight for temperature sensitive product offerings.

C. Prior to project closeout, clean all exposed surfaces with a suitable cleaner. Manufacturer suggests Xylene for Santoprene seals, ensure non-solvent cleansers are not utilized throughout product lifespan.

END OF SECTION

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes all hollow-metal work.

1.2 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include elevations, door edge details, frame profiles, metal thicknesses, preparations for hardware, and other details.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Samples for Verification: For each type of exposed finish required.

E. Schedule: Prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

1.5 WARRANTY

A. Special Warranty: Manufacturer’s standard form in which manufacturer agrees to repair or replace components of hollow metal door and frame systems that fail in materials or workmanship within specified warranty period.

1. Warranty Period: One year from substantial completion.

1.6 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ceco Door Products; an Assa Abloy Group company.
2. Curries Company; an Assa Abloy Group company
3. Steel craft; an Ingersoll-Rand company.

1.7 REGULATORY REQUIREMENTS

A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

1. Smoke- and Draft-Control Assemblies: Provide an assembly with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.

B. Fire-Rated, Borrowed-Light Assemblies: Complying with NFPA 80 and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.

1.8 INTERIOR FRAMES

A. Standard-Duty Doors and Frames: SDI A250.8, Level 1.

1. Physical Performance: Level C according to SDI A250.4.

2. Frames:

a. Materials: Metallic-coated, cold-rolled steel sheet, minimum thickness of 0.042 inch.
b. Construction: Full profile welded.

3. Exposed Finish: Factory primed.

1.9 EXTERIOR HOLLOW-METAL DOORS AND FRAMES

A. Heavy-Duty Doors and Frames: SDI A250.8, Level 2.

1. Physical Performance: Level B according to SDI A250.4.
2. Doors:

a. Type: As indicated in the Door and Frame Schedule.
b. Thickness: 1-3/4 inches.
c. Face: Metallic-coated steel sheet, minimum thickness of 0.042 inch, with minimum A40 coating.
d. Edge Construction: Seamless.
e. Core: Manufacturer’s standard insulation material.

3. Thermal-Rating: Provide doors fabricated with thermal-resistance value (R-value) of not less than 2.1 deg F x h x sq. ft./Btu when tested according to ASTM C 1363.

4. Frames:

   a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A40 coating.
   b. Construction: Full profile welded.

5. Exposed Finish: Factory Primed.

1.10 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
2. Stud-Wall Type: Designed to engage stud, welded to back frames; not less than 0.042 inch thick.
3. Post-installed Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch, and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

1.11 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.

D. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot dip galvanized according to ASTM A 153/A 153M, Class B.

E. Inserts, Bolts, and Fasteners: Hot dip galvanized according to ASTM A 153/A 153M.

F. Power-Actuated Fasteners in Concrete: From corrosion-resistant materials.

G. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.

H. Glazing: Section 088000 "Glazing."

1.12 FABRICATION

A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assembling units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Hollow-Metal Doors:

1. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
2. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated.

C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
4. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
5. Jamb Anchors: Provide number and spacing of anchors as follows:

a. Masonry Type: Locate anchors not more than 16 inches from top and bottom of frame. Space anchors not more than 32 inches o.c., to match coursing, and as follows:

1) Two anchors per jamb up to 60 inches high.
2) Three anchors per jamb from 60 to 90 inches high.
3) Four anchors per jamb from 90 to 120 inches high.
4) Four anchors per jamb plus one additional anchor per anchor per jamb for each 24 inches or fraction thereof above 120 inches high.

b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

1) Three anchors per jamb up to 60 inches high.
2) Four anchors per jamb from 60 to 90 inches high.
3) Five anchors per jamb from 90 to 96 inches high.
4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.

c. Post installed Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.

6. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers.

a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

D. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; includes cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.

1. Reinforce doors and frames to receive non-templated, mortised, and surface-mounted door hardware.
2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

E. Stops and Moldings: Provide stops and moldings around glazed lites. Form corners of stops and moldings with mitered hairline joints.

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.
2. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
3. Provide loose stops and moldings on inside of hollow-metal work.
4. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

1.13 STEEL FINISHES

A. Prime Finish: Clean, pre-treat, and apply manufacturer's standard primer.

1. Shop Primer: SDI A250.10.

B. Field Finish: Paint as specified for Steel Substrates in Section 099600 “High Performance Coatings”

1. Color and Gloss: As selected by Architect.

1.14 ACCESSORIES

A. Mullions and Transom Bars: Join adjacent members by welding or rigid mechanical anchors.

B. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

PART 2 - EXECUTION

2.1 INSTALLATION

A. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

a. At fire-rated openings, install frames according to NFPA 80.
b. Where frames are fabricated in sections because of shipping or handling limitations, field splices at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
c. Install frames with removable stops located on secure side of opening.
d. Install door silencers in frames before grouting.
e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
g. Field apply bituminous coating to backs of frames that will be filled with grout containing anti-freezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.

a. Floor anchors may be set with power-actuated fasteners instead of post-installed expansion anchors if so indicated and approved on Shop Drawings.

3. Metal-Stud Partitions: Solidly pack un-faced fiber-glass insulation inside frames.
4. In-Place Concrete or Masonry Construction: Secure frames in place with post-installed expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
5. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

a. Squareness: Plus, or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
b. Alignment: Plus, or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
c. Twist: Plus, or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
d. Plumbness: Plus, or minus 1/16 inch, measured at jambs at floor.

B. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Steel Doors:

a. Between Door and Frame Jambs and Head: 1/8 inch plus or minus 1/32 inch.
b. Between Edges of Pairs of Doors: 1/8 inch to 1/4 inch plus or minus 1/32 inch.
c. At Bottom of Door: 5/8 inch plus or minus 1/32 inch.
d. Between Door Face and Stop: 1/16 inch to 1/8 inch plus or minus 1/32 inch.

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
3. Smoke-Control Doors: Install doors and gaskets according to NFPA 105.

C. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

2.2 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow-metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

E. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 081113

SECTION 081416 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Plastic laminate faced doors.

B. Product Data: For each type of door.

C. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:

1. Dimensions and locations of blocking.
2. Dimensions and locations of mortises and holes for hardware.
3. Dimensions and locations of cutouts.
4. Undercuts.
5. Fire-protection ratings of fire-rated doors.

D. Samples: For plastic-laminated door faces.

PART 2 - PRODUCTS

2.1 FLUSH WOOD DOORS, GENERAL

A. Contractor shall field verify information of existing solid wood doors to be matched, prior to bidding. Failure to perform said verification shall be the responsibility of the contractor.

B. Quality Standard (Solid wood doors): In addition to requirements specified, comply with AWI's, AWMAC's, and WI's "Architectural Woodwork Standards."

C. Low-Emitting Materials: Fabricate doors with adhesives and composite wood products that do not contain urea formaldehyde.

D. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to **NFPA 252**.

1. Cores: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
2. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
3. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.

2.2 PLASTIC-LAMINATE-FACED DOORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Algoma Hardwoods, Inc.
2. Ampco.
3. Graham Wood Doors; an Assa Abloy Group company.
4. Oshkosh Door Company.
5. VT Industries, Inc.

B. Interior Solid-Core Doors:

1. Grade: Premium.
2. Plastic-Laminate Faces: High-pressure decorative laminates complying with NEMA LD 3, Grade HGS.
3. Colors, Patterns, and Finishes: As selected by Architect from laminate manufacturer's full range of products.
4. Exposed Vertical Edges: Plastic laminate that matches faces, applied before faces.
5. Core: Structural composite lumber.
6. Construction: Five plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before faces and cross-bands are applied

2.3 FABRICATION

A. Factory machine doors for hardware that is not surface applied.

B. Openings: Factory cut and trim openings through doors.

1. Light Openings: Trim openings with moldings of material and profile indicated.
2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 088000 "Glazing."

PART 3 - EXECUTION

3.1 INSTALLATION

A. Hardware: For installation, see Section 087111 "Door Hardware."

B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.

1. Install fire-rated doors according to NFPA 80.
2. Install smoke- and draft-control doors according to NFPA 105.

C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.

1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.

    a. Comply with NFPA 80 for fire-rated doors.

D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

END OF SECTION 081416

SECTION 083313 - COILING COUNTER DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Counter doors.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for miscellaneous steel supports.

1.2 ACTION SUBMITTALS

A. Product Data: For each type and size of coiling counter door and accessory.

B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.

1. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
2. Show locations of controls, locking devices, detectors or replaceable fusible links, and other accessories.
3. Include diagrams for power, signal, and control wiring.

C. Samples: For each exposed product and for each color and texture specified.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.

PART 2 - PRODUCTS

2.1 COUNTER DOOR ASSEMBLY

A. Counter Door: Coiling counter door formed with curtain of interlocking metal slats.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Overhead door Corporation; Model 650 or comparable product by one of the following:

    a. ACME Rolling Doors.
    b. Alpine Overhead Doors, Inc.
    c. C.H.I. Overhead Doors.
    d. Cookson Company.
    e. Overhead Door Corporation.
    f. Raynor.
    g. Wayne-Dalton Corp.

B. Door Curtain Material: Galvanized steel.

C. Door Curtain Slats: Flat profile slats of 1-1/2-inch center-to-center height.

D. Bottom Bar: Manufacturer's standard continuous channel or tubular shape fabricated hot-dip galvanized steel and finished to match door.

E. Curtain Jamb Guides: Aluminum with exposed finish matching curtain slats. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise.

F. Hood: Match curtain material and finish.

1. Mounting: Face of wall.

G. Sill Configuration: No sill.

H. Locking Devices: Equip door with locking device assembly and chain lock keeper.

1. Locking Device Assembly: Cremorne type, both jamb sides locking bars, operable from inside and outside with cylinders.

I. Manual Door Operator: Chain-hoist operator.

J. Door Finish:
1. Baked-Enamel or Powder-Coated Finish: Color as selected by Architect from manufacturer's full range.

2.2 DOOR CURTAIN MATERIALS AND CONSTRUCTION

A. Door Curtains: Fabricate coiling counter-door curtain of interlocking metal slats in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturers for performance, size, and type of door indicated, and as follows:

1. Metal Interior Curtain-Slat Facing: Match metal of exterior curtain-slat face.

B. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain

curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain.

1. Removable Posts and Jamb Guides: Manufacturer's standard.

2.3 HOODS

A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.

2.4 LOCKING DEVICES

A. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.

1. Lock Cylinders: Cylinders standard with manufacturer and keyed to building keying system.
2. Keys: Three for each cylinder.

B. Chain Lock Keeper: Suitable for padlock.

2.5 COUNTERBALANCING MECHANISM

A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

B. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.6 MANUAL DOOR OPERATORS

A. General: Equip door with manual door operator by door manufacturer.

B. Chain-Hoist Operator: Consisting of endless steel hand chain, chain-pocket wheel and guard, and gear-reduction unit with a maximum 25-lbf force for door operation. Provide alloy-steel hand chain with chain holder secured to operator guide.

C. Crank Operator: Consisting of crank and crank gearbox, steel crank drive shaft, and gear-reduction unit, of type indicated. Size gears to require not more than 25-lbf (111-N) force to turn crank. Fabricate gearbox to be oil tight and to completely enclose operating mechanism. Provide manufacturer's standard crank-locking device.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install coiling counter doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

B. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion. Lubricate bearings and sliding parts as recommended by manufacturer.

3.2 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain coiling counter doors.

END OF SECTION 083313

SECTION 084113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior and interior storefront framing.
2. Exterior and interior manual-swing entrance doors.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include plans, elevations, sections, full-size details, and attachments to other work.

1. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.

C. Samples: For each exposed finish required.

D. 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.

1.4 INFORMATIONAL SUBMITTALS

A. Energy Performance Certificates: NFRC-certified energy performance values from manufacturer.

B. Product test reports.

C. Field quality-control reports.

D. Sample warranties.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.

C. 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.

1.7 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

B. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
2. Failure also includes the following:

a. Thermal stresses transferring to building structure.
b. Glass breakage.
c. Noise or vibration created by wind and thermal and structural movements.
d. Loosening or weakening of fasteners, attachments, and other components.
e. Failure of operating units.

B. Structural Loads: As required by the International Building Code, 2021 edition.

C. Deflection of Framing Members: At design wind pressure, as follows:

1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans greater than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch, whichever is smaller.

    a. Operable Units: Provide a minimum 1/16-inch clearance between framing members and operable units.

3. Cantilever Deflection: Where framing members overhang an anchor point, as follows:

    a. Perpendicular to Plane of Wall: No greater than 1/240 of clear span plus 1/4 inch for spans greater than 11 feet 8-1/4 inches or 1/175 times span, for spans less than 11 feet 8-1/4 inches.

D. Structural: Test according to ASTM E 330 as follows:

1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
3. Test Durations: As required by design wind velocity, but not less than 10 seconds.

E. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:

1. Fixed Framing and Glass Area:

    a. Maximum air leakage of 0.06 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..

2. Entrance Doors:

    a. Pair of Doors: Maximum air leakage of 1.0 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft.
    b. Single Doors: Maximum air leakage of 1.0 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft.

F. Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:

1. No evidence of water penetration through fixed glazing and framing areas when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 10 lbf/sq. ft.

G. Energy Performance: Certify and label energy performance according to NFRC as follows:

1. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.44 Btu/sq. ft. x h x deg F as determined according to NFRC 100.
2. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than 0.35 as determined according to NFRC 200.
3. Condensation Resistance: Fixed glazing and framing areas shall have an condensation resistance factor of no less than 62 for frames and 68 for glass as determined according to AAMA Specification 1503.

H. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 MANUFACTURERS

A. Basis-of-Design: Subject to compliance with requirements, provide Kawneer Co., Inc; Trifab VG 451T.

1. Old Castle Phone: 1.866.653.2278
2. YKK AP America Inc. 5300 Hollister St. Suite 320 Houston, Texas 77040 Phone: 713.329.9551.

2.3 FRAMING

A. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Construction: Thermally broken.
2. Frame Size: 2 inches by 4-1/2 inches.
3. Glazing System: Retained mechanically with gaskets on four sides.
4. Glazing Plane: Center.
5. Finish: As selected by Architect from the following:

    a. AA-M10C21A44/AA-M45C22A44, AAMA 611, Architectural Class 1, Clear anodic finish.
    b. Full range of manufacturer’s standard AA-M10C21A44/AA-M45C22A44, AAMA 611, Architectural Class 1, Color anodic finishes.
    c. Full range of manufacturer’s standard AAMA 2605, 70% PVDF, Fluoropolymer Coatings.
    d. Custom color AAMA 2605, 70% PVDF, Fluoropolymer Coating.

6. Fabrication Method: Field-fabricated stick system.

B. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.

C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

D. Materials:

1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

    a. Sheet and Plate: ASTM B 209.
    b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
    c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
    d. Structural Profiles: ASTM B 308/B 308M.

2. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.

    a. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
    b. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
    c. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.4 ENTRANCE DOOR SYSTEMS

A. Basis-of-Design: Subject to compliance with requirements, provide Kawneer Co., Inc; Series 500 Wide Stile.

1. Door Construction: 2- to 2-1/4-inch overall thickness, with minimum 0.125-inch thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.

    a. Thermal Construction: High-performance plastic connectors separate aluminum members exposed to the exterior from members exposed to the interior.

2. Door Design: Medium stile; 3-1/2-inch nominal width.
3. Glazing Gaskets: Manufacturer’s standard compression type, replaceable, extruded EPDM rubber.

2.5 ENTRANCE DOOR HARDWARE

A. Entrance Door Hardware: Hardware not specified in this Section is specified in Section 087100 "Door Hardware."

B. General: Provide entrance door hardware for each entrance door to comply with requirements in this Section.

1. Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and products complying with BHMA standard referenced.
2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
3. Opening-Force Requirements:

a. Egress Doors: Not more than 15 lbf to release the latch and not more than 30 lbf to set the door in motion and not more than 15 lbf to open the door to its minimum required width.
b. Accessible Interior Doors: Not more than 5 lbf to fully open door.

C. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of entrance door hardware are indicated in "Entrance Door Hardware Sets" Article. Products are identified by using entrance door hardware designations as follows:

1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in "Entrance Door Hardware Sets" Article.
2. References to BHMA Standards: Provide products complying with these standards and requirements for description, quality, and function.

D. Butt Hinges: BHMA A156.1, Grade 1, radius corner.

1. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while entrance door is closed.
2. Exterior Hinges: Stainless steel, with stainless-steel pin.
3. Quantities:

a. For doors up to 87 inches high, provide three hinges per leaf.
b. For doors more than 87 and up to 120 inches high, provide four hinges per leaf.

E. Mortise Auxiliary Locks: BHMA A156.5, Grade 1.

F. Automatic and Self-Latching Flush Bolts: BHMA A156.3, Grade 1.

G. Panic Exit Devices: BHMA A156.3, Grade 1, listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.

H. Cylinders: As specified in Section 087100 "Door Hardware."

1. Keying: Master key system. Permanently inscribe each key with a visual key control number and include notation "DO NOT DUPLICATE".

I. Strikes: Provide strike with black-plastic dust box for each latch or lock bolt; fabricated for aluminum framing.

J. Operating Trim: BHMA A156.6.

K. Closers: BHMA A156.4, Grade 1, with accessories required for a complete installation, sized as required by door size, exposure to weather, and anticipated frequency of use; adjustable to comply with field conditions and requirements for opening force.

L. Concealed Overhead Holders: BHMA A156.8, Grade 1.

M. Door Stops: BHMA A156.16, Grade 1, floor or wall mounted, as appropriate for door location indicated, with integral rubber bumper.

N. Weather Stripping: Manufacturer's standard replaceable components.

O. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.

P. Silencers: BHMA A156.16, Grade 1.

Q. Thresholds: BHMA A156.21, raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch.

2.6 GLAZING

A. Glazing: Comply with Section 088000 "Glazing."

B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.

C. Glazing Sealants: As recommended by manufacturer.

D. Sealants used inside the weatherproofing system shall have a VOC content of 250 g/L.

2.7 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Physical and thermal isolation of glazing from framing members.
4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
5. Provisions for field replacement of glazing from interior.
6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

E. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

F. Entrance Doors: Reinforce doors as required for installing entrance door hardware.

G. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.

H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure nonmovement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
6. Seal perimeter and other joints watertight unless otherwise indicated.

B. Metal Protection:

1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Set continuous sill members and flashing in full sealant bed as specified in Section 079200 "Joint Sealants" to produce weathertight installation.

D. Install components plumb and true in alignment with established lines and grades.

E. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.

F. Install glazing as specified in Section 088000 "Glazing."

G. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.

1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

END OF SECTION 084113

SECTION 084413 - GLAZED ALUMINUM CURTAIN WALLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes glazed aluminum curtain walls.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include plans, elevations, sections, full-size details, and attachments to other work.

1. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.

C. Samples: For each exposed finish required.

D. Delegated-Design Submittal: For glazed aluminum curtain walls indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

A. Energy Performance Certificates: NFRC-certified energy performance values from manufacturer.

B. Product test reports.

C. Field quality-control reports.

D. Sample warranties.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.

C. 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.

1.7 WARRANTY

A. Special Assembly Warranty: Manufacturer agrees to repair or replace components of glazed aluminum curtain wall that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

B. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Warranty Period: 20 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 glazed aluminum curtain walls.

B. General Performance: Comply with performance requirements specified, as determined by testing of glazed aluminum curtain walls representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

1. Glazed aluminum curtain walls shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
2. Failure also includes the following:

a. Thermal stresses transferring to building structure.
b. Glass breakage.
c. Noise or vibration created by wind and thermal and structural movements.

d. Loosening or weakening of fasteners, attachments, and other components.
e. Failure of operating units.

C. Structural Loads:

1. Wind Loads: As required by the International Building Code, 2021 edition.
2. Other Design Loads: As required by the International Building Code, 2021 edition.

D. Deflection of Framing Members: At design wind pressure, as follows:

1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans greater than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch, whichever is smaller.

a. Operable Units: Provide a minimum 1/16-inch clearance between framing members and operable units.

3. Cantilever Deflection: Where framing members overhang an anchor point, as follows:

a. Perpendicular to Plane of Wall: No greater than 1/240 of clear span plus 1/4-inch for spans greater than 11 feet 8-1/4 inches or 1/175 times span, for spans less than 11 feet 8-1/4 inches.

E. Structural: Test according to ASTM E 330 as follows:

1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
3. Test Durations: As required by design wind velocity, but not less than 10 seconds.

F. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:

1. Fixed Framing and Glass Area:

a. Maximum air leakage of 0.06 cfm/sq. ft. at a static-air-pressure differential of 6.24 lbf/sq. ft..

G. Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:

1. No evidence of water penetration through fixed glazing and framing areas when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 10 lbf/sq. ft..

H. Energy Performance: Certify and label energy performance according to NFRC as follows:

1. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than that of products indicated on drawings, as determined according to NFRC 100.
2. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than that of products indicated on drawings, as determined according to NFRC 200.

I. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 MANUFACTURERS

A. Basis of Design: Subject to compliance with requirements, provide products indicated on drawings.

2.3 GLAZING

A. Glazing: Comply with Section 088000 "Glazing."

B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.

C. Glazing Sealants: As recommended by manufacturer.

D. Sealants used inside the weatherproofing system shall have a VOC content of 250 g/L or less.

2.4 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Physical and thermal isolation of glazing from framing members.
4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
5. Provisions for field replacement of glazing from interior for vision glass and exterior for spandrel glazing panels.
6. Provisions for safety railings mounted between mullions at interior.
7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
8. Components curved to indicated radii.

D. Fabricate components to resist water penetration as follows:

1. Internal guttering system or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.
2. Pressure-equalized system or double barrier design with primary air and vapor barrier at interior side of glazed aluminum curtain wall and secondary seal weeped and vented to exterior.

E. Factory-Assembled Frame Units:

1. Rigidly secure nonmovement joints.
2. Prepare surfaces that are in contact with structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion.
3. Preparation includes, but is not limited to, cleaning and priming surfaces.
4. Seal joints watertight unless otherwise indicated.
5. Install glazing to comply with requirements in Section 088000 "Glazing."

F. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.5 ALUMINUM FINISHES

A. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.

1. Color: As selected by Architect from full range of industry colors and color densities.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure nonmovement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
6. Where welding is required, weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
7. Seal joints watertight unless otherwise indicated.

B. Metal Protection:

1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with primer, applying sealant or tape, or installing nonconductive spacers as recommended by manufacturer for this purpose.

2. Where aluminum is in contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.

D. Install components plumb and true in alignment with established lines and grades.

E. Install glazing as specified in Section 088000 "Glazing."

END OF SECTION 084413

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes commercial door hardware for the following:

1. Swinging doors.
2. Other doors to the extent indicated.

B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Electromechanical door hardware.
3. Cylinders specified for doors in other sections.

C. Related Sections:

1. Division 01 Section "General Conditions".
2. Division 06 Section “Rough Carpentry”.
3. Division 06 Section “Finish Carpentry”.
4. Division 08 Section “Operations and Maintenance”.
5. Division 08 Section “Hollow Metal Doors and Frames”.
6. Division 08 Section “Flush Wood Doors”.
7. Division 08 Section “Aluminum-Framed Entrances and Storefronts”.
8. Division 26 Section "Electrical”

D. Codes and References: Comply with the version adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
2. ICC/IBC - International Building Code.
3. NFPA 70 - National Electrical Code.
4. NFPA 80 - Fire Doors and Windows.
5. NFPA 101 - Life Safety Code.
6. NFPA 105 - Installation of Smoke Door Assemblies.
7. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:

1. ANSI/BHMA Certified Product Standards - A156 Series.
2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
3. ANSI/UL 294 - Access Control System Units.

4. UL 305 - Panic Hardware.
5. ANSI/UL 437- Key Locks.

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing, fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
3. Content: Include the following information:

    a. Type, style, function, size, label, hand, and finish of each door hardware item.
    b. Manufacturer of each item.
    c. Fastenings and other pertinent information.
    d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
    e. Explanation of abbreviations, symbols, and codes contained in schedule.
    f. Mounting locations for door hardware.
    g. Door and frame sizes and materials.
    h. Warranty information for each product.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Shop Drawings: Details of electrified access control hardware indicating the following:

1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:

    a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
    b. Complete (risers, point-to-point) access control system block wiring diagrams.
    c. Wiring instructions for each electronic component scheduled herein.

2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.

D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

E. Informational Submittals:

1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

1.4 CLOSEOUT SUBMITTALS

A. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.

B. Project Record Documents: Provide record documentation of as-built door hardware sets in digital format (.pdf, .docx, .xlsx, .csv) and as required in Division 01, Project Record Documents.

1.5 QUALITY ASSURANCE

A. Hardware Supplier and Hardware Installer must obtain a license with the Louisiana Office of State Fire Marshall in accordance to RS 40:1464 and RS 40:1664.

B. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

C. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).

D. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

E. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity.

F. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.

1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

G. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.

H. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:

1. Function of building, purpose of each area and degree of security required.
2. Plans for existing and future key system expansion.
3. Requirements for key control storage and software.
4. Installation of permanent keys, cylinder cores and software.
5. Address and requirements for delivery of keys.

I. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.

1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
3. Review sequence of operation narratives for each unique access controlled opening.
4. Review and finalize construction schedule and verify availability of materials.
5. Review the required inspecting, testing, commissioning, and demonstration procedures

J. At completion of installation, provide written documentation that components were applied according to manufacturer's instructions and recommendations and according to approved schedule.

1.6 DELIVERY, STORAGE AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.7 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.8 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Warranty Period: Unless otherwise indicated, warranty shall be one year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 BUTT HINGES

A. Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.

1. Quantity: Provide the following hinge quantity:

a. Two Hinges: For doors with heights up to 60 inches.
b. Three Hinges: For doors with heights 61 to 90 inches.
c. Four Hinges: For doors with heights 91 to 120 inches.
d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:

a. Widths up to 3’0”: 4-1/2” standard or heavy weight as specified.
b. Sizes from 3’1” to 4’0”: 5” standard or heavy weight as specified.

3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:

a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.

4. Hinge Options: Comply with the following:

    a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for all out-swinging lockable doors.

5. Manufacturers:

    a. Ives (IV) - 5BB Series, 5-knuckle.
    b. McKinney (MK) - TA/T4A Series, 5-knuckle.

2.2 CONTINUOUS HINGES

A. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 continuous geared hinge. with minimum 0.120-inch thick extruded 6063-T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.

1. Manufacturers:.

    a. Ives (IV).
    b. Pemko (PE).

2.3 FLOOR CLOSERS AND PIVOTS

A. Pivots: ANSI/BHMA A156.4, Grade 1; space intermediate pivots equally not less than 25 inches on center apart or not more than 35 inches on center for doors over 121 inches high. Pivot hinges to have oil impregnated bronze bearing in the top pivot and a radial roller and thrust bearing in the bottom pivot with the bottom pivot designed to carry the full weight of the door. Pivots to be UL listed for windstorm where applicable.

1. Manufacturers:

    a. Ives (IV).
    b. Norton Rixson (NO).

2.4 POWER TRANSFER DEVICES

A. Electrified Quick Connect Continuous Geared Transfer Hinges: Provide electrified transfer continuous geared hinges with a removable service panel cutout accessible without de-mounting door from the frame. Furnish with Molex™ standardized plug connectors with sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.

1. Manufacturers:

    a. Ives (IV) - Connect.
    b. Pemko (PE) - SER-QC (# wires) Option.

B. Electric Door Wire Harnesses: Provide electric/data transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-

door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number and type of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.

1. Provide one each of the following tools as part of the base bid contract:

    a. McKinney (MK) - Electrical Connecting Kit: QC-R001.
    b. McKinney (MK) - Connector Hand Tool: QC-R003.

2. Manufacturers:

    a. McKinney (MK) - QC-C Series.
    b. Von Duprin (VD) - Connect.

2.5 DOOR OPERATING TRIM

A. Flush Bolts and Surface Bolts: Provide products conforming to ANSI/BHMA A156.3 and A156.16, Grade 1.

1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
2. Furnish dust proof strikes for bottom bolts.
3. Surface bolts to be minimum 8” in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
5. Manufacturers:

    a. Ives (IV).
    b. Rockwood (RO).

B. Coordinators: ANSI/BHMA A156.3 door coordinators consisting of active-leaf, hold-open lever and inactive-leaf release trigger. Model as indicated in hardware sets.

1. Manufacturers:

    a. Ives (IV).
    b. Rockwood (RO).

C. Door Push Plates and Pulls: ANSI/BHMA A156.6 door pushes and pull units of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.

1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.

4. Pulls shall be provided with a 10” clearance from the finished floor on the push side to accommodate wheelchair accessibility.
5. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets. When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.
6. Manufacturers:

    a. Ives (IV).
    b. Rockwood (RO).

2.6 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

B. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:

1. Threaded mortise cylinders with rings and cams to suit hardware application.
2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
4. Tubular deadlocks and other auxiliary locks.
5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
6. Keyway: Match Facility Standard.

C. Patented Cylinders: ANSI/BHMA A156.5, Grade 1 Certified Products Directory (CPD) listed cylinders employing a utility patented and restricted keyway requiring the use of a patented key. Cylinders are to be protected from unauthorized manufacture and distribution by manufacturer’s United States patents.

1. Patented key systems shall not be established with products that have an expired patent. Expired systems shall only be specified and supplied to support existing systems.
2. Manufacturers:

    a. Dorma kaba BEST (BE) – CORMAX – **Match existing facility standard, verify**

D. Keying System: Each type of lock and cylinders to be factory keyed.

1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
3. Existing System: Field verify and key cylinders to match Owner's existing system.

E. Key Quantity: Provide the following minimum number of keys:

1. Change Keys per Cylinder: Two (2)
2. Master Keys (per Master Key Level/Group): Five (5).
3. Construction Keys (where required): Ten (10).
4. Construction Control Keys (where required): Two (2).
5. Permanent Control Keys (where required): Two (2).

F. Construction Keying: Provide temporary keyed construction cores.

G. Key Registration List (Bitting List):

1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
2. Provide transcript list in writing or electronic file as directed by the Owner.

2.7 KEY CONTROL

A. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.

1. Manufacturers:

a. Lund Equipment (LU).
b. MMF Industries (MM).
c. Telkee (TK).

2.8 CYLINDRICAL LOCKS AND LATCHING DEVICES

A. Cylindrical Locksets, Grade 1 (Commercial Duty): ANSI/BHMA A156.2, Series 4000, Operational Grade 1 Certified Products Directory (CPD) listed cylindrical locksets. Listed manufacturers shall meet all functions and features as specified herein.

1. Manufacturers:

a. ASSA ABLOY ACCENTRA (YA) 4700LN Series.
b. Falcon Lock (FA) - T Series.

2.9 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.
2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
4. Dustproof Strikes: BHMA A156.16.

2.10 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. Exit devices shall have a five-year warranty.
2. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
3. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer’s catalog and template book for specific requirements.
4. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
5. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
6. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.

    a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
    b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.

7. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
8. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2” wide stiles.
9. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
10. Rail Sizing: Provide exit device rails factory sized for proper door width application.
11. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed exit devices. Listed manufacturers shall meet all functions and features as specified herein.

1. Electromechanical exit devices shall have the following functions and features:

    a. Universal Molex plug-in connectors that have standardized color-coded wiring and are field configurable in fail safe or fail secure and operate from 12vdc to 24vdc regulated.
    b. EcoFlex or equivalent technology that reduces energy consumption up to 92% as certified by GreenCircle.
    c. Options to be available for request-to-exit or enter signaling, latchbolt and touchbar monitoring.
    d. Field configurable electrified trim to fail-safe or fail-secure that operates from 12-24VDC.
    e. Five-year limited warranty for electromechanical features.

2. Manufacturers:

a. ASSA ABLOY ACCENTRA (YA) - 7000 Series.
b. Von Duprin (VD) - 35A/98 XP Series.

2.11 SURFACE DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard..

1. Manufacturers:

a. ASSA ABLOY ACCENTRA (YA) - 4400 Series.
b. LCN Closers (LC) - 4040 Series.

C. Door Closers, Surface Mounted (Commercial Duty): ANSI/BHMA 156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, institutional grade door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck, closing sweep, and latch speed control valves. Provide non-handed units standard.

1. Manufacturers:

a. ASSA ABLOY ACCENTRA (YA) - 3500 Series.
b. LCN Closers (LC) - 1450 Series.

2.12 ARCHITECTURAL TRIM AND ACCESSORIES

A. Door, Frame and Wall Protective Trim: ANSI/BHMA A156.6, protective products as specified in the hardware sets. Door protection plates shall be not more than 2" less than door width on stop side and 1” less door width on the pull side or on stop side of pairs of doors. Listed manufacturers shall meet all functions and features as specified herein.

1. Provide protective trim with functions and features as follows:

a. Meets ADA requirements for smooth bottom door surfaces.
b. UL Classified options for use on fire-rated doors up to 3 hours.
c. Fabricated from stainless steel, brass, bronze, aluminum, or high-impact plastic.
d. Available in a variety of sizes, finishes, and profiles to suit aesthetic and functional requirements.
e. Designed to protect doors, frames, and adjacent walls from damage due to impact, abrasion, or traffic.
f. Fasteners included; adhesive-backed options available for select models.
g. Ten-year limited warranty.

2. Manufacturers:

a. Ives (IV).
b. Rockwood (RO).

2.13 DOOR STOPS AND HOLDERS

A. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

1. Manufacturers:

a. Ives (IV).
b. Rockwood (RO).

2.14 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.

1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.

1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NFPA 252, Standard Methods of Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Manufacturers:

1. Pemko (PE).
2. Zero (ZE).

2.15 ELECTRONIC ACCESSORIES

A. Door Position Switches: Door position magnetic reed contact switches specifically designed for use in commercial door applications. On recessed models the contact and magnetic housing snap-lock into a 1" diameter hole. Surface mounted models include wide gap distance design complete with armored flex cabling. Provide SPDT, N/O switches with optional Rare Earth Magnet installation on steel doors with flush top channels.

1. Manufacturers:

a. Alarm Controls (AK) - CP1-1026 Series.
b. Security Door Controls (SD) - DPS Series.
c. Securitron (SU) - DPS Series.

B. Switching Power Supplies: Provide the least number of power supplies at the appropriate amperage level sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.

1. Power supplies shall meet all functions and features as specified herein.

a. UL listed dual voltage 12 or 24 VDC field selectable continuous output.
b. Tolerates brownout or overvoltage input ± 15% of nominal voltage.
c. Thermal shutdown protection with auto restart.
d. Circuit breaker protection against overcurrent and reverse battery faults.
e. Integrated battery charging circuit to prevent overvoltage on locking devices.
f. Available with a single relay fire trigger or individually triggered relayed outputs.
g. Monitoring options as specified.

2. Manufacturers:

a. Altronix (AS) - Maximal 3.
b. Securitron (SU) - AQD Series.

2.16 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.17 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."

2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

D. Push Plates and Door Pulls: When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.

E. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

F. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

A. Field Inspection (Punch Report): Reference Division 01 Sections “Closeout Procedures”. Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.

1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

1. Quantities listed are for each pair of doors, or for each single door.
2. The supplier is responsible for handing and sizing all products.
3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

B. Manufacturer’s Abbreviations:

1. MK - McKinney
2. PE - Pemko
3. NO - Norton Rixson
4. RO - Rockwood
5. YA - ASSA ABLOY ACCENTRA
6. BE - BEST Locks & Closers
7. OT - Other
8. SU - Securitron

Hardware Sets based on plans dated April 2026

Set: 1.0
Doors: 102, 119, 124, 125, 125a
Description: Ext Alum - By Manufacturer

1	Cylinder	As required - Temp Core	630	YA
1	Match Existing	Best CorMax	626	BE
1	Balance of hardware	By the door manufacturer		OT

Set: 2.0
Doors: 103, 109, 118
Description: Sgl Ext. Access Control Exit - HM

1	Continuous Hinge	CFMxxHD1 SER*		PE	
1	Rim Exit Device, Nightlatch	7150 B MELR 632F	630	YA	
1	Cylinder	As required - Temp Core	630	YA	
1	Match Existing	Best CorMax	626	BE	
1	Surface Closer with stop	UNI4400 (Brackets/spacer as req'd)	689	YA	
1	Kick Plate	K1050 10" BEV CSK	US32D	RO	
1	Gasketing	2891APK		PE	
1	Sweep	315CN x Width		PE	
1	Threshold	2005AT		PE	
1	ElectroLynx Harness	QC-CXXX Length as Required		MK	
1	ElectroLynx Harness	QC-C1500P		MK	
1	Card Reader	By Security Contractor		OT	
1	Position Switch	DPS-x-BK		SU	
1	Power Supply	AQD*		SU	

Notes: Doors are normally closed and secure. Presentation of valid credential will allow entry by pull. Upon loss of power, doors will remain secure. Free egress at all times.

Set: 3.0
Doors: 112, 166
Description: Sgl Ext. Exit - HM

1	Continuous Hinge	CFM_HD1		PE	
1	Rim Exit Device, Nightlatch	7150 632F	630	YA	
1	Cylinder	As required - Temp Core	630	YA	
1	Match Existing	Best CorMax	626	BE	
1	Surface Closer with stop	UNI4400 (Brackets/spacer as req'd)	689	YA	
1	Kick Plate	K1050 10" BEV CSK	US32D	RO	
1	Rain Guard	346C width plus 4"		PE	
1	Gasketing	2891APK		PE	
1	Sweep	315CN x Width		PE	
1	Threshold	2005AT		PE	
1	Position Switch	DPS-x-BK		SU	

Notes: Door is monitored.

Set: 4.0
Doors: 107
Description: Sgl Ext. Lock - HM - DPS

1	Continuous Hinge	CFM_HD1		PE	
1	Storeroom or Closet Lock	AU 4705LN Temp Core	626	YA	
1	Match Existing	Best CorMax	626	BE	
1	Surface Closer with stop	UNI4400 (Brackets/spacer as req'd)	689	YA	
1	Kick Plate	K1050 10" BEV CSK	US32D	RO	
1	Rain Guard	346C width plus 4"		PE	
1	Gasketing	2891APK		PE	
1	Sweep	315CN x Width		PE	
1	Threshold	2005AT		PE	
1	Position Switch	DPS-x-BK		SU	

Notes: Door is monitored.

Set: 5.0
Doors: 168
Description: Sgl Ext. Lock - Classroom - HM - DPS - Inswing

1	Continuous Hinge	CFM_HD1		PE	
1	Classroom Lock	AU 4708LN Temp Core	626	YA	
1	Match Existing	Best CorMax	626	BE	
1	Surface Closer	4400	689	YA	
1	Kick Plate	K1050 10" BEV CSK	US32D	RO	
1	Door Stop	406/409/441H Per Conditions	US26D	RO	
1	Rain Guard	346C width plus 4"		PE	
1	Gasketing	2891APK		PE	
1	Sweep	315CN x Width		PE	
1	Threshold	171A		PE	
1	Position Switch	DPS-x-BK		SU	

Notes: Door is monitored.

Set: 6.0
Doors: 106
Description: Pr Ext. Lock - HM - closer - AFB DPS

2	Continuous Hinge	CFM_HD1		PE	
1	Flush Bolt w/Fire Bolt	2848 / 2948	US32D	RO	
1	Storeroom or Closet Lock	AU 4705LN Temp Core	626	YA	
1	Match Existing	Best CorMax	626	BE	
1	Coordinator	26** size and bracket as required	US28	RO	
2	Surface Closer with stop	UNI4400 (Brackets/spacer as req'd)	689	YA	
2	Kick Plate	K1050 10" BEV CSK	US32D	RO	
1	Rain Guard	346C width plus 4"		PE	
1	Gasketing	2891APK		PE	
2	Astragal Set (2)	303AS		PE	
2	Sweep	315CN x Width		PE	
1	Threshold	2005AT		PE	
2	Position Switch	DPS-x-BK		SU	

Notes: Closer at active leaf. Doors are monitored.

Set: 7.0
Doors: 157, 158
Description: Pr Ext. Lock - HM - closer AFB- DPS - Inswing

2	Continuous Hinge	CFM_HD1		PE	
1	Flush Bolt w/Fire Bolt	2848 / 2948	US32D	RO	
1	Storeroom or Closet Lock	AU 4705LN Temp Core	626	YA	
1	Match Existing	Best CorMax	626	BE	
1	Coordinator	26** size and bracket as required	US28	RO	
2	Surface Closer	4400	689	YA	
2	Kick Plate	K1050 10" BEV CSK	US32D	RO	
2	Door Stop	406/409/441H Per Conditions	US26D	RO	

1	Rain Guard	346C width plus 4"		PE
1	Gasketing	2891APK		PE
2	Astragal Set (2)	303AS		PE
2	Sweep	315CN x Width		PE
1	Threshold	171A		PE
2	Position Switch	DPS-x-BK		SU

Notes: Doors are monitored.

Set: 8.0
Doors: 138, 139, 167
Description: AL Pr Int.- CVR CRxEO x Cylinder Dogging

2	Pivot Set	195	626	NO
2	Intermediate Pivot	M19	626	NO
1	Concealed Vert Rod Exit, Classroom	7225 503F	630	YA
1	Concealed Vert Rod Exit, Exit Only	7225 EO	630	YA
3	Cylinder	As required - Temp Core	630	YA
3	Match Existing	Best CorMax	626	BE
2	Door Pull	BF157	US32D	RO
2	Surface Closer w/ stop arm	3521	689	YA
1	Gasketing	By Door Supplier		OT

Notes: Confirm hardware compatibility with aluminum door supplier.

Set: 9.0
Doors: 140
Description: AL Sgl Classroom Exit

1	Pivot Set	195	626	NO
1	Intermediate Pivot	M19	626	NO
1	Rim Exit Device, Classroom	7205 AU506F	630	YA
2	Cylinder	As required - Temp Core	630	YA
2	Match Existing	Best CorMax	626	BE
1	Surface Closer	3501	689	YA
1	Door Stop	406/409/441H Per Conditions	US26D	RO
1	Gasketing	By Door Supplier		OT

Notes: Confirm hardware compatibility with aluminum door supplier.

Set: 10.0
Doors: 104
Description: Sgl Int Passage Exit

3	Hinge (heavy weight)	T4A3786 (NRP as req)	US26D	MK
1	Fire Rated Rim Exit, Passage	7100F AU628F	630	YA
1	Surface Closer	3501	689	YA
1	Kick Plate	K1050 10" BEV CSK	US32D	RO
1	Door Stop	406/409/441H Per Conditions	US26D	RO
1	Gasketing	S88BL LAR		PE

Set: 11.0
Doors: 135

Description: Sgl Int Exit - CR - Gasket

3	Hinge (heavy weight)	T4A3786 (NRP as req)	US26D	MK
1	Rim Exit Device, Classroom	7105 AU626F	630	YA
2	Cylinder	As required - Temp Core	630	YA
2	Match Existing	Best CorMax	626	BE
1	Surface Closer w/ stop arm	3521	689	YA
1	Kick Plate	K1050 10" BEV CSK	US32D	RO
1	Gasketing	S88BL LAR		PE

Set: 12.0
Doors: 143
Description: Sgl Int Storage - WF stop

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Storeroom or Closet Lock	AU 4705LN Temp Core	626	YA
1	Match Existing	Best CorMax	626	BE
1	Door Stop	406/409/441H Per Conditions	US26D	RO
3	Silencer	608		RO

Set: 13.0
Doors: 148, 162
Description: Sgl Int Storage - Closer - Gasket

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Storeroom or Closet Lock	AU 4705LN Temp Core	626	YA
1	Match Existing	Best CorMax	626	BE
1	Surface Closer	3501	689	YA
1	Kick Plate	K1050 10" BEV CSK	US32D	RO
1	Door Stop	406/409/441H Per Conditions	US26D	RO
1	Gasketing	S88BL LAR		PE

Set: 14.0
Doors: 156
Description: Sgl Int Storage - Closer/stop - Gasket

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Storeroom or Closet Lock	AU 4705LN Temp Core	626	YA
1	Match Existing	Best CorMax	626	BE
1	Surface Closer w/ stop arm	3521	689	YA
1	Kick Plate	K1050 10" BEV CSK	US32D	RO
1	Gasketing	S88BL LAR		PE

Set: 15.0
Doors: 147
Description: Sgl Int Storage - Closer

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Storeroom or Closet Lock	AU 4705LN Temp Core	626	YA
1	Match Existing	Best CorMax	626	BE
1	Surface Closer	3501	689	YA
1	Kick Plate	K1050 10" BEV CSK	US32D	RO
1	Door Stop	406/409/441H Per Conditions	US26D	RO

3	Silencer	608		RO

Set: 16.0
Doors: 129, 130, 131, 132, 134, 141, 142, 144, 145, 149, 150, 151, 153, 154, 164
Description: Int Sgl Office

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Entry Lock	AU 4704LN Temp Core	626	YA
1	Match Existing	Best CorMax	626	BE
1	Door Stop	406/409/441H Per Conditions	US26D	RO
3	Silencer	608		RO

Set: 17.0
Doors: 146
Description: Int Sgl Classroom

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Classroom Lock	AU 4708LN Temp Core	626	YA
1	Match Existing	Best CorMax	626	BE
1	Door Stop	406/409/441H Per Conditions	US26D	RO
3	Silencer	608		RO

Set: 18.0
Doors: 155
Description: Int Sgl Office - Closer

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Entry Lock	AU 4704LN Temp Core	626	YA
1	Match Existing	Best CorMax	626	BE
1	Surface Closer	3501	689	YA
1	Kick Plate	K1050 10" BEV CSK	US32D	RO
1	Door Stop	406/409/441H Per Conditions	US26D	RO
1	Gasketing	S88BL LAR		PE

Set: 19.0
Doors: 126, 127, 165, 169
Description: Int Alum Sgl Office - Closer

1	Pivot Set	195	626	NO
1	Intermediate Pivot	M19	626	NO
1	Entry Lock	AU 4704LN Temp Core	626	YA
1	Match Existing	Best CorMax	626	BE
1	Surface Closer	3501	689	YA
1	Door Stop	406/409/441H Per Conditions	US26D	RO
1	Gasketing	By Door Supplier		OT

Notes: Confirm hardware compatibility with aluminum door manufacturer.

Set: 20.0
Doors: 128, 159
Description: Int Sgl Classroom - Closer - gasket

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Classroom Lock	AU 4708LN Temp Core	626	YA
1	Match Existing	Best CorMax	626	BE
1	Surface Closer	3501	689	YA
1	Kick Plate	K1050 10" BEV CSK	US32D	RO
1	Door Stop	406/409/441H Per Conditions	US26D	RO
3	Silencer	608		RO

Set: 21.0
Doors: 136, 137, 161
Description: Int Sgl Push/Pull - Closer - gasket

3	Hinge (heavy weight)	T4A3786 (NRP as req)	US26D	MK
1	Pull Plate	111x70C	US32D	RO
1	Push Plate	70C	US32D	RO
1	Surface Closer	3501	689	YA
1	Kick Plate	K1050 10" BEV CSK	US32D	RO
1	Door Stop	406/409/441H Per Conditions	US26D	RO
1	Gasketing	S88BL LAR		PE

Set: 22.0
Doors: 133, 160, 163
Description: Int Sgl Privacy - Closer

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Privacy Lock	AU 5402LN	626	YA
1	Surface Closer	3501	689	YA
1	Kick Plate	K1050 10" BEV CSK	US32D	RO
1	Door Stop	406/409/441H Per Conditions	US26D	RO
1	Gasketing	S88BL LAR		PE

Set: 23.0
Doors: 105, 110, 111, 113, 114, 115, 116, 117, 120, 121, 122, 123
Description: OH Door

1	All hardware	By the door manufacturer	OT

Notes: Verify cylinder required with door manufacturer.

Set: 24.0
Doors: 108
Description: PVC Door

1	All hardware	By the door manufacturer	OT

Set: 25.0
Doors: 171
Description: Not Found

1	Opening	Not found on floor plan	OT

END OF SECTION 087100

SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

1. Doors.
2. Storefront framing.
3. Glazed entrances.
4. Interior borrowed lites.

1.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design glass, including comprehensive engineering analysis according to ASTM E 1300 and ICC's 2021 International Building Code by a qualified professional engineer, using the following design criteria:

1. Design Wind Pressures: As required by ICC’s 2021 International Building Code.
2. Vertical Glazing: For glass surfaces sloped 15 degrees or less from vertical, design glass to resist design wind pressure based on glass type factors for short-duration load.
3. Sloped Glazing: For glass surfaces sloped more than 15 degrees from vertical, design glass to resist each of the following combinations of loads:

    a. Outward design wind pressure minus the weight of the glass. Base design on glass type factors for short-duration load.
    b. Inward design wind pressure plus the weight of the glass plus half of the design snow load. Base design on glass type factors for short-duration load.
    c. Half of the inward design wind pressure plus the weight of the glass plus the design snow load. Base design on glass type factors for long-duration load.
4. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.

1.3 PRECONSTRUCTION TESTING

A. Preconstruction Adhesion and Compatibility Testing: Test each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.

1. Testing will not be required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.

1.4 ACTION SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches square.

C. Glazing Schedule: List of glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

D. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Preconstruction adhesion and compatibility test report.

1.6 QUALITY ASSURANCE

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: GANA’s "Laminated Glazing Reference Manual" and GANA's "Glazing Manual."
2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

B. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

C. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, whether glazing is for use in fire doors or other openings, whether or not glazing passes hose-stream test, whether or not glazing has a temperature rise rating of 450 deg F, and the fire-resistance rating in minutes.

D. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

1.7 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer’s standard form in which coated-glass manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass

contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

1. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty on Laminated Glass: Manufacturer’s standard form in which laminated-glass manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1. Warranty Period: 10 years from date of Substantial Completion.

C. Manufacturer's Special Warranty on Insulating Glass: Manufacturer’s standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS, GENERAL

A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.

B. Strength: Provide fully tempered glass is indicated, provide Kind FT heat-treated float glass.

C. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
2. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
3. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.2 GLASS PRODUCTS

A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.

2.3 INSULATING GLASS

A. Manufacturers: Subject to compliance with requirements, provide products indicated on drawings.

B. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other specified requirements.

2.4 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:

1. Neoprene complying with ASTM C 864.
2. EPDM complying with ASTM C 864.
3. Silicone complying with ASTM C 1115.
4. Thermoplastic polyolefin rubber complying with ASTM C 1115.

B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned neoprene, EPDM, silicone or thermoplastic polyolefin rubber gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.

1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.

2.5 GLAZING SEALANTS

A. General:

1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Sealants used inside the weatherproofing system, shall have a VOC content of not more than 250 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
4. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

2.6 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer

rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.7 MISCELLANEOUS GLAZING MATERIALS

A. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

B. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

C. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturers to maintain glass lites in place for installation indicated.

D. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

E. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

F. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

2.8 MONOLITHIC-GLASS TYPES

A. Glass Type (Exterior Hollow Metal doors): Clear fully tempered float glass.

1. Thickness: 1/2 inch.
2. Low-E.
3. Visible Light Transmittance: 35%
4. Summer Daytime U-Factor 0.27 maximum.
5. Winter Night Time U-Value: 0.29 maximum.
6. Solar Heat Gain Coefficient: 0.25 maximum.

B. Provide safety glazing labeling.

C. Glass Type (Interior Hollow Metal doors): Clear fully tempered float glass.

1. Thickness: 1/4 inch.
2. Provide safety glazing labeling.

D. Glass Type (Interior Aluminum Entrances and Storefronts): Clear Fully tempered float glass.

1. Thickness: 1/4 inch.
2. Provide safety glazing labeling.

E. Glass Type (Interior Borrowed Lites): Clear Fully tempered float glass.

1. Thickness: 1/4 inch.
2. Provide safety glazing labeling.

2.9 INSULATING-GLASS TYPE (EXTERIOR STOREFRONT GLAZING)

A. Vitro Glass Type (Exterior Storefront Glazing): Solar Control Tinted Insulating Glass - Solarban R100 (2) Optigray + Clear by Vitro Architectural Glass. Spandrel glass shall be Optigray + Solarban R100 (2) Spandrel number 3-8009 Cliffside Nest.

1. Overall Unit Thickness: 1 inch.
2. Thickness of Glass Lite: 1/4- inch glass + 1/2- inch air space + 1/4-inch glass
3. Outdoor Lite: R100 (2) Optigray + Clear
   Spandrel 3-8009 - Cliffside Nest – (See exterior elevations on drawings for location).
4. Interspace Content: Air.
5. Indoor Lite: Clear fully tempered float glass.
6. Low-E Coating: location by Vitro.
7. Visible Light Transmittance: 29 percent minimum.
8. Winter Nighttime U-Factor: 0.29 maximum.
9. Summer Daytime U-Factor: 0.27 maximum.
10. Solar Heat Gain Coefficient: 0.20 maximum.
11. Shading Coefficient: 0.23
12. Outdoor Visible Light Reflectance: 18%

PART 3 - EXECUTION

3.1 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass lites where length plus width is larger than 50 inches.

H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

3.2 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tape to heads and sills first and then to jambs. Cover horizontal framing joints by applying tape to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Apply heel bead of elastomeric sealant.

F. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

G. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.3 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturers.

E. Install gaskets so they protrude past face of glazing stops.

3.4 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.5 CLEANING AND PROTECTION

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

END OF SECTION 088000

SECTION 090561.13 – MOISTURE VAPOR EMISSION CONTROL

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes application of polymer-based, high-solids, water-based moisture control and primer system for underlayments.
B. Related Requirements:
1. Section 03 35 00 – Concrete Finishing. (coordinate w/ structural)
2. Section 035416 – Hydraulic Cement Underlayment. (coordinate w/ structural)
3. Section 096500 – Resilient Flooring.

C. It is the intent of the Contract Documents that the specified moisture mitigation coating be applied to all interior concrete floor slabs scheduled to receive resilient flooring, rubber flooring, wood flooring, carpet tile, or other moisture-sensitive finishes, unless specifically excluded on the drawings.
The coating shall be applied in accordance with the manufacturer's written instructions and as specified here-in.

1.2 REFERENCES

A. ASTM F1869 – Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
B. ASTM F2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs.
C. ASTM F3010 – Two-Component Vapor-Permeability Systems.
D. ASTM F3513 – One-Component Vapor-Permeability Systems.

1.3 SUBMITTALS

A. Product Data: Manufacturer's technical data and installation instructions.
B. Safety Data Sheets (SDS).
C. Certification of compliance with ASTM standards.

1.4 QUALITY ASSURANCE

A. Manufacturer qualifications: 10 years minimum producing moisture mitigation systems.
B. Installer qualifications: Minimum 2 years experience with resinous flooring systems.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in unopened containers with manufacturer's labels intact.

B. Store between 50°F and 90°F. Protect from freezing.

1.6 FIELD CONDITIONS

A. Do not install when ambient or substrate temperature is below 50°F.
B. Substrate temperature must be at least 5°F above dew point.

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PART 2 – PRODUCTS

2.1 BASIS OF DESIGN: Subject to compliance with requirements, provide Planiseal Max by Mapei Corporation 1144 East Newport Center Drive Deerfield, FL. 33442 Ph. 1.888.876.2734 or by one of the following.

A. Koster American Corp. Ph. 757.425.1206
B. Maxxon Corp. 1.800.238.8461 or 1.800.878.5586

2.2 MATERIALS

A. One-component, high-solids, water-based, polymer moisture mitigation coating with textured surface.
B. Color: Burgundy.
C. VOC Content: <50 g/L.

2.3 PERFORMANCE REQUIREMENTS

A. Moisture vapor emission: Up to 25 lb/1000 ft²/24 h (ASTM F1869).
B. Relative humidity: Up to 100% (ASTM F2170).
C. pH resistance: Up to 14.
D. Water vapor permeance: <0.1 perms (ASTM E96).

2.4 PACKAGING

A. 4-gallon (15.1 L) pails.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify substrate is structurally sound, porous, and free of contaminants.
B. Verify moisture and pH testing is complete.

3.2 SURFACE PREPARATION
A. Mechanically prepare substrate to ICRI CSP 1 minimum.
B. Clean surface of dust and debris before application.

3.3 APPLICATION
A. Mix: Stir gently before use.
B. Apply two coats by roller at 200 ft²/gal per coat.
C. Allow 30 minutes between coats, dry to touch.
D. Allow 1–2 hours cure time before applying underlayment or adhesive.

3.4 PROTECTION
A. Protect finished surface from traffic until covered with subsequent flooring.

3.5 CLEANING
A. Clean tools with water immediately after use.

END OF SECTION

SECTION 092216 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Non-load-bearing steel framing systems for interior gypsum board assemblies.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: Provide materials and construction identical to those tested according to ASTM E 119.

2.2 FRAMING SYSTEMS

A. General: Where structural drawings/notes indicate a thicker base-metal thickness (heavier gauge) or wider flange, the structural drawings/notes shall govern.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Allied Studco, Inc.
2. ClarkDietrich Building Systems.
3. Marino Ware Industries.
4. The Steel Network, Inc.
5. Unimast Incorporated.
6. Delta Metal Products.

C. Interior Partition Steel Studs and Runners: ASTM C 645. Use either steel studs and runners or dimpled steel studs and runners of equivalent minimum base-metal thickness.

1. Minimum Base-Metal Thickness: 0.0205 inch.
2. Flange: 1-1/4 inch.
3. Web Width: As indicated on drawings.

D. Exterior Wall Steel Studs and Runners: ASTM C 645. Use either steel studs and runners or dimpled steel studs and runners of equivalent minimum base-metal thickness.

1. Minimum Base-Metal Thickness: 0.0312 inch.
2. Flange: 1-1/4 inch.
3. Web Width: As indicated on drawings.

E. Cold-Rolled Channel Bridging: Steel, 0.053 inch minimum base-metal thickness, with minimum 1/2-inch wide flanges.

1. Depth: 1-1/2 inches.
2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch thick, galvanized steel.

2.3 AUXILIARY MATERIALS

A. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754.

1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

C. Install bracing at terminations in assemblies.

D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.2 INSTALLING FRAMED ASSEMBLIES

A. Install framing system components according to spacing indicated, but not less than spacing required by referenced installation standards for assembly types.

B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

C. Install studs so flanges within framing system point in same direction.

D. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.

1. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

    a. Install two studs at each jamb unless otherwise indicated.
    b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
    c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

2. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.

E. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

END OF SECTION 092216

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Texture finishes.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples:

1. Textured Finishes: 24-inch by 24-inch for each textured finish indicated and on same backing indicated for Work.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 INTERIOR GYPSUM BOARD

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Certainteed.
2. James Hardie Building Products, Inc.
3. National Gypsum Company.
4. Temple-Inland.
5. United States Gypsum Company.
6. ClarkDietrich Building Systems.

B. Gypsum Board, Type X: ASTM C 1396/C 1396M.

1. Thickness: 5/8 inch.
2. Long Edges: Tapered.

C. Gypsum walls, Ceiling/Furr-down Board: ASTM C 1396/C 1396M.

1. Thickness: 5/8 inch.
2. Long Edges: Tapered.

D. Cementitious Backer Units, Walls: ASTM C1325, Type A.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. C-Cure.
   b. Custom Building Products.
   c. FinPan, Inc.
   d. USG Corporation.
2. Thickness: **1/2 inch (12.7 mm)**.

E. Extruded-Polystyrene-Foam wall Sheathing: ASTM C578, Type IV, in manufacturer's standard lengths and widths with tongue-and-groove or shiplap long edges as standard with manufacturer.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Owens Corning.
   b. The Dow Chemical Company.

2. Thickness: **As indicated**.
3. Flame Propagation Test: Materials and construction are to be tested in accordance with NFPA 285.

2.3 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet.

2.4 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.

C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

2.5 AUXILIARY MATERIALS

A. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

B. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."

2.6 TEXTURE FINISHES

A. Primer: As recommended by textured finish manufacturer.

B. Non-Aggregate Finish: Pre-mixed, vinyl texture finish for spray application.

1. Products: Subject to compliance with requirements, provide one of the following:

a. CertainTeed Corp.; ProRoc Easi-Tex Spray Texture.
b. National Gypsum Company; Perfect Spray EM Texture.
c. USG Corporation; BEADEX FasTex Wall and Ceiling Spray Texture.

2. Texture: As selected by Architect.

PART 3 - EXECUTION

3.1 APPLYING AND FINISHING PANELS

A. Comply with ASTM C 840.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

D. Install trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
1. Control Joints: Install control joints, according to ASTM C 840 and in specific locations approved by Architect for visual effect.

E. Pre-fill open joints and damaged surface areas.

F. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

G. Texture Finish Application: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Mix and apply finish using powered spray equipment, to produce a uniform texture, matching approved mockup, and free of starved spots or other evidence of thin application or of application patterns.

H. Protect adjacent surfaces from drywall compound and texture finishes and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

I. Remove and replace panels that are wet, moisture damaged, and mold damaged.

END OF SECTION 092900

SECTION 093000 - TILING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Porcelain and Ceramic Tile
2. Thresholds.
3. Waterproof membrane.
4. Stainless Steel Trim.

1.2 ACTION SUBMITTALS

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

B. Samples:

1. Each type and composition of tile and for each color and finish required.
2. Assembled samples, with grouted joints, for each type and composition of tile and for each color and finish required.
3. Stone thresholds in 4 inch lengths.

1.3 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering and identified with labels describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.

1.4 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup of each type of floor tile installation.
2. Build mockup of each type of wall tile installation.
3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Manufacturer: Subject to compliance with requirements, provide products listed or comparable product by one of the following:

1. Daltile
2. Crossville
3. American Olean

2.2 TILE PRODUCTS

A. ANSI Ceramic Tile Standard: Provide Standard grade tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

B. FloorScore Compliance: Tile for floors shall comply with requirements of FloorScore Standard.

C. Floor Tile Type: Porcelain Floor Tile, PFT-1

1. Basis-of-Design Product: Milestone, Rustic Stone

2. Module Size: 12 inch by 24 inch.
3. Tile Color and Pattern: As selected by Architect from manufacturer's full range.
4. Grout Color: As selected by Architect from manufacturer's full range.
5. Trim: See PWT-1 coordinating cove base.

D. Floor Tile Type: Porcelain Floor Tile, PFT-2

1. Basis-of-Design Product: Milestone, Stratos

2. Module Size: 12 inch by 24 inch.
3. Tile Color and Pattern: As selected by Architect from manufacturer's full range.
4. Grout Color: As selected by Architect from manufacturer's full range.
5. Trim: As indicated on the drawings.

E. Wall Tile Type: Porcelain Wall Tile, PWT-1

1. Basis-of-Design Product: Milestone, Net-Zero

2. Module Size: 12 inch by 24 inch.
3. Tile Color and Pattern: selected by Architect from manufacturer's full range.
4. Grout Color: As selected by Architect from manufacturer's full range.
5. Trim: Metal Schluter Trim

F. or required to provide transition between adjacent floor finishes.

1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch or less above adjacent floor surface.

G. Thresholds:

1. Description: Stainless steel, 1.4301 (V2A)

2. Description: Stone

2.3 WATERPROOF MEMBRANE

A. General: Manufacturer's standard product, selected from the following, that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated.

B. Fluid-Applied Membrane: Liquid-latex rubber or elastomeric polymer.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Bostik, Inc.; Durabond D-222 Duraguard Membrane.
b. C-Cure; Pro-Red Waterproofing Membrane 63.
c. Custom Building Products; Redgard Waterproofing and Crack Prevention Membrane.
d. Laticrete International, Inc.; Latapoxy 24hr HydroProofing.
e. MAPEI Corporation; Mapelastic HPG.
f. TEC, a subsidiary of H. B. Fuller Company; HydraFlex - Waterproofing Crack Isolation Membrane.

2.4 STAINLESS STEEL TRIM

A. General: Manufacturer's standard product, selected from the following, that is recommended by the manufacturer for the application indicated.

B. Stainless steel cove trim: Heavy-duty stainless steel, cove-shaped profile for floor/ wall transitions. Schluter-DILEX series or equal.

C. Stainless steel edge protection: Stainless steel finishing and edge-protection profile for external edges of tile covering. Schluter-FINEC series or equal.

A. Products: Provide Schluter Systems or manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.

Available products that may be incorporated into the Work include, but are not limited to, the following:

a. Schulter Systems
b. Essential
c. Blanke Corp.

2.5 SETTING MATERIALS

A. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Bonsal American; an Oldcastle company.
   b. Bostik, Inc.
   c. C-Cure.
   d. Custom Building Products.
   e. Laticrete International, Inc.
   f. MAPEI Corporation.
   g. Mer-Kote Products, Inc.
   h. TEC; a subsidiary of H. B. Fuller Company.

2. Prepackaged, dry-mortar mix to which only water must be added.
3. For wall applications, provide nonsagging mortar.

2.6 GROUT MATERIALS

A. Water-Cleanable Epoxy Grout: ANSI A118.3, with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Boiardi Products; a QEP company.
   b. Bonsal American; an Oldcastle company.
   c. Bostik, Inc.
   d. C-Cure.
   e. Custom Building Products.
   f. Laticrete International, Inc.
   g. MAPEI Corporation.
   h. TEC; a subsidiary of H. B. Fuller Company.

2.7 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

B. Grout Sealer: Manufacturer's standard product for sealing grout joints and that does not change color or appearance of grout.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Bonsal American, an Oldcastle company; Grout Sealer.
   b. Bostik, Inc.; CeramaSeal Grout & Tile Sealer.

c. C-Cure; Penetrating Sealer 978.
d. Custom Building Products; Surfaceguard Sealer.
e. MAPEI Corporation; KER 004, Keraseal Penetrating Sealer for Unglazed Grout and Tile.
f. TEC, a subsidiary of H. B. Fuller Company; TA-256 Penetrating Silicone Grout Sealer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.

3.2 PREPARATION

A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

B. Blending: For tile exhibiting color variations, use factory blended tile or blend tiles at Project site before installing.

C. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.3 INSTALLATION

A. Comply with TCA's "Handbook for Ceramic Tile Installation" for TCA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

1. For the following installations, follow procedures in the ANSI A108 Series of tile installation standards for providing 95 percent mortar coverage:

a. Tile floors in wet areas.

B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.

E. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

F. Joint Widths: Unless otherwise indicated or otherwise recommended by tile manufacturer, install tile with the following joint widths:

1. Wall Tile: 1/16 inch.
2. Floor Tile: 1/16 inch.

G. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

H. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

I. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.

J. Grout Sealer: Apply grout sealer to cementitious grout joints in tile floors and tile floor wall bases according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

K. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness and bonded securely to substrate.

END OF SECTION 093000

SECTION 093000-A – QUARRY TILE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Quarry tile.
2. Stone thresholds.
3. Waterproof membrane
4. Crack isolation membrane.

5. 090561.13 Moisture Vapor Emission Control: The specified moisture mitigation coating shall be applied to all interior concrete floor slabs scheduled to receive resilient flooring, rubber flooring, wood flooring, carpet tile, or other moisture-sensitive finishes**,** unless specifically excluded on the drawings.

1.2 ACTION SUBMITTALS

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

B. Samples:

1. Each type and composition of tile and for each color and finish required.
2. Assembled samples, with grouted joints, for each type and composition of tile and for each color and finish required.
3. Stone thresholds in 6-inch (150-mm) lengths.

1.3 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering and identified with labels describing contents.

1. Tile and Trim Units:[**Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.**]

1.4 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup of[**each type of**] floor tile installation.
2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

2.1 TILE PRODUCTS

A. ANSI Ceramic Tile Standard: Provide Standard grade tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

B. FloorScore Compliance: Tile for floors shall comply with requirements of FloorScore Standard.

C. Low-Emitting Materials: Tile flooring systems shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. Tile Type : **Unglazed** square-edged quarry tile.

1. Manufacturers: Subject to compliance with requirements, **provide products by one of the following**.

a. American Olean; Division of Dal-Tile International Inc.
b. Daltile; Division of Dal-Tile International Inc.
c. Endicott Tile Ltd.; Endicott Clay Products Co.
d. Florida Brick & Clay Company Inc.
e. Florida Tile Industries, Inc.
f. Quarry Tile Co.
g. Summitville Tiles, Inc.
h. United States Ceramic Tile Company.

2. Face Size: **8 by 8 inches**.
3. Thickness: **1/2 inch**.
4. Wearing Surface: **Abrasive aggregate embedded in surface**.
5. Finish: **Mat, opaque**.
6. Tile Color and Pattern: (TBD) Color selected by owner.
7. Grout Color: **As selected by Architect from manufacturer's full range**.
8. Trim Units: Provide shapes selected from manufacturer's standard shapes:

a. Base: Coved **with surface bullnose top edge**, face size **8 by 8 inches**.

2.2 THRESHOLDS

A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.

1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch (1.5 mm) above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch (12.7 mm) or less above adjacent floor surface.

B. Marble Thresholds: ASTM C 503, with a minimum abrasion resistance per ASTM C 1353 or ASTM C 241 and with honed finish.

1. Description: Uniform, fine- to medium-grained white stone with gray veining.

2.3 WATERPROOF MEMBRANE

A. General: Manufacturer's standard product that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated.

2.4 CRACK ISOLATION MEMBRANE

B. General: Manufacturer's standard product that complies with ANSI A118.12 for **high** performance and is recommended by the manufacturer for the application indicated.

2.4 SETTING MATERIALS

A. Portland Cement Mortar (Thickset) Installation Materials: ANSI A108.02.

B. Water-Cleanable, Tile-Setting Epoxy: ANSI A118.3 **with a VOC content of 65 g/L or less when "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."**

1. Manufacturers: Subject to compliance with requirements, **available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**:

a. Atlas Minerals & Chemicals, Inc.
b. Bonsal American; an Oldcastle company.
c. Bostik, Inc.
d. C-Cure.
e. Custom Building Products.
f. Jamo Inc.
g. Laticrete International, Inc.
h. MAPEI Corporation.
i. Mer-Kote Products, Inc.
j. Southern Grouts & Mortars, Inc.
k. Summitville Tiles, Inc.
l. TEC; a subsidiary of H. B. Fuller Company.

2.5 GROUT MATERIALS

A. Water-Cleanable Epoxy Grout: ANSI A118.3**, with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D**.

1. Manufacturers: Subject to compliance with requirements, **provide products by one of the following**:
2. Basis-of-Design Product: Subject to compliance with requirements, provide **product indicated on Drawings,** or comparable product by one of the following:

    a. Atlas Minerals & Chemicals, Inc.
    b. Boiardi Products; a QEP company.
    c. Bonsal American; an Oldcastle company.
    d. Bostik, Inc.
    e. C-Cure.
    f. Custom Building Products.
    g. Jamo Inc.
    h. Laticrete International, Inc.
    i. MAPEI Corporation.
    j. Mer-Kote Products, Inc.
    k. Southern Grouts & Mortars, Inc.
    l. Summitville Tiles, Inc.
    m. TEC; a subsidiary of H. B. Fuller Company.
    n. <**Insert manufacturer's name**>.

2.6 ELASTOMERIC SEALANTS

A. Multipart, Pourable Urethane Sealant for Use T: ASTM C 920; Type M; Grade P; Class 25; Uses T, M, A, and, as applicable to joint substrates indicated, and for use in **commercial kitchens.**

1. Products: Subject to compliance with requirements, **provide one of the following**

    a. Bostik, Inc.; Chem-Calk 550.
    b. Degussa Building Systems; Sonneborn Sonolastic SL 2.
    c. Pecora Corporation;
    d. Sika Corporation; Sikaflex-2c SL
    e. Tremco Incorporated.;

2.7 MISCELLANEOUS MATERIALS

A. Trowelable Underlayment's and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations in **commercial kitchens**.

B. Grout Sealer: Manufacturer's standard product for sealing grout joints and that does not change color or appearance of grout and is suitable for **commercial kitchens**.

1. Products: Subject to compliance with requirements, **provide one of the following** must be suitable for **commercial kitchen floors.**

    a. Bonsal American, an Oldcastle company; Grout Sealer.
    b. Bostik, Inc.;
    c. MAPEI Corporation;

d. Southern Grouts & Mortars

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.

3.2 PREPARATION

A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with [**adhesives**] [**or**] [**thin-set mortar**] with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot (1:50) toward drains.

C. Blending: For tile exhibiting color variations, use factory blended tile or blend tiles at Project site before installing.

D. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.3 INSTALLATION

A. Comply with TCA's "Handbook for Ceramic Tile Installation" for TCA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

1. For the following installations, follow procedures in the ANSI A108 Series of tile installation standards for providing 95 percent mortar coverage:

a. Interior quarry tile floors for commercial kitchens
b. Tile floors in wet areas.

B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.

E. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

F. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:

1. Quarry Tile: **3/8 inch (9.5 mm)**

G. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

H. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.

1. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in latex-portland cement mortar (thin set).

I. Metal Edge Strips: Install [**where exposed edge of tile flooring meets carpet, wood, VCT or other flooring that finishes flush with or below top of tile and no threshold is indicated**].

J. Grout Sealer: Apply grout sealer to grout joints[**on commercial kitchen floors**] according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer from tile faces by wiping with soft cloth. **Grout must be suitable for commercial kitchen floors**.

K. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness and bonded securely to substrate.

L. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness and bonded securely to substrate.

3.4 INTERIOR TILE INSTALLATION SCHEDULE

A. Interior Floor Installations, Concrete Subfloor:

1. Tile Installation F114: Cement mortar bed (thickset) with cleavage membrane; epoxy grout; TCA F114.

a. Tile Type: 8” x 8” Quarry tile.
b. Grout: Water-cleanable epoxy grout.

END OF SECTION 093000

SECTION 09 30 00
TILE EDGE-PROTECTION AND TRANSITION PROFILES

McClendon Baptist Church — Basis of Design Specification

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Edge-protection and transition profiles for tiled floors; Basis of Design: Schluter®-RENO-U.

B. Decorative edge-protection profiles for tile finishes; Basis of Design: Schluter®-DECO.

C. Related setting materials, sealants, and accessories required for a complete installation of the profiles specified herein.

1.02 RELATED REQUIREMENTS

A. Section 01 25 00 – Substitution Procedures: Requirements governing “or-equal” and substitution requests.

B. Section 01 33 00 – Submittal Procedures.

C. Section 03 30 00 – Cast-in-Place Concrete: Concrete substrates and slab tolerances.

D. Section 07 92 00 – Joint Sealants: Sealants at movement and perimeter joints.

E. Section 09 30 00 – Tiling: Ceramic and stone tile, setting and grouting materials, and membranes.

F. Section 09 65 00 – Resilient Flooring: Adjacent resilient floor coverings at transitions.

1.03 REFERENCES

A. American National Standards Institute (ANSI):

1. ANSI A108 – Installation of Ceramic Tile.
2. ANSI A118 – Specifications for Setting Materials.
3. ANSI A137.1 – Specifications for Ceramic Tile.

B. ASTM International (ASTM):

1. ASTM B221 – Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
2. ASTM A240 – Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip.

C. Tile Council of North America (TCNA) Handbook for Ceramic, Glass, and Stone Tile Installation.

D. Americans with Disabilities Act (ADA) Standards for Accessible Design and ICC A117.1 – Accessible and Usable Buildings and Facilities: Requirements for changes in floor level at transitions.

SPECIFIER NOTE: Interior spaces will be publicly accessible; verify that transition profile heights and bevel geometry satisfy ADA / ICC A117.1 limits for changes in level (typically 1/4 in. vertical maximum, or up to 1/2 in. beveled at 1:2). RENO-U’s sloped surface is well suited to compliant transitions between coverings of differing height.

1.04 SUBMITTALS

A. Comply with Section 01 33 00.

B. Product Data: Manufacturer’s data sheets for each profile, including material, finish, profile height, and installation instructions.

C. Samples: Minimum 8 in. (200 mm) long sample of each profile type, in each specified material, finish, and height for color and finish verification.

D. Shop Drawings: Show profile locations, transition conditions, junctions, terminations, and coordination with adjacent floor and wall finishes.

E. Substitution Requests: For products offered as “or-equal,” submit documentation in accordance with Section 01 25 00 demonstrating compliance with the salient characteristics in Part 2.

F. Maintenance Data: Manufacturer’s cleaning and maintenance instructions for inclusion in the operation and maintenance manuals.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing tile edge and transition profiles with not less than five (5) years of documented experience.

B. Installer Qualifications: Tile installer experienced in installing the specified profiles in conjunction with the tile work of Section 09 30 00.

C. Single-Source Responsibility: Provide profiles and compatible setting materials from a single manufacturer or from manufacturers recommended by the profile manufacturer.

D. Mock-Up: Where directed, install a representative transition using each profile type; approved mock-up establishes the standard for the Work and may remain as part of the completed Work.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer’s original, unopened packaging with labels intact.

B. Store profiles flat, protected from bending, moisture, and construction traffic. Protect finished surfaces from scratching and staining.

1.07 FIELD CONDITIONS

A. Do not install profiles until substrates and adjacent finishes are within the tolerances required by the referenced standards and the tile manufacturer.

B. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by the manufacturer of the setting materials.

1.08 WARRANTY

A. Provide manufacturer’s standard warranty against defects in materials for the profiles specified herein.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Basis-of-Design Manufacturer: Schluter Systems L.P., 194 Pleasant Ridge Road, Plattsburgh, NY 12901-5841; Tel. (800) 472-4588; www.schluter.com.

B. Acceptable Manufacturers: Subject to compliance with the salient characteristics of Article 2.02, products of the following manufacturers are approved as equal to the Basis of Design:

1. Blanke Corporation (Blanke Systems); www.blankecorp.com – transition and renovation profiles.
2. Dural USA (Dural, LLC); www.dural.com – DURATRANS ramp transition profiles with perforated anchoring leg.

C. Other Substitutions: Products of manufacturers other than those listed above will be considered only in accordance with Section 01 25 00, provided they meet the salient characteristics specified in this Section and are approved in writing prior to bid or as permitted by the Contract Documents.

2.02 SALIENT CHARACTERISTICS (“OR-EQUAL” CRITERIA)

A. Products offered as equal to the Basis of Design shall, at a minimum, provide the following:

1. Extruded or formed one-piece profile with an integrated, trapezoid-perforated anchoring leg that is fully embedded in the tile setting bed.
2. Integrated grout-joint spacer sized to the adjacent grout joint where the profile abuts tile (floor transition profile).
3. Material and finish selected to withstand the anticipated mechanical and chemical exposure of the application, in the finish scheduled.
4. Profile height matched to the adjacent tile/covering thickness, providing a flush or code-compliant beveled transition.
5. Sloped or beveled exposed surface at floor transitions that complies with ADA / ICC A117.1 limits for changes in level.

2.03 FLOOR TRANSITION PROFILE – BASIS OF DESIGN: SCHLUTER®-RENO-U

A. Basis of Design: Schluter®-RENO-U, or approved equal meeting the salient characteristics of Article 2.02.

B. Description: Profile with sloped exposed surface, 5/32 in. (4 mm) tall leading edge, integrated trapezoid-perforated anchoring leg, and integrated grout-joint spacer. Provides a sloped transition from a higher tile covering to a lower adjacent floor covering.

C. Application: Use as a finished-edge and sloped transition between tile and an adjacent floor covering of lesser height (e.g., resilient flooring, at doorways, and at thresholds).

D. Material and Finish: As selected by the Architect from the manufacturer’s standard range, including the following:

1. E – Stainless Steel, Type 304 (V2A).
2. EB – Brushed Stainless Steel, Type 304 (V2A).
3. M – Solid Brass.
4. AE – Satin Anodized Aluminum.
5. ACB – Bright Chrome Anodized Aluminum.
6. AT – Satin Nickel; ATGB – Brushed Nickel Anodized Aluminum.
7. AK – Satin Copper/Bronze; AKGB – Brushed Copper/Bronze; ABGB – Brushed Antique Bronze Anodized Aluminum.
8. AM – Satin Brass; AMB – Bright Brass Anodized Aluminum.

E. Height: [_____] to match adjacent tile thickness, or as required by field conditions. Confirm availability with the manufacturer’s current Illustrated Price List.

SPECIFIER NOTE: Select the RENO-U material/finish based on anticipated mechanical and chemical stress (a food-service / clinical environment favors Stainless Steel Type 304 – finish E or EB – for cleanability and corrosion resistance). Insert the required height to suit the specified tile.

2.04 DECORATIVE EDGE-PROTECTION PROFILE – SCHLUTER®-DECO

A. Basis of Design: Schluter®-DECO, or approved equal meeting the salient characteristics of Article 2.02.

B. Description: Profile with 1/4 in. (6 mm) wide visible surface and integrated trapezoid-perforated anchoring leg, providing a decorative accent and finished edge for tile.

C. Anchoring Leg:

1. Straight anchoring leg for standard (linear) applications.
2. Special radius-perforated anchoring leg for curved applications (aluminum and brass only; not available in stainless steel).

D. Material and Finish: As selected by the Architect from the manufacturer's standard range, including the following:
   1. E – Stainless Steel, Type 304 (V2A).
   2. M – Solid Brass.
   3. MC – Chrome-Plated Solid Brass.
   4. AE – Satin Anodized Aluminum.

E. Height: [_____] to match adjacent tile thickness, or as required. Confirm availability with the manufacturer's current Illustrated Price List.

SPECIFIER NOTE: DECO is a decorative border/accent and finished-edge profile. Specify radius perforation only where curved layouts occur, and note that the radius option is not available in stainless steel.

2.05 ACCESSORIES AND SETTING MATERIALS

A. Setting Materials: Bonding mortar / thin-set adhesive complying with ANSI A118 and compatible with the profiles and substrate, as specified in Section 09 30 00.

B. Sealants: As specified in Section 07 92 00, where profiles abut dissimilar materials or at movement joints.

C. Provide corners, connectors, and end caps furnished by the profile manufacturer where offered for the specified profile and finish.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and adjacent construction. Verify that surfaces are sound, level, clean, and within the tolerances required for tile work.

B. Verify that the thickness of adjacent floor coverings is known so that profile heights produce a flush or code-compliant transition.

C. Commencement of installation constitutes acceptance of substrate and adjacent conditions.

3.02 PREPARATION

A. Coordinate profile locations with tile layout and adjacent finishes shown on the Drawings and approved Shop Drawings.

B. Cut profiles cleanly to length using tools recommended by the manufacturer; deburr cut edges of metal profiles.

3.03 INSTALLATION

A. Install profiles in accordance with Schluter®-Systems' current technical literature, the TCNA Handbook, and ANSI A108, or in accordance with the approved equal manufacturer's instructions.

B. Floor Transition Profiles (RENO-U):
   1. Apply bonding mortar to the substrate and press the perforated anchoring leg into the mortar so that it is fully embedded.
   2. Align the integrated grout-joint spacer with the adjacent tile and set tile against the profile, leaving a grout joint of the width of the spacer.
   3. Position the sloped exposed surface toward the lower adjacent covering to form a smooth, code-compliant transition. Fill the grout joint solidly.

C. Decorative Edge Profiles (DECO):
   1. Embed the perforated anchoring leg in the bonding mortar behind the tile so the visible surface aligns flush with the finished tile face.

2. For curved layouts, use the radius-perforated profile and form to the required radius before setting.

D. Provide manufacturer’s prefabricated corners and connectors where available; miter and fit joints neatly where they are not.

E. Set profiles true to line and level, rigidly anchored and free of waves, warps, and offsets at joints.

3.04 FIELD QUALITY CONTROL

A. Verify that installed transitions comply with ADA / ICC A117.1 limits for changes in level.

B. Verify that profiles are securely embedded, aligned, and that grout joints are fully and uniformly filled.

3.05 CLEANING AND PROTECTION

A. Clean exposed profile surfaces of mortar and grout residue using methods that will not damage the finish.

B. Protect installed profiles from damage during the remainder of construction.

END OF SECTION 09 30 00

SECTION 095100 ACOUSTICAL CEILINGS & WALL PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Suspended Acoustical units

B. Sound Soak wall panels

C. Sound Scapes (Blades)

1.2 RELATED REQUIREMENTS

A. Section 016116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 072100 - Thermal Insulation: Acoustical insulation.

C. Section 211300 - Fire-Suppression Sprinkler Systems: Sprinkler heads in ceiling system.

D. Section 233700 - Air Outlets and Inlets: Air diffusion devices in ceiling.

E. Section 265100 - Interior Lighting: Light fixtures in ceiling system.

F. Section 275116 - Public Address Systems: Speakers in ceiling system.

G. Section 284600 - Fire Detection and Alarm: Fire alarm components in ceiling system.

1.3 REFERENCE STANDARDS

A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures Most Recent Edition Cited by Referring Code or Reference Standard.

B. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings 2017.

C. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels 2019.

D. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing 2017.

E. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions 2020.

F. ASTM E795 - Standard Practices for Mounting Test Specimens During Sound Absorption Tests 2016.

G. ASTM E1264 - Standard Classification for Acoustical Ceiling Products 2019.

H. CHPS (HPPD) - High Performance Products Database Current Edition at www.chps.net/.

I. ISO 14644-1 - Cleanrooms and associated controlled environments - Part 1: Classification of air cleanliness by particle concentration 2015.

J. UL (FRD) - Fire Resistance Directory Current Edition.

K. UL (GGG) - GREENGUARD Gold Certified Products Current Edition.

L. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

B. Do not install acoustical units until after interior wet work is dry.

1.5 SUBMITTALS

A. See Section 013300 - Administrative Requirements for submittal procedures.

B. Shop Drawings: Indicate grid layout and related dimensioning.

C. Product Data: Provide data on suspension system components and acoustical units.

D. Evaluation Service Reports: Show compliance with specified requirements.

E. Samples: Submit two samples 12" x 12" inch in size illustrating material and finish of acoustical units.

F. Samples: Submit two full size samples illustrating material and finish of acoustical units.

G. Samples: Submit two samples each, 12 inches long, of suspension system main runner, cross runner, and perimeter molding.

H. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

I. Manufacturer's Qualification Statement.

J. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Section 016000 - Product Requirements, for additional provisions.
2. Extra Acoustical Units: Quantity equal to 5 percent of total installed.

1.6 QUALITY ASSURANCE

A. Designer Qualifications for Seismic Design: Perform under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed at the State in which the Project is located.

B. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.7 FIELD CONDITIONS

A. Maintain uniform temperature of minimum 60 degrees F (16 degrees C), and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acoustic Tiles/Panels:
1. Armstrong World Industries, Inc; www.armstrongceilings.com/#sle.
2. CertainTeed Corporation; www.certainteed.com/#sle.
3. USG Corporation; www.usg.com/ceilings/#sle.
4. Substitutions: See Section 016000 - Product Requirements.

B. Suspension Systems:
1.
2. CertainTeed Corporation; www.certainteed.com/#sle.
3. USG Corporation; www.usg.com/ceilings/#sle.
5. Substitutions: See Section 016000 - Product Requirements.

2.2 Performance Requirements

A. Seismic Performance: Ceiling systems designed to withstand the effects of earthquake motions determined according to ASCE 7 for Seismic Design complying with the following:
1. Local authorities having jurisdiction.
2. ICC-ES Evaluation Report.

2.3 Acoustical ceiling panels

A. **Basis Of Design: (Act 1)** Suspended Acoustic Ceiling shall be: Armstrong 1754 Fine Fissured "Fine Fissured" mineral fiber.
1. Size: 24" by 24".
2. Thickness: 7/8".
3. Tile Edge: Square.
4. Color: White.
5. Suspension System: Prelude 15/16" color white

B. **Basis Of Design: (Act 2)** Suspended Acoustic shall be: Armstrong 607 Ceramaguard Fine Fissured Perforated washable.
1. Size: 24" x 24"
2. Thickness 5/8"
3. Tile Edge: Square
4. Color: White
5. Suspension System: Prelude 15/16"

2.4 ACCESSORIES

A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.

B. Hanger Wire: 12 gauge, 0.08 inch (2 mm) galvanized steel wire.

C. Perimeter Moldings: Same metal and finish as grid.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that layout of hangers will not interfere with other work.

3.2 Preparation

A. Install after major above-ceiling work is complete.

B. Coordinate the location of hangers with other work.

C. Provide hanger clips during steel deck erection. Provide additional hangers and inserts as required.

3.3 INSTALLATION - SUSPENSION SYSTEM

A. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, and

manufacturer's instructions and as supplemented in this section.

B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.

C. Lay out system to a balanced grid design with edge units no less than 50 percent of acoustical unit size.

D. Locate system on room axis according to reflected plan.

E. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
   1. Install in bed of acoustical sealant
   2. Use longest practical lengths.
   3. Overlap and rivet corners.

F. Suspension System, Non-Seismic: Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

G. Seismic Suspension System, Seismic Design Category C: Hang suspension system independent of walls, columns, ducts, pipes and conduit. Maintain a 3/8 inch (9 mm) clearance between grid ends and wall.

H. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

I. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.

J. Support fixture loads using supplementary hangers located within 6 inches (152 mm) of each corner, or support components independently.

K. Do not eccentrically load system or induce rotation of runners.

3.4 INSTALLATION - ACOUSTICAL UNITS

A. Install acoustical units in accordance with manufacturer's instructions.

B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.

C. Fit border trim neatly against abutting surfaces.

D. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.

E. Cutting Acoustical Units:
   1. Make field cut edges of same profile as factory edges.

END OF SECTION

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Resilient base.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified, not less than 4 inches long.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. FloorScore Compliance: Resilient base shall comply with requirements of FloorScore certification.

2.2 THERMOPLASTIC-RUBBER BASE

A. Basis of Design: Subject to compliance with requirements, provide ROPPE, Pinnacle Plus Profile #15.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Burke Flooring (Flexco).
2. Nora Rubber Products.
3. Roppe Corp.
4.

C. Product Standard: ASTM F 1861, Type TP (rubber, thermoplastic).

D. Thickness: 0.125 inch.

E. Height: 5 ¼” High.

F. Lengths: Coils in manufacturer's standard length.

G. Outside Corners: Preformed.

H. Inside Corners: Preformed.

I. Colors: Up to four (4) as selected by Architect from manufacturer’s full range, within same Collection/Series as indicated on drawings.

2.3 RUBBER STAIR ACCESSORIES

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

B. Basis-of-Design Product: Subject to compliance with requirements, Johnsonite; Stairwell Management VIRTR-RD or comparable product by one of the following:

1. AB; American Biltrite.
2. Armstrong World Industries, Inc.
3. Burke Mercer Flooring Products, Division of Burke Industries Inc.
4. Flexco.
5. Johnsonite; A Tarkett Company.
6. Roppe Corporation, USA.

C. Stair Treads: ASTM F 2169.

1. Type: Rubber with integrated riser.
2. Class: 2 (pattern; embossed, grooved, or ribbed).
3. Group: 2 (with contrasting color for the visually impaired).

D. Landing Tile: Matching treads; produced by same manufacturer as treads and recommended by manufacturer for installation with treads.

E. Locations: Provide rubber stair accessories in areas indicated.

F. Colors and Patterns: As selected by Architect from full range of industry colors.

2.4 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

1. Adhesives shall have a VOC content of 50 g/L or less.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

C. Do not install resilient products until they are the same temperature as the space where they are to be installed.

D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.2 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Preformed Corners: Install preformed corners before installing straight pieces.

H. Job-Formed Corners: Job-formed corners are not acceptable

3.3 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.

B. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 096513

SECTION 096519 - RESILIENT TILE FLOORING (LVT)

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Luxury Vinyl Tile

2. **090561.13** Moisture Vapor Emission Control: The specified moisture mitigation coating shall be applied to all interior concrete floor slabs scheduled to receive resilient flooring, rubber flooring, wood flooring, carpet tile, or other moisture-sensitive finishes**,** unless specifically excluded on the drawings.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.

1. Show details of special patterns.

C. Samples: Full-size units of each color and pattern of floor tile required.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

B. FloorScore Compliance: Resilient tile flooring shall comply with requirements of FloorScore certification.

2.2 Luxury Vinyl Floor Tile

A. Basis-of-Design: Subject to compliance with requirements, Provide Mohawk Group, Hot and Heavy II Collection 5.0mm., size 7” x 48”

1. Wear layer: 20 mil
2. Total thickness: 5mm
3. Color: To be selected by the architect from the manufacturer’s full range of colors.

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.

B. Adhesives: TAG 100 Pressure Sensitive Adhesive as manufactured by Lighthouse Adhesives/Professional Flooring Supply.

1. Adhesives shall comply with the following limits for VOC content:

a. Tile Adhesives: 50 g/L or less

b. Rubber Floor Adhesives: 60g/L or less

2. Install in strict accordance with manufacturer’s written instructions and recommendation for Shaw Contract Luxury Vinyl Tile.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
4. Moisture Testing: Proceed with installation only after substrates pass testing according to floor tile manufacturer's written recommendations, but not less stringent than the following:

a. Perform anhydrous calcium chloride test according to ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
b. Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install floor tiles until they are the same temperature as the space where they are to be installed.

E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.2 FLOOR TILE INSTALLATION

A. Comply with manufacturer's written instructions for installing floor tile.

B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

1. Lay tiles in pattern indicated.

C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

1. Lay tiles in pattern of colors and sizes indicated.

D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.

G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.

H. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

I. Provide Schluter Schiene transition trim or approved equal at all locations where resilient tile flooring meets dissimilar flooring materials. Install transitions to ensure all flooring types are flush.

3.3 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.

B. Cover floor tile until Substantial Completion.

END OF SECTION 096519

SECTION 096813 - TILE CARPETING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes modular, carpet tile.

B. **090561.13** Moisture Vapor Emission Control: The specified moisture mitigation coating shall be applied to all interior concrete floor slabs scheduled to receive resilient flooring, rubber flooring, wood flooring, carpet tile, or other moisture-sensitive finishes, unless specifically excluded on the drawings.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site

1.3 ACTION SUBMITTALS

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

B. Shop Drawings: Show the following:

1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
2. Type of subfloor.
3. Type of installation.
4. Pattern of installation.
5. Pattern type, location, and direction.
6. Pile direction.

C. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Sample warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association.

B. Fire-Test-Response Ratings: Where indicated, provide carpet tile identical to those of assemblies tested for fire response according to NFPA 253 by a qualified testing agency.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI 104.

1.8 FIELD CONDITIONS

A. Comply with CRI 104 for temperature, humidity, and ventilation limitations.

1.9 WARRANTY

A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.

1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
2. No Edge Ravel-No Sealer required to guarantee no edge ravel at edge or seams under normal use for life of carpet.
3. No delamination-Guaranteed for Life.
4. 20 lb. Tuft bind-Guaranteed for Life.
5. Carpet installed over pad or glued directly to floor requires use of no chair pads. Backing guaranteed not to delaminate.
6. Carpet impervious to water. Must meet British Spill Test Method E".

PART 2 - PRODUCTS

2.1 CARPET TILE PRODUCTS

A. CARPET TILE: **CPT-1**
1. Basis-of-Design Product: Subject to compliance with requirements, provide Mohawk Group; Style: Spatial Build, Dynamic Field. Size: 24" X 24". Color/Pattern: To be Determined by Architect from Manufacturer's full line.
2. Backing: EcoFlex One
3. Gauge: 1/12"
4. Tuft Pile Weight: 20 oz/yd2
5. Installation: Glue down

2.2 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

B. Adhesive: Shaw Contract TotalWorx LokWorx 5000 Carpet Tile Adhesive, premium acrylic based pressure-sensitive adhesive recommended by carpet tile manufacturer for insalllation of specified carpet tile.
   1. Polymer Type: Acrylic
   2. VOC Content: Less that 7g/L
   3. Moisture Resistance:
      a. Relative Humidity: Up to 97% when tested in accordance with ASTM F2170
      b. Moisture Vapor Emission Rate: Up to 15 lbs./1000 sq ft/24 hr when tested in accordance with ASTM F1869.
      c. pH Range: 5 to 11
   4. Adhesive shall be water resistant, mildew resistant, nonstaining, and compatible with specified carpet tile backing and substrate conditions indicated.
   5. Adhesive shall comply with flammability requirements for installed carpet tile and shall be installed in accordance with manufacturer’s written instructions.
   6. Installation shall permit releasable or permanent bond installation as recommended by manufacturer.

2.3 INSTALLATION ACCESSORIES

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

D. Preparation: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.

E. Installation: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.

F. Installation Method: As recommended in writing by carpet tile manufacturer.

G. Maintain dye lot integrity. Do not mix dye lots in same area.

H. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.

I. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

J. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.

K. Install pattern as indicated by drawings.

L. Perform the following operations immediately after installing carpet tile:

1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
2. Remove yarns that protrude from carpet tile surface.
3. Vacuum carpet tile using commercial machine with face-beater element.

M. Protect installed carpet tile to comply with CRI 104, Section 16, "Protecting Indoor Installations."

END OF SECTION 096813

SECTION 097200 - WALL COVERINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Acoustical Polyester wall covering.
2. Woven Polyester wall covering.
3. Dimensional Wall panel

1.2 ACTION SUBMITTALS

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

B. Shop Drawings: Show location and extent of each wall-covering type. Indicate **pattern placement,** seams and termination points.

C. Samples: Full width by **36-inch** long section of wall covering from same print run or dye lot to be used for the Work. **Show complete pattern repeat.** Mark top and face of fabric.

1.3 INFORMATIONAL SUBMITTALS

A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for wall covering.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For wall coverings to include in maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Wall-Covering Materials: For each type, full-size units equal to [**5**] percent of amount installed.

1.6 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: As determined by testing identical wall coverings applied with identical adhesives to substrates according to test method indicated below by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Surface-Burning Characteristics:
   a. ASMT E84 Class A
   b. CAN/ULC S102

2. Fire-Growth Contribution: Textile wall coverings complying with acceptance criteria.
3. Fire-Growth Contribution: Textile wall coverings tested according to [**NFPA 265**] [**NFPA 286**] and complying with test protocol and criteria in the 2021 IBC.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Low-Emitting Materials: Wall covering system shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.2 WALL COVERINGS

A. General: Provide rolls of each type of wall covering from same dye lot.

2.3 ACOUSTICAL WALL COVERINGS

A. Acoustical Wall Covering WC1
   1. Basis-of-Design Product: Reference the DID book. Momentum Textiles & Walls; NuFelt Manchester in the color Library.
   2. Width: 63 inches
   3. Thickness: 1/8 inch
   4. Weight: 25 oz.
   5. Backing: Fused Polyester
   6. Fiber Content: 100% recycled polyester
   7. Installation Method: Non-reverse hang, random match.
   8. Repeat: None.
   9. Acoustical Performance:
      a. NRC: 0.15
      b. SAA: 0.18
   10. Lightfastness: Class 5, 40 hours
   11. Bleach Cleanable: 9:1 water-to bleach solution
   12. Environmental Characteristics:
      a. PVC Free
      b. GREENGUARD certified

c. Low VOC, California Section 01350 compliant
d. HPD documented
e. Recycled Content

B. Wall Covering Standards:
1. ASTM E84 Class A
2. CAN/ULC S102

2.4 WOVEN POLYESTER WALL COVERING

A. Woven Polyester Wall Covering WC2
1. Basis-of-Design: Reference the DID book. Designtex: Wannabe Rib, Pattern No. 5622 in the color Gull 5622-101.
2. Width: 63 inches
3. Thickness: 3.25 mm
4. Weight: 25 oz, per linear yard
5. Backing: None
6. Fiber Content:
a. 80% postconsumer recycled solution dyed polyester.
b. 20% solution dyed polyester
7. Installation Method: Straight hang, random match.
8. Pattern Type: Stripe Texture
9. Acoustical Performance:
a. NRC:0.15
b. SAA: 0.17
10. Lightfastness: 40 hours
11. Cleaning Code: Water-based/Solvent (WS)
12. Approved Disinfectants:
a. Bleach 10:1 solution
b. Sani-Cloth Bleach Germicidal Disposable Wipes
13. Environmental Characteristics:
a. SCS Indoor Advantage Gold Certified
b. HPD Documented
c. LEED compliant
d. WELL compliant
e. Low VOC
f. PVC free
g. No PFAS
h. No Phthalates
i. No Antimicrobials

B. Wall Covering Standard:
1. ASTM E84 Class A
2. CAN/ULC S102

2.5 DIMENSIONAL METAL WALL PANEL

A. Dimensional Metal Wall Panel MT1

1. Basis-of-Design: Reference the DID book. Gage78; Plaza Collection; Style EM 7805 in the color Prismatiques Mocha Pearl.
2. Material: Extruded aluminum
3. Alloy: 6063
4. Temper: T5
5. Material Thickness: 0.11 inch
6. Total Width: 9.25 inches
7. Visual Width: 8 inches
8. Maximum length: 20 feet
9. Weight: 2.5 lbs per square foot
10. Tensile strength: 22,000 psi
11. Yield strength: 16,000 psi
12. Finish: Factory-applied powder coat

B. Samples: Provide physical sample from manufacturer's standard samples.

C. Installation Requirements:
1. Install in accordance with manufacturer's written instructions and approved shop drawings.
2. Verify substrates are properly framed, aligned, and ready to receive metal panel components.
3. Stud spacing shall be 8 inches on center unless otherwise approved by manufacturer.
4. Install panels plumb, level, true to line, and free of distortion.
5. Provide sequential attachment process to prevent damage to exposed panel surfaces.
6. Remove protective coverings only as installation progresses.
7. Replace damaged panels that exhibit dents, scratched, gouges, or other visible defects.

2.6 ACCESSORIES

A. Adhesive: Mildew-resistant, nonstaining**, strippable** adhesive recommended by wall covering manufacturer for intended substrate and wall covering.

1. Adhesive shall have VOC content of [**50**] g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. Primer/Sealer: Mildew resistant, complying with requirements recommended by wall manufacturer for intended substrate and wall covering.

C. Wall Liner: As recommended in writing by wall covering manufacturer.

D. Seam Tape: As recommended in writing by wall-covering manufacturer.

PART 3 - EXECUTION

3.1 INSPECTION

A. Installer shall inspect all areas and conditions under which wallcoverings are to be installed. Installer shall notify the contractor and architect in writing of any conditions detrimental to the proper and timely completion of the installation; work will proceed only when conditions have been corrected and accepted by the installer.

3.2 SURFACE PREPARATION

A. Prepare substrates to achieve a smooth, dry, clean, structurally sound surface free of flaking, unsound coatings, cracks, and defects.

1. Moisture Content: Maximum of 5 percent on new plaster, concrete, and concrete masonry units when tested with an electronic moisture meter.
2. Plaster: Allow new plaster to cure. Neutralize areas of high alkalinity. Prime with primer as recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.
3. Metals: If not factory primed, clean and apply metal as recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.
4. Gypsum Board: Prime with primer as recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.
5. Painted Surfaces: Treat areas susceptible to pigment bleeding.

B. Clean substrates of substances that could impair bond of wall covering, including dirt, oil, grease, mold, mildew, and incompatible primers.

C. Remove hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.

D. Acclimatize wall-covering materials by removing them from packaging in the installation areas not less than 24 hours before installation.

E. Install wall liner, with no gaps or overlaps, where required by wall-covering manufacturer. Form smooth wrinkle-free surface for finished installation. Do not begin wall-covering installation until wall liner has dried.

3.3 INSTALLATION

A. Wallcovering shall be installed by experienced workers and contractors in strict accordance with the manufacturer’s printed instructions using wallcovering adhesive recommended by the manufacturer (WHEAT PASTE SHALL NOT BE USED).

B. Install wall covering plumb, level, and free from bubbles, wrinkles, blisters, open seams, and other defects.

C. Match patterns and textures where required.

D. Fully bond wall coverings to substrate.

E. Remove excess adhesive immediately after installation.

3.4 CLEAN UP COMPLETION

A. Reinstall hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.

B. Upon completion of work, remove surplus materials, rubbish, and debris, resulting from the wallcovering.

C. Protect installed wall covering from damage until substantial completion.

END OF SECTION 097200

SECTION 099000 – PAINTING AND COATING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints, stains, and varnishes.

C. Scope: Finish all interior and exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.

D. Do Not Paint or Finish the Following Items:
1. Items fully factory-finished unless specifically so indicated; materials and products having factory-applied primers are not considered factory finished.
2. Items indicated to receive other finishes.
3. Items indicated to remain unfinished.
4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
5. Floors, unless specifically so indicated.
6. Glass.
7. Concealed pipes, ducts, and conduits.

E. See Schedule of finishes included in this Section.

1.02 RELATED REQUIREMENTS

A. Section 321723 - Traffic Paint: Pavement markings.

B. Division 3 - Concrete Floor Finishing.

C. Section 055000 - Metal Fabrications: Shop-primed items.

D. Section 061000 - Rough Carpentry: Exposed telephone and electrical panel boards.

E. Section 062023 – Interior Finish Carpentry.

F. Section 076200 - Sheet Metal Flashing and Trim.

G. Section 081113 – Hollow Metal Doors.

H. Section 083323 - Overhead Coiling Doors.

I. Section 092900 - Gypsum Board Assemblies

J. Division 22- Mechanical: Painted identification.

K. Division 26 - Electrical: Painted identification.

1.03 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for

Architectural Coatings; U.S. Environmental Protection Agency; current edition.

B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2012.

C. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 2007.

1.04 DEFINITIONS

A. Conform to ASTM D 16 for interpretation of terms used in this section.

1.05 SUBMITTALS

A. See Section 013300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on all finishing products, including VOC content.

C. Samples: Submit two painted samples, illustrating selected colors for each color and system selected with specified coats cascaded. Submit on aluminum sheet, 6 x 6 inch in size.

D. Manufacturer's Instructions: Indicate special surface preparation procedures.

E. Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces.

1.06 QUALITY ASSURANCE

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

B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum three years experience.

1.07 REGULATORY REQUIREMENTS

A. Conform to applicable code for flame and smoke rating requirements for products and finishes.

1.08 MOCK-UP

A. See Section 014000 - Quality Requirements, for general requirements for mock-up.

B. Provide panel, 8 feet long by 8 feet wide, illustrating specified coating color, texture, and finish.

C. Provide door and frame assembly illustrating paint coating color, texture, and finish.

D. Locate where directed.

E. Mock-up may remain as part of the work.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90

degrees F, in ventilated area, and as required by manufacturer's instructions.

1.10 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.

D. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.

E. Minimum Application Temperature for Varnish Finishes: 65 degrees F for interior or exterior, unless required otherwise by manufacturer's instructions.

F. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

1.11 EXTRA MATERIALS

A. See Section 016000 - Product Requirements, for additional provisions.

B. Supply 1 gallon of each color; store where directed.

C. Label each container with color in addition to the manufacturer's label.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide all paint and coating products used in any individual system from the same manufacturer, no exceptions.

i) Sherwin-Williams is the basis of design. Up to 8 colors to be selected by architect.

B. Approved Manufacturers:

i) Benjamin Moore

ii) Behr

iii) PPG

iv) Kelly-Moore

C. Primer Sealers: Same manufacturer as topcoats.

D. Block Fillers: Same manufacturer as topcoats.

2.02 PAINTS AND COATINGS - GENERAL

A. Paints and Coatings: Ready mixed, unless intended to be a field-catalyzed coating.

1. Provide paints and coatings of a soft paste consistency, capable of being readily and uniformly

dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
2. Supply each coating material in quantity required to complete entire project's work from a single production run.
3. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.

B. Primers: Where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.

C. Volatile Organic Compound (VOC) Content:

1. Provide coatings that comply with the most stringent requirements specified in the following:
   a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.

2.03 PAINT SYSTEMS – EXTERIOR

A. Wood: Unprimed, Latex, 3 Coat:
1. One coat of SW B42W8041, Exterior Latex Wood Primer.
2. Semi-gloss: Two coats of SW A89-Series, SuperPaint Exterior Satin.

B. Drywall, Unprimed, Latex, 3 Coat:
1. One coat of SW B51-450 Series, Multi-Purpose Interior/Exterior Latex Primer.
2. Semi-gloss: Two coats of SW A89-Series, SuperPaint Exterior Satin.

C. Masonry/Concrete, Opaque Paint System, Latex, 3 Coat:
1. One coat of SW LX2W50, Loxon Concrete & Masonry Primer.
2. Flat: Two coats of SW A89-Series, SuperPaint Exterior Satin.

D. CMU, Opaque Waterproofing System, Latex, 3 Coat:
1. One coat SW CF1W50, ConFlex Block Filler.
2. Flat: Two coats of SW CF11W51 Series, ConFlex XL Elastomeric Smooth.

E. Ferrous Metals, (doors, frames, & handrails), Primed, Latex, 2 Coat:
1. Touch-up with SW B66-1300 Series, Pro-Cryl Universal Water Based Primer.
2. Semi-gloss: Two coats of B53-1150 Series, WB Alkyd Urethane Enamel Semi-Gloss.

F. Galvanized Metals, Latex, 3 Coat:
1. One coat of SW B66-1300 Series, Pro-Cryl Universal Water Based Primer.
2. Gloss: Two coats of SW B66-1661 Series, Pro Industrial DTM Acrylic Eg-Shel.

G. Aluminum, Unprimed, Latex, 3 Coat:
1. One coat of SW B66-1300 Series, Pro-Cryl Universal Water Based Primer.
2. Semi-gloss: Two coats of SW B66-1661 Series, Pro Industrial DTM Acrylic Eg-Shel.

H. Architectural PVC, Plastic, Fiberglass: Unprimed, Latex, 3 Coat:
1. One coat of SW B51W1150, Extreme Bond Interior/Exterior Bonding Primer.
2. Semi-gloss: Two coats of SW A89-Series, SuperPaint Exterior Satin.

I. Traffic Marking Paint Latex, 2 Coat:
1. Two Coats Setfast Low VOC Acrylic Traffice Marking Paint, TM Series; White

Yellow, Red, or Black.

2.04 PAINT SYSTEMS – INTERIOR

A. Gypsum Board/Plaster Ceilings, Latex Flat Finish, 3 Coat:
   1. One coat of B28W2600, ProMar 200 Zero VOC Interior Latex Primer.
   2. Flat: Two coats of B30-2600 Series, ProMar 200 Zero VOC Interior Latex Flat.

B. Gypsum Board/Plaster Walls, Latex-Acrylic Semi-Gloss Finish, 3 Coat:
   1. One coat of B28W2600, ProMar 200 Zero VOC Interior Latex Primer.
   2. Semi-gloss: Two coats of B31-2600 Series, ProMar 200 Zero VOC Interior Latex Semi-Gloss.

C. Concrete/Masonry, Opaque, Latex, 3 Coat:
   1. One coat of SW LX2W50, Loxon Concrete & Masonry Primer.
   2. Flat: Two coats of SW B3-2600 Series, ProMar 200 Zero VOC Interior Latex Semi-Gloss.

D. Ferrous Metals (doors, frames, & handrails), Unprimed, Latex, 3 Coat:
   1. One coat of SW B66-1300 Series, Pro-Cryl Universal Water Based Primer.
   2. Semi-gloss: Two coats of B53-1150 Series, WB Alkyd Urethane Enamel Semi-Gloss.

E. Galvanized Metals, Latex, 3 Coat:
   1. One coat of SW B66-1300 Series, Pro-Cryl Universal Water Based Primer.
   2. Semi-gloss: Two coats of B66-1661 Series, Pro Industrial DTM Acrylic Eg-Shel.

F. Aluminum, Unprimed, Latex, 3 Coat:
   1. One coat etching primer: SW B71Y1, DTM Wash Primer.
   2. Semi-gloss: Two coats of B66-1661 Series, Pro Industrial DTM Acrylic Eg-Shel.

G. Concrete/Masonry, Epoxy Enamel, 3 Coat: (typically wet areas)
   1. One coat of SW LX2W50, Loxon Concrete & Masonry Primer.
   2. Gloss: Two coats of SW B73V300 Series, Waterborne Catalyzed Epoxy Gloss.

H. CMU, Pre-Catalyzed Epoxy Finish Semi-Gloss, Latex, 3 Coat:
   1. One coat SW CF1W50, ConFlex Block Filler.
   2. Eg-shel: Two coats of SW K46-1150 Series, Pre-Catalyzed Waterbased Semi-Gloss.

I. Wood, Opaque, Latex, 3 Coat:
   1. One coat of SW B28W8111, Premium Wall & Wood Interior Latex Primer
   2. Semi-Gloss: Two coats of SW K46-1150 Series, Pre-Catalyzed Waterbased Semi-Gloss.

J. Wood, Transparent, Varnish, Stain:
   1. One coat of Minwax Performance Series Tintable Interior Stain 7150/7151.
   2. One coat Minwax Performance Fast-Dry, Sanding Sealer 81580.
   3. Satin: Two coats of Minwax Performance Series Fast-Dry Varnish 9150/9151 Series.

K. Fabrics/Insulation Jackets, Latex, 3 Coat:
   1. One coat of SW B66-310 Series, Pro-Cryl Universal Water Based Primer.
   2. Semi-gloss: Two coats of B66-1661 Series, Pro Industrial DTM Acrylic Eg-Shel.

L. Metal Decking DryFall Finish, Latex Flat, 2 Coat:
   1. Flat: Two coats of B42W181, Pro Industrial Waterborne Acrylic DryFall Flat. (possible primer if rusting is present)

M. Metal Decking DryFall Finish, Latex Eg-Shel, 2 Coat:

1. Eg-Shel: Two coats of B42W82, Pro Industrial Waterborne Acrylic DryFall Eg-Shel. (possible primer if rusting is present)

N. Epoxy Floor Coating, 3 Coat:
   1. One coat of SW B70V8100, ArmorSeal 8100 Water Based Epoxy Floor Coating. (reduce with one pint of water per gallon)
   2. Satin or Gloss: Two coats of B70-8100/8160 Series ArmorSeal 8100 Water Based Epoxy Floor Coating.

O. Resinous / Industrial Coatings for Concrete Floors.
High Performance Flooring Coatings – Sherwin-Williams

2.05 ACCESSORY MATERIALS

A. Accessory Materials: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required to achieve the finishes specified whether specifically indicated or not; commercial quality.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

C. Test shop-applied primer for compatibility with subsequent cover materials.

D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
   1. Gypsum Wallboard: 12 percent.
   2. Plaster and Stucco: 12 percent.
   3. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
   4. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
   5. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.
   6. Concrete Floors and Traffic Surfaces: 8 percent.

3.02 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to coating application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

D. Surfaces: Correct defects and clean surfaces which affect work of this section. Remove or repair existing coatings that exhibit surface defects.

E. Seal surfaces that might cause bleed through or staining of topcoat.

F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

G. Concrete and Unit Masonry Surfaces to be Painted: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.

H. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.

I. Plaster Surfaces to be Painted: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.

J. Insulated Coverings to be Painted: Remove dirt, grease, and oil from canvas and cotton.

K. Concrete Floors and Traffic Surfaces to be Painted: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.

L. Aluminum Surfaces to be Painted: Remove surface contamination by steam or high pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.

M. Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.

N. Uncorroded Uncoated Steel and Iron Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs.

O. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.

P. Interior Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.

Q. Interior Wood Surfaces to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner.

R. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.03 APPLICATION

A. Apply products in accordance with manufacturer's instructions.

B. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.

C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is

applied.

D. Apply each coat to uniform appearance.

E. Sand wood and metal surfaces lightly between coats to achieve required finish.

F. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

G. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

H. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

A. Refer to Division 15 and Division 16 for schedule of color coding of equipment, duct work, piping, and conduit.

B. Paint shop-primed equipment, where indicated.

C. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

D. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.05 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.06 SCHEDULE - SURFACES TO BE FINISHED

A. Do Not Paint or Finish the Following Items:
   1. Items fully factory-finished unless specifically noted.
   2. Fire rating labels, equipment serial number and capacity labels.
   3. Stainless steel items.

B. Paint the surfaces described.

C. Mechanical and Electrical: Use paint systems defined for the substrates to be finished.
   1. Paint all insulated and exposed pipes occurring in finished areas to match background surfaces, unless otherwise indicated.
   2. Paint shop-primed items occurring in finished areas.
   3. Paint interior surfaces of air ducts and convector and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
   4. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.

END OF SECTION

SECTION 099600 - HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes surface preparation and application of high-performance coating systems (paint) on the following substrates:

1. Interior Substrates:

a. Steel.
b. Gypsum board.
c. Concrete floors

2. Exterior Substrates:

a. Steel.

1.2 DEFINITIONS

A. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

B. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include preparation requirements and application instructions.

B. Samples: For each type of coating system and in each color and gloss of topcoat indicated. Provide panel, 4 feet long by 4 feet wide, illustrating specified colors, texture, and finish. See architect for color selections. All colors must be approved by the owner. The painted panels shall remain on the job site protected from the weather.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Coatings: 5 percent, but not less than 1 gal. of each material and color applied.

1.5 QUALITY ASSURANCE

A. Mockups: Apply mockups of each coating system indicated to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each coating system specified in Part 3.

a. Wall and Ceiling Surfaces: Provide samples of at least 2 sq. ft.
b. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on mockups.

a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide products by one of the following:

1. Tnemec
2. Dupont
3. Sherwin-Williams
4. Corotech

2.2 HIGH-PERFORMANCE COATINGS, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and are listed in "MPI Approved Products List."

B. Material Compatibility:

1. Provide materials for use within each coating system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a coating system, provide products recommended in writing by manufacturers of topcoat for use in coating system and on substrate indicated.
3. Provide products of same manufacturer for each coat in a coating system.

C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior coatings applied at project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 150 g/L.
3. Primers, Sealers, and Undercoaters: 200 g/L.
4. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: 250 g/L.

5. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
6. Pre-Treatment Wash Primers: 420 g/L.
7. Floor Coatings: 100 g/L.
8. Shellacs, Clear: 730 g/L.
9. Shellacs, Pigmented: 550 g/L.

9. Shellacs, Pigmented: 550 g/L.

D. Colors: As selected by Architect from manufacturer's full range and as necessary to match existing.

2.3 BLOCK FILLERS (NOT USED)

A. Block Filler, Cementitious Acrylic:

1. Basis-of-Design Product: Tnemec; Series 130 “Envirofill”.

B. Block Filler, Polyamine Epoxy:

1. Basis-of-Design Product: Tnemec; Series 215 “Surfacing Epoxy”.

2.4 INTERIOR PRIMERS/SEALERS

A. Primer Sealer, Vinyl Acrylic, Interior:

1. Basis-of-Design Product: Tnemec; Series 51 “PVA Sealer”.

2.5 METAL PRIMERS

A. Primer, Rust-Inhibitive:

1. Tnemec; Series 10 “Tnemec Primers”.

2.6 EPOXY COATINGS

A. Polyamidoamine Epoxy, Satin:

1. Basis-of-Design Product: Tnemec; Series N69 “Hi-Build Epoxoline”.

2.7 ACRYLIC COATINGS

A. Acrylic Polymer, water-based, Semi-gloss:

1. Basis-of-Design Product: Tnemec; Series 1029 “Enduratone”.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

    a. Concrete: 12 percent.
    b. Masonry (Clay and CMU): 12 percent.
    c. Wood: 15 percent.
    d. Gypsum Board: 12 percent.

B. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

C. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce coating systems indicated.

3.3 APPLICATION

A. Apply high-performance coatings according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."

B. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

3.4 CLEANING AND PROTECTION

A. Protect work of other trades against damage from coating operation. Correct damage by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.

B. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

3.5 EXTERIOR HIGH-PERFORMANCE COATING SCHEDULE

A. Steel Substrates:

1. Acrylic System, new steel, exterior, exposed to view:

    a. Prime Coat: Primer, rust-inhibitive.
    b. Intermediate Coat: Acrylic Polymer, semi-gloss.
    c. Topcoat: Acrylic Polymer, semi-gloss.

2. Acrylic System, new steel, exterior, not exposed to view:

    a. Prime Coat: Primer, rust-inhibitive.

3. Interior Concrete is to receive a single coat of Latex. Prime wall before adding final coat of Latex.

3.6 INTERIOR HIGH-PERFORMANCE COATING SCHEDULE

A. CMU Substrates: (NOT USED)

1. Acrylic System:

    a. Block Filler: Block filler, epoxy.
    b. Intermediate Coat: Acrylic Polymer, semi-gloss.
    c. Topcoat: Acrylic Polymer, semi-gloss.

2. Epoxy-Modified Latex System:

    a. Block Filler: Block filler, latex, interior/exterior[, MPI #4].
    b. Intermediate Coat: Epoxy-modified latex, interior, gloss (Gloss Level 6)[, MPI #115].
    c. Topcoat: Epoxy-modified latex, interior, gloss (Gloss Level 6)[, MPI #115].

B. Gypsum Board Substrates:

1. Acrylic System:

    a. Prime Coat: Primer sealer, vinyl acrylic, interior.
    b. Intermediate Coat: Acrylic Polymer, semi-gloss.
    c. Topcoat: Acrylic Polymer, semi-gloss.

C. Steel Substrates:

1. Acrylic System, new steel, interior, exposed to view:

    a. Prime Coat: Primer, rust-inhibitive.
    b. Intermediate Coat: Acrylic Polymer, semi-gloss.
    c. Topcoat: Acrylic Polymer, semi-gloss.

2. Acrylic System, new steel, interior, not exposed to view:

    a. Prime Coat: Primer, rust-inhibitive.

D. Interior Concrete Floor

1. Dur-A-Flex system exposed interior concrete floors in kitchen area see drawings for finish schedule.

a. Poly-Crete MDB – Prepare floors as required by manufacture.

END OF SECTION 099600

SECTION 101416 - PLAQUES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes plaques.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For plaques.

1. Include fabrication and installation details and attachments to other work.
2. Show plaque mounting heights, locations of supplementary supports to be provided by others, and accessories.
3. Show message list, typestyles, graphic elements, and layout for each plaque at least half size.

C. Samples: For each exposed product and for each color and texture specified.

D. Plaque Schedule: Use same designations specified or indicated on Drawings or in a plaque or sign schedule.

1.3 INFORMATIONAL SUBMITTALS

A. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of plaques that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

2.2 PLAQUES

A. Cast Plaque: Plaque with background texture, border, and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. A. R. K. Ramos Signage Systems.
b. Gemini Incorporated.
c. Metal Arts; Division of L & H Mfg. Co.
d. Metallic Arts.

2. Plaque Material: Cast bronze.
3. Plaque Thickness: 0.50 inch.
4. Size: See Drawings
5. Finishes:

a. Integral Metal Finish: As selected by Architect from full range of industry finishes.

6. Background Texture: As selected by Architect from manufacturer's full range.
7. Integrally Cast Border Style: Raised flat band.
8. Mounting: Concealed studs.

2.3 MATERIALS

A. Bronze Castings: Lead-free alloy.

2.4 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of plaques, noncorrosive and compatible with each material joined, and complying with the following:

1. Use concealed fasteners and anchors unless indicated to be exposed.
2. For exterior exposure, furnish stainless-steel devices unless otherwise indicated.
3. Exposed Metal-Fastener Components, General:

a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.

4. Plaque Mounting Fasteners:

a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of plaque, screwed into back of plaque, or screwed into tapped lugs cast integrally into back of plaque, unless otherwise indicated.

2.5 FABRICATION

A. General: Provide manufacturer's standard plaques according to requirements indicated.

1. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
2. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
3. Provide rebates, lugs, and brackets necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match plaque finish.
4. Castings: Fabricate castings free of warp, cracks, blowholes, pits, scale, sand holes, and other defects that impair appearance or strength. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks before finishing.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install plaques using mounting methods indicated and according to manufacturer's written instructions.

1. Install plaques level, plumb, true to line, and at locations and heights indicated, with plaque surfaces free of distortion and other defects in appearance.
2. Install plaques so they do not protrude or obstruct according to the accessibility standard.
3. Before installation, verify that plaque surfaces are clean and free of materials or debris that would impair installation.
4. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

B. Mounting Methods:

1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of plaque. Remove loose debris from hole and substrate surface.

a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place plaque in position and push until flush to surface, embedding studs in holes. Temporarily support plaque in position until adhesive fully sets.
b. Thin or Hollow Surfaces: Place plaque in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.

C. Remove temporary protective coverings and strippable films as plaques are installed.

END OF SECTION 101416

SECTION 101419 - DIMENSIONAL LETTER SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal dimensional characters.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For dimensional letter signs.

1. Include fabrication and installation details and attachments to other work.
2. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
3. Show message list, typestyles, graphic elements, and layout for each sign at least 1/4“ = 1’-0”.

C. Samples: For each exposed product and for each color and texture specified.

D. Sign Schedule: Use same designations specified or indicated on Drawings or in a sign schedule.

1.3 INFORMATIONAL SUBMITTALS

A. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

2.2 DIMENSIONAL CHARACTERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide products by one of the following:

1. Ace Sign Systems, Inc.
2. A.R.K. Ramos.
3. ASI Sign Systems, Inc.
4. Gemini Incorporated.

B. Back-lit Cast Metal Characters:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Gemini Incorporated; Halo Lit Dimensional Letters or comparable product by one of the following:
2. Material: 514 alloy aluminum
3. Profile: Rounded or flat, as selected by Architect.
4. Mounting: Combination stud through pad on all mounts.
5. Lighting: Backlit with manufacturer’s standard LED lighting system.
6. Color: Manufacturer's standard integral color process, in color as selected by Architect from manufacturer's full range.

C. Back-lit Custom Cutout Characters: Characters with uniform faces; square-cut, smooth edges; precisely formed lines and profiles; and as follows: See sheet A5.01 of the drawings for the West Ouachita High School Logo.

1. Character Material: .063 aluminum 3” deep.
2. Character Height: 0’-6” x 8’-0” see drawings.
3. Thickness: 3”
4. Finishes: See drawings for colors required.

5. Mounting: Concealed offset studs.

2.3 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:

1. Use concealed fasteners and anchors unless indicated to be exposed.
2. For exterior exposure, furnish stainless-steel devices unless otherwise indicated.
3. Sign Mounting Fasteners:

a. Projecting Studs: Threaded studs with sleeve spacer, welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.

B. Adhesives: As recommended by sign manufacturer and with a VOC content of 70 g/L or less for adhesives used inside the weatherproofing system and applied on-site when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.4 FABRICATION

A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.

1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
2. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
3. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

B. Mounting Methods:

1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.

    a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place sign in position and push until flush to surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.
    b. Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.

C. Remove temporary protective coverings and strippable films as signs are installed.

END OF SECTION 101419

SECTION 101423 - PANEL SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Room-identification signs.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For panel signs.

1. Include fabrication and installation details and attachments to other work.
2. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
3. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign at least half size.

C. Samples: For each exposed product and for each color and texture specified.

D. Sign Schedule: Use same designations specified or indicated on Drawings or in a sign schedule.

1. Actual Room Names and Room Numbers to be used will be marked-up on shop drawings by the Construction Administrator, during the review process.

1.3 INFORMATIONAL SUBMITTALS

A. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Accessibility Standard: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for signs.

2.2 SIGNS

A. Custom Panel Sign: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:

1. Illuminated Panel Sign: Interior and Backlighted construction with LED lighting including transformers, insulators, and other accessories for operability, with provision for servicing and concealing connections to building electrical system. Use tight or sealed joint construction to prevent unintentional light leakage. Space lamps apart from each other and away from sign surfaces as needed to illuminate evenly.

    a. Power: As indicated on electrical Drawings.

2. Solid-Sheet Sign Acrylic sheet with finish specified in "Surface Finish and Applied Graphics" Subparagraph below and as follows:

    a. Surface-Applied Graphics: Applied photo image.
    b. Etched and Filled Graphics: Sign face etched or routed to receive enamel-paint infill.
    c. Inset, Cutout Characters: Sign face routed to receive push-through acrylic graphics.

3. Sign-Panel Perimeter: Finish edges smooth.

    a. Edge Condition: Square cut.
    b. Corner Condition in Elevation: Custom.

4. Frame: Entire perimeter with continuous edge retainers.

    a. Material: Aluminum.
    b. Profile: Custom.
    c. Corner Condition in Elevation: Custom.
    d. Finish and Color: As selected by Architect from manufacturer's full range.

5. Mounting: Projecting from wall with concealed anchors.
6. Surface Finish and Applied Graphics:
    a. Photo-Image Graphics: Manufacturer's standard multicolor, 600-dpi halftone or dot-screen image.
    b. Overcoat: Manufacturer's standard.

B. Room-Identification Sign (Provide at each entry door to all rooms:

1. Basis-of-Design Product: 2/90 Sign Systems; Slide Modular Sign System or equal.

2. Mounting: Manufacturer's standard method for substrates indicated.

2.3 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:

1. Use concealed fasteners and anchors unless indicated to be exposed.
2. For exterior exposure, furnish stainless-steel devices unless otherwise indicated.
3. Exposed Metal-Fastener Components, General:

    a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.

4. Sign Mounting Fasteners:

    a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material or screwed into back of sign assembly, unless otherwise indicated.
    b. Projecting Studs: Threaded studs with sleeve spacer, welded or brazed to back of sign material or screwed into back of sign assembly, unless otherwise indicated.
    c. Through Fasteners: Exposed metal fasteners matching sign finish, with type of head indicated, installed in predrilled holes.

B. Adhesives: As recommended by sign manufacturer and that comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 0.045 inch thick, with adhesive on both sides.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.

1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
2. Install signs so they do not protrude or obstruct according to the accessibility standard.
3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
4. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

B. Mounting Methods (as applicable):

1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.

    a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place sign in position and push until flush to surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.
    b. Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.

2. Projecting Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.

    a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place spacers on studs, place sign in position, and push until spacers are pinched between sign and substrate, embedding the stud ends in holes. Temporarily support sign in position until adhesive fully sets.
    b. Thin or Hollow Surfaces: Place spacers on studs, place sign in position with spacers pinched between sign and substrate, and install washers and nuts on stud ends projecting through opposite side of surface, and tighten.

3. Through Fasteners: Drill holes in substrate using predrilled holes in sign as template. Countersink holes in sign if required. Place sign in position and flush to surface. Install through fasteners and tighten.
4. Brackets: Remove loose debris from substrate surface and install backbar or bracket supports in position so that signage is correctly located and aligned.
5. Adhesive: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of adhesive symmetrically to back of sign and of suitable quantity to support weight of sign after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as sign is applied and to prevent visibility of cured adhesive at sign edges. Place sign in position, and push to engage adhesive. Temporarily support sign in position until adhesive fully sets.
6. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.

C. Remove temporary protective coverings and strippable films as signs are installed.

SECTION 102113.19 – SOLID PLASTIC TOILET COMPARTMENTS

PART 1 GENERA

1.1 SECTION INCLUDES

A. Solid plastic toilet compartments including the following

1. Floor mounted overhead-braced toilet compartments.

2. Floor and wall mounted urinal screens.

1.2 RELATED SECTIONS

A. Section 06 10 00 - Rough Carpentry.

1.3 REFERENCES

A. ASTM International:

1. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
2. ASTM B 85 - Standard Specification for Aluminum-Alloy Die Castings.
3. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

B. National Fire Protection Association (NFPA) 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.

C. United States Green Building Council (USGBC): LEED Green Building Rating System.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 30 00 - Administrative Requirements.

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: Provide layout drawings and installation details with location and type of hardware required.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, two samples representing actual product, color, and patterns.

F. Sustainable Design Submittals:
1. Recycled Content: Certify percentages of post-consumer and pre-consumer recycled

content.

2. Regional Materials: Certify distance in miles between manufacturer and Project and between manufacturer and extraction or harvest point.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A company regularly engaged in manufacture of products specified in this section, and whose products have been in satisfactory use under similar service conditions for not less than 5 years.

B. Installer Qualifications: A company regularly engaged in installation of products specified in this Section, with a minimum of 5 years' experience.

C. Performance Requirements:

1. Fire Resistance: Partition materials shall comply with the following requirements, when tested in accordance with the ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials:
   a. Class B flame spread/smoke developed rating, tested to ASTM E84.
2. Material Fire Ratings:
   a. National Fire Protection Association (NFPA) 286: Pass.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

1.7 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.

1.8 WARRANTY

A. Manufacturer guarantees its plastic against breakage, corrosion, and delamination under normal conditions for **25 years** from the date of receipt by the customer. If materials are found to be defective during that period for reasons listed above, the materials will be replaced free of charge. (Labor not included in warranty.)

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Subject to compliance with requirements, provide Scranton Products, which is located at: 801 E. Corey St.; Scranton, PA 18505; Toll Free Tel: 800-445-5148; Fax: 855-376-6161; Email:request info (info@scrantonproducts.com), or comparable products by one of the following.

1. ASI Global Partitions
2. Hadrian Inc.; Zurn Industries, LLC.
3. Knickerbocker Partitions Corporation.
4. Scranton Products.

2.2 MATERIAL

A. Plastic Panels: High density polyethylene (HDPE) suitable for exposed applications, waterproof, non-absorbent, and graffiti-resistant textured surface;

1. Fire-resistance Rating: Tested in Accordance with NFPA 286.
2. Fire-resistance Rating: Tested to meet ASTM E84, Class B.
3. Standard Collection, Does not meet NFPA 286 or ASTM E84

B. Aluminum Extrusions: ASTM B221, 6463-T5 alloy and temper.

C. Aluminum Die Castings: ASTM B85, A380 alloy.

D. Stainless Steel Castings: ASTM A167, Type 304.

E. Rubber: Abrasion resistant Styrene Butadiene Rubber, 65 to 80 Shore A durometer, black.

2.3 SOLID PLASTIC TOILET COMPARTMENTS AND SCREENS

A. Basis of Design: Eclipse Toilet Partitions as manufactured by and supplied by Scranton Products.

1. Style: Floor mounted overhead-braced toilet compartments.

B. Doors and Panels: High density polyethylene (HDPE), fabricated from SEQ CHAPTER 1extruded polymer resins, forming single thickness panel.

1. Waterproof and nonabsorbent, with self-lubricating surface, resistant to marks by pens, pencils, markers, and other writing instruments.
2. Thickness: 1 inch.
3. Edges: Shiplap.

C. Panel Color: Traditional Series: To be selected by Architect / Owner. Submit color samples for selection. Architect has the choice to select from Traditional Series as well as those list below D, E, & F.

D. Panel Color: Bold Series:

E. Panel Color: Warm Series:

F. Panel Color: Metallic Series:

G. Doors and Dividing Panels:

1. High Privacy:
   a. Height: 62 inches high and mounted at 9 inches above the finished floor.

H. Metal Posts: 82.75 inches high, heavy duty extruded aluminum, clear anodized finish, fastened to foot with stainless steel tamper resistant screw.

I. Hidden Shoe (Foot): One-piece molded polyethylene invisible shoe inserted into metal post and secured to metal post with stainless steel tamper resistant screw.

J. Headrail Cap and Corner Cap: One-piece molded polyethylene secured to metal post with stainless steel tamper resistant screw; adjustable to level headrail to finished floor.

K. Wall Brackets: Continuous heavy duty extruded aluminum, clear anodized finish, inserted into slotted panel and fastened to panels with stainless steel tamper resistant screws.

1. Type: Single Ear bracket aluminum.
2. Length: 61 inches

L. Headrail: Heavy duty extruded aluminum, designer anti-grip design, clear anodized finish, fastened to headrail bracket with stainless steel tamper resistant screw and to headrail cap or corner cap with stainless steel tamper resistant screw.

1. Headrail Brackets: Heavy duty extruded aluminum, clear anodized finish, secured to wall with stainless steel tamper screws.

M. Door Hardware:
1. Hinges:
   a. Edge-mounted helix style stainless steel continuous hinge.
      1) Closing degree: 5 degrees.
      2) Comes to a full close on its own weight
2. Occupancy Indicator Latch and Housing:
   a. Material: Satin stainless steel.
   b. Occupancy indicators: Green for occupied and red not occupied.
   c. Slide bolt and button.
3. Coat Hook and Door Bumper Combination:
   a. Material: Chrome plated Zamak
   b. Handicap Door: Equip with second door pull and door stop.
4. Door Pulls: Chrome plated Zamak

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.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Examine areas to receive toilet partitions, screens, and shower compartments for correct height and spacing of anchorage/blocking and plumbing fixtures that affect installation of partitions. Report discrepancies to the architect.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions and approved Shop Drawings.

B. Install partitions rigid, straight, plumb, and level.

C. Locate bottom edge of doors and panels 9 inches above finished floor.

D. Clearance at vertical edges of doors shall be uniform top to bottom and shall not exceed 3/8 inch.

E. No evidence of cutting, drilling, and/or patching shall be visible on the finished work.

F. Finished surfaces shall be cleaned after installation and be left free of imperfections.

3.4 ADJUSTING

A. Adjust doors and latches to operate correctly.

3.5 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

Section 102226 – OPERABLE PARTITIONS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Manually operated, individual acoustical panel operable partition.

B. Related Sections include the following:
   1. Division 03 Sections for concrete tolerances required.
   2. Division 05 Sections for primary structural support, including pre-punching of support members by structural steel supplier per operable partition supplier's template.
   3. Division 06 Sections for wood framing & supports, and all blocking at head and jambs as required.
   4. Division 09 Sections for wall and ceiling framing at head and jambs.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is certified in writing by the operable partition manufacturer, as qualified to install the manufacturer's partition systems for work similar in material, design, and extent to that indicated for this Project.
B. Acoustical Performance: Test operable partitions in an independent acoustical laboratory in accordance with ASTM E90 test procedure and classified in accordance with ASTM E413 to attain no less than the STC rating specified. Provide a complete and unedited written test report by the testing laboratory upon request.
C. Preparation of the opening shall conform to the criteria set forth per ASTM E557 *Standard Practice for Architectural Application and Installation of Operable Partitions.*
D. The operable wall must be manufactured by a certified ISO-9001-2015 company or an equivalent quality control system.

1.4 REFERENCE STANDARDS

A. ASTM International

   1. ASTM E557 Standard Practice for Architectural Application and Installation of Operable Partitions.
   2. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
   3. ASTM C1036 - Standard Specification for Flat Glass.
   4. ASTM C1048 - Heat-Treated Flat Glass—Kind HS, Kind FT Coated and Uncoated Glass.
   5. ASTM E84 - Surface Burning Characteristics of Building Materials.
   6. ASTM E413 - Classification for Rating Sound Insulation

B. Health Product Declaration Collaborative

   1. Health Product Declaration Open Standard v2.1

C. International Standards Organization

1. ISO 14021 - Environmental Labels and Declarations - Self-Declared Environmental Claims (Type II Environmental Labeling).
2. ISO 14025:2011-10, Environmental Labels and Declarations - Type III Environmental Declarations - Principles and Procedures.
3. ISO 14040:2009-11, Environmental Management - Life Cycle Assessment - Principles and Framework.
4. ISO 14044:2006-10, Environmental Management - Life Cycle Assessment - Requirements and Guidelines.
5. ISO 21930 – Sustainability in Buildings and Civil Engineering Works — Core Rules for Environmental Product Declarations of Construction Products and Services.

D. Other Standards

1. ADA – Americans with Disabilities Act.
2. ANSI Z97.1 - Safety Glazing Materials Used in Buildings.
3. CPSC 16 CFR 1201 - Safety Standard for Architectural Glazing Materials.
4. NEMA LD3 - High Pressure Decorative Laminates.

1.5 SUBMITTALS

A. Product Data: Material descriptions, construction details, finishes, installation details, and operating instructions for each type of operable partition, component, and accessory specified.
B. Shop Drawings: Show location and extent of operable partitions. Include plans, elevations, sections, details, attachments to other construction, and accessories. Indicate dimensions, weights, conditions at openings, and at storage areas, and required installation, storage, and operating clearances. Indicate location and installation requirements for hardware and track, including floor tolerances required and direction of travel. Indicate blocking to be provided by others.
C. Setting Drawings: Show imbedded items and cutouts required in other work, including support beam punching template.
D. Samples: Color samples demonstrating full range of finishes available by architect. Verification samples will be available in same thickness and material indicated for the work.
E. Reports: Provide a complete and unedited written sound test report indicating test specimen matches product as submitted.
F. Create spaces that are healthy for occupants.

1. Furnish products and materials with Health Product Declaration (HPD), Manufacturer Inventory, or other material health disclosure documentation. Products without an HPD or other disclosure documentation are not acceptable.

G. Furnish materials that generate the least amount of pollution.

1. Furnish products and materials that have third party verified environmental product declarations (EPD’s). Consider products and materials that have optimized environmental performance (reduced life cycle impacts). Products without an EPD or other disclosure documentation are not acceptable.

H. Buy American: Folding door to be manufactured in the United States in compliance with applicable U.S. Federal Trade Commission (FTC) and U.S. Customs Service and Border Protections regulations and be labeled "Made in America".

1.5 DELIVERY, STORAGE, AND HANDLING

A. Clearly mark packages and panels with numbering systems used on Shop Drawings. Do not use permanent markings on panels.
B. Protect panels during delivery, storage, and handling to comply with manufacturer's direction and as required to prevent damage.

1.6 WARRANTY

A. Provide written warranty by manufacturer of operable partitions agreeing to repair or replace any components with manufacturing defects.
B. Warranty period: Two (2) years.
C. Suspension System Warranty:

1. OP-01: Five (5) years.

PART 2 – PRODUCTS

2.1 MANUFACTURERS, PRODUCTS, AND OPERATION

A. Basis Of Design: Subject to compliance with requirements, provide Modernfold, Inc. 215 West New Road Greenfield, IN 46140 Phone 800.869.9685 info@modernfold.com Acousti-Seal Legacy or comparable product by one of the following.

1. KWIK-WALL Company
2. Moderco Inc.
3. Advanced Equipment Corporation

B. Doors to be manufactured in the U.S.A.
C. Products: Subject to compliance with the requirements, provide the following product

1. OP-01: Acousti-Seal Legacy - Single Panel: Manually operated individual panel operable partition.
   a. Nominal Panel Thickness 3 inches
   b. Frame – Roll formed & welded 16 ga. Steel
   c. Skin / Face options – steel
   d. Finish options – Fabric and Dry Erase Board (Selected by Architect).
   e. Width – 25'-0" total width verify at job site / Operable Panel size + or – 42.19" to be verified.
   f. Height – 12'-0" verify at job site
   g. STC – 52
   h. Hanging weight – 11 lbs / sq. ft.

2.2 OPERATION

A. OP-01: Acousti-Seal Legacy - Series of individual flat panels, manually operated, top supported with operable floor seals.

B. Final Closure:

1. OP-01: Horizontally expanding panel edge with removable crank.

2.3 PANEL CONSTRUCTION

A. OP-01: Nominal 3-inch (76mm) thick panels in manufacturer's standard 48-inch (1220mm) widths. All panel horizontal and vertical framing members fabricated from minimum 16-gage formed steel with overlapped and welded corners for rigidity. Top channel is reinforced to support suspension system components. Frame is designed so that full vertical edges of panels are of formed steel and provide concealed protection of the edges of the panel skin.
B. Panel skin shall be: Fabric selected by Architect

    1. OP-01: Roll-formed steel wrapping around panel edge. Panel skins shall be lock formed and welded directly to the frame for unitized construction. Acoustical ratings of panels with this construction minimum:
        a. 52 STC

C. Hinges for Closure Panels shall be: TBD

D. Panel Trim: No vertical trim required or allowed on edges of panels; minimal groove appearance at panel joints.

E. Panel Weights:

    1. OP-01: 52 STC - 11 lbs./square foot

2.4 PANEL FINISH

A. Panel finish shall be:

    1. OP-01: Fabric and Dry Erase Board selected by Architect.

B. Panel Trim: Exposed panel trim of one consistent color:

    1. OP-01: To Be Advised

2.5 SOUND SEALS

A. Vertical Interlocking Sound Seals between panels: Roll-formed steel astragals, with reversible tongue and groove configuration in each panel edge for universal panel operation. Rigid plastic or aluminum astragals or astragals in only one panel edge are not acceptable.
B. Horizontal Top Seals: Continuous contact extruded vinyl bulb shape with pairs of non-contacting vinyl fingers to prevent distortion without the need for mechanically operated parts.
C. Horizontal bottom floor seals shall be:

    1. OP-01: Modernfold SM2 Bottom Seal. Manually activated seals providing nominal 2" (51mm) operating clearance with an operating range of + 0.50" (13mm) to -1.50" (38mm). Seal shall be operable from panel edge or face. Extended seal shall exert nominal 120 pounds (54 kg) downward force to the floor throughout operating range.

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2.6 SUSPENSION SYSTEM

A. OP-01: #17 Suspension System - “Smart Track”

    1. Suspension Tracks: Minimum 11-gauge, 0.12-inch (3.04mm) roll-formed steel track, suitable for either direct mounting to a wood header or supported by adjustable steel hanger brackets,

supporting the load-bearing surface of the track, connected to structural support by pairs of 0.38-inch (10mm) diameter threaded rods. Aluminum track is not acceptable.
a. Exposed track soffit: Steel, integral to track, and pre-painted off-white.

2. Carriers: Two all-steel trolleys with steel tired ball bearing wheels. Non-steel tires are not acceptable. Suspension system shall provide automatic indexing of panels into stack area using preprogrammed switches and trolleys without electrical, pneumatic, or mechanical activation.

2.7 OPTIONS

A. Work Surfaces shall be as indicated on drawings:

1. OP-01: Markerboard: White enamel on steel, bonded to the face of the panel with horizontal trim without exposed fasteners. Trim is not acceptable on vertical edges to provide uninterrupted work surface.

B. Available accessories/options:

1. OP-01: Pocket Doors: Acousti-Seal Pocket Doors by Modernfold, Inc. Equipped with electric interlock system. (see supplement specification)

PART 3 – EXECUTION

3.1 INSTALLATION

A. General: Comply with ASTM E557, operable partition manufacturer's written installation instructions, Drawings and approved Shop Drawings.
B. Install operable partitions and accessories after other finishing operations, including painting have been completed.
C. Match operable partitions by installing panels from marked packages in numbered sequence indicated on Shop Drawings.
D. Broken, cracked, chipped, deformed or unmatched panels are not acceptable.

3.2 CLEANING AND PROTECTION

A. Clean partition surfaces upon completing installation of operable partitions to remove dust, dirt, adhesives, and other foreign materials according to manufacturer’s written instructions.
B. Provide final protection and maintain conditions in a manner acceptable to the manufacturer and Installer that ensure operable partitions are without damage or deterioration at time of Substantial Completion.

3.3 ADJUSTING

A. Adjust operable partitions to operate smoothly, easily, and quietly, free from binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Lubricate hardware and other moving parts.

3.4 EXAMINATION

A. Examine flooring, structural support, and opening, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of operable partitions. Proceed with installation only after unsatisfactory conditions have been corrected.

3.5 DEMONSTRATION

A. Demonstrate proper operation and maintenance procedures to Owner's representative.
B. Provide Operation and Maintenance Manual to Owner's representative.

END OF SECTION 102226

102600 – RESILIENT PLASTIC CORNER GUARDS

PART 1 - GENERAL

1.01 SUMMARY

A. Corner guard system for wall protection:

1.02 SECTION INCLUDES

A. Surface Mounted, Resilient Plastic Corner Guard Systems

1.03 SUBMITTALS

A. Product data for each type of corner guard specified.
B. Detail drawings indicating mounting details with the appropriate fasteners for specific project substrates.
C. Samples for verification purposes of corner guard, 6" (152mm) long, in full size profiles of each type and color indicated.
D. Cleaning and maintenance instructions for door and wall protection systems.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in unopened factory packaging to the jobsite and store in original packaging in a climate controlled location away from direct sunlight.

1.05 PROJECT CONDITIONS

A. Products must be installed in an interior climate controlled environment.

1.06 WARRANTY

A. Standard Koroseal Limited Lifetime Warranty against material and manufacturing defects.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Basis Of Design: Subject to compliance with requirements, provide Koroseal Wall Protection Systems, Louisville, KY. Ph: 855-753-5474; Fax: 330-668- 7703; Internet Address: www.korogard.com or comparable products by one of the following.

1. Construction Specialties
2. IPC Door and Wall Protection Systems, InPro CorporationAmerican
3. Floor Products Company, Inc.

B. Provide all corner guards and wall protection from a single source.

2.02 MANUFACTURED UNITS

A. Corner Guards

1. Surface-Mounted, Resilient Plastic Corner Guards: Model, Size, Attachment Method, Grade, Thickness
    a. Cover: Rigid, impact-resistant plastic, nominal 0.078 inch (1.9 mm) thick, in dimensions and profiles indicated.
    b. Retainer:
        i. Continuous, one-piece, extruded aluminum retainer, nominal 0.062 inch (1.6 mm) thick.
    c. G100 Series: 2 inch (50 mm); Corner Radius: 1/4 inch (6.35 mm).
    d. Accessories: Prefabricated aluminum retainer with concealed splices,mounting hardware, and other accessories as required.
        End caps:
        (1) Match plastic cover color to the nearby wall paint color.
        (2) Field adjustable for close alignment with snap-on plastic covers.
    e. Color: Custom Color to be provided by the architect.

2.03 MATERIALS

1. Rigid Plastic Material: Extruded, textured, chemical-and stain-resistant, high-impact, acrylic modified vinyl plastic, thickness as indicated. Comply with specified requirements of ASTM D 256 for impact resistance and ASTM E 84 for flame spread and smoke developed characteristics. Color: As selected by Architect from the manufacturer's full range of standard colors.
2. Aluminum Extrusions: ASTM B 221 (ASTM B 221M) for 6063-T5
3. Fasteners: Use non-corrosive metal screws, bolts, and other fasteners compatible with aluminum components, hardware, anchors, and other items being fastened. Use theft-proof fasteners where exposed to view.

2.04 COMPONENTS

A. Attachment

1. Adhesive: Field applied heavy duty adhesive
2. Fasteners: Pre-drilled beveled holes and Phillips head screws.

2.05 FINISHES

A. Resilient Plastic: Color to be selected by architect from full range of manufacturer selections.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions in which the corner guard systems will be installed.

1. Complete all finishing operations, including painting, before beginning installation of corner guards.

B. Wall surface shall be dry and free from dirt, grease, and loose paint.

3.02 PREPARATION

A. General: Prior to installation, clean substrate to remove dust, debris, and loose particles.

3.03 INSTALLATION

1. General: Locate the corner guard as indicated on the approved detail drawing for the appropriate substrate and in compliance with the Koroseal installation instructions. Install corner guard level and plumb at the height indicated on the drawings.

2. Installation of Corner Guards:
   a. Install wall surface protection units plumb, level, and true to line without distortions.
   b. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished work.
   c. Install aluminum retainers, mounting brackets, and other accessories in strict accordance with the manufacturer's instructions.
   d. Where splices occur in horizontal runs of over 20 feet (6 m), splice aluminum retainer and plastic cover at same locations along the run.

3.04 CLEANING

1. Clean plastic covers and accessories using a standard non-ammonia based household cleaning agent.
2. Clean metal components in accordance with the manufacturer's recommendations.
3. Remove excess adhesive in manner recommended by manufacturer.

END OF SECTION

SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Public-use washroom accessories.
2. Under-lavatory guards.
3. Custodial accessories.

B. Owner-Furnished Material.

1.2 ACTION SUBMITTALS

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

B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify locations using room designations indicated.
2. Identify products using designations indicated.

1.3 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.6 WARRANTY

A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS PRODUCTS

2.1 PUBLIC-USE WASHROOM ACCESSORIES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. A & J Washroom Accessories, Inc.
2. American Specialties, Inc.
3. Bobrick Washroom Equipment, Inc.
4. Bradley Corporation

B. Toilet Tissue (Roll) Dispenser – ***Surface Mounted***

1. Basis-of-Design Product: Bradley 5402 Surface Mounted Multi-Roll.
2. Description: Roll-in-reserve dispenser with hinged front secured with tumbler lockset.
3. Mounting: Surface mounted.
4. Operation: Non-control delivery with theft-resistant spindle.
5. Capacity: Designed for 5-inch diameter tissue rolls.
6. Material and Finish: Stainless steel, No. 4 finish (satin).

C. Toilet Tissue (Roll) Dispenser – ***Partition Mounted***

1. Basis-of-Design Product: Bradley 5422 - Partition Mounted Multi-Roll.
2. Description: Roll-in-reserve dispenser with hinged front secured with tumbler lockset.
3. Mounting: Partition mounted.
4. Operation: Non-control delivery with theft-resistant spindle.
5. Capacity: Designed for 5-inch diameter tissue rolls.
6. Material and Finish: Stainless steel, No. 4 finish (satin).

D. Paper Towel (Roll) Dispenser: ***Surface Mounted***

1. Basis-of-Design Product: Bradley 250-15 Surface Mounted
2. Description: Dual dispenser and trash receptacle
3. Mounting: Semi-recessed mounted.
4. Minimum Capacity: 11-inch wide

E. Paper Towel (Roll) Dispenser with Waste Receptacle: ***Semi-Recessed***

1. Basis-of-Design Product: Bradley 2291-Series
2. Description: Dual dispenser and trash receptacle
3. Mounting: Semi-recessed mounted.
4. Minimum Capacity: 14-inch wide

F. Liquid-Soap Dispenser: BY OWNER

1. Basis of Design Product: Bradley 6562 Vandal resistant filler hole cover. Valve dispenses commercially marketed all purpose hand soap. satin finish type 316 stainless steel. Capacity 40 fl-oz. Size: 4 13/16” W x 8 3/16” H x 2 7/8” D

G. Grab Bar:

1. Basis-of-Design Product: Bradley 812.
2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05 inch thick.

    a. Finish: Smooth, No. 4 finish (satin) on ends and slip-resistant texture in grip area.

4. Outside Diameter: 1-1/2 inches.
5. Configuration and Length: As indicated on Drawings.

H. Sanitary-Napkin Disposal Unit: ***Partition Mounted***

1. Basis-of-Design Product: Bradley 4721-15
2. Mounting: Partition mounted, dual access.
3. Door or Cover: Self-closing, disposal-opening cover.
4. Receptacle: Removable.

I. Welded Frame Mirror: ***Standard Mount (ADA MOUNTED 40" AFF TO BOTTOM OF GLASS NOT BOTTOM OF FRAME.***

1. Basis-of-Design Product: Bobrick B-290 2436 Tempered Glass Welder-Frame mirror.
2. Frame: Stainless-steel angle, 0.05 inch thick.

    a. Corners: Welded and ground smooth.

3. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.

    a. One-piece, galvanized-steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
    b. Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.

4. Size: As indicated on Drawings.

2.2 UNDER-LAVATORY GUARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Plumberex Specialty Products, Inc.
2. Truebro by IPS Corporation.

B. Under-lavatory Guard:

1. Basis-of-Design Product: Truebro LA Guard 2.
2. Description: Insulating pipe covering for supply and drain piping assemblies that prevent direct contact with and burns from piping; allow service access without removing coverings.

3. Material and Finish: Antimicrobial, molded plastic, white.

2.3 ACCESSORIES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. A & J Washroom Accessories, Inc.
2. American Specialties, Inc.
3. Bobrick Washroom Equipment, Inc.
4. Bradley Corporation.
5. GAMCO Specialty Accessories; a division of Bobrick Washroom Equipment, Inc.
6. Tubular Specialties Manufacturing, Inc

B. Mop and Broom Holder:

1. Basis-of-Design Product: Bradley 9953, 9954, 9955
2. Description: Unit with holders.
3. Length: 34 inches
4. Mop/Broom Holders: Three, spring-loaded, rubber hat, cam type.
5. Material and Finish: Stainless steel, No. 4 finish (satin).

C. Double Robe Hook:
1. Basis of Design Product: Bradley 9124
2. Description: Satin Stainless Steel Robe hook
3. Projects 2 ¼”

D. Door Stop:
1. Basis of Design Product: Bradley 9144
2. Description: Satin Stainless Steel
3. Projects 2 1/8”

2.4 FABRICATION

A. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.

END OF SECTION 102800

SECTION 102813.13 - WARM AIR HAND DRYERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. High-efficiency, energy-efficient heated air electric hand dryer.

1.2 RELATED SECTIONS

A. Division 06 Section "Rough Carpentry" for concealed blocking for anchoring electric hand dryers.

B. Division 09 Section "Non-Structural Metal Framing" for concealed backer plates for anchoring electric hand dryers.

C. Division 26 Section "Grounding and Bonding Requirements for Electrical Systems."

1.3 REFERENCES

A. International Code Council (ICC):

1. ICC/ANSI A117.1 - American National Standard for Accessible and Useable Buildings and Facilities; 1998.

B. UL, LLC / UL Environment:

1. Product Category Rule (PCR) for Hand Dryers.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of electric hand dryer indicated include the following:

1. Product Data: Manufacturer's data sheets for each specified product, including:
   a. Preparation instructions and recommendations.
   b. Operating instructions and performance.
   c. Storage and handling requirements and recommendations.
   d. Installation methods.
   e. Electrical wiring diagrams

2. Include Viral Filtration Efficiency test data from qualified independent testing agency.

1.5 INFORMATIONAL SUBMITTALS

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data.

B. Warranty.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing of specified products with minimum five years' experience.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver electric hand dryers in manufacturer's original packaging marked for location of installation.

1.9 COORDINATION

A. Coordinate location of concealed blocking required for anchoring of electric hand dryers.

1.10 WARRANTY

A. Special Manufacturer’s Warranty: Provide manufacturer's standard form in which manufacturer agrees to repair or replace products that fail in materials or workmanship within the following period:

1. Warranty Period: 7 years following date of substantial completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Provide listed products of Excel Dryer, Inc., East Longmeadow, MA 01028; (413) 525-4531; sales@exceldryer.com; www.exceldryer.com.

2.2 PERFORMANCE REQUIREMENTS

A. UL Product Category Rule (PCR) Testing:

1. Dry Time: Not greater than eight seconds.

2. Energy per Use: Not greater than 3.7 W-h (13.3 J).

B. Viral Filtration Efficiency (VRE): Provide hand dryer systems meeting the following VRE when tested according to ASTM F2100 and ASTM F2101 as adapted:

1. VRE not less than 99.999 percent removal.

C. Electrical Components: Listed and labeled per NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

D. Certification: Products certified by Underwriters Laboratory, Inc., with UL and ULC labels.

E. Accessibility Requirements: Comply with requirements of ADA/ABA and accessibility requirements of authorities having jurisdiction.

1. Comply with ICC/ANSI A117.1.

2.3 HIGH EFFICIENCY AIR HAND DRYER, HEATED

A. Basis of Design: Excel Dryer, Inc., XLERATOR XL Hand Dryer.

B. High-speed energy-efficient rapid-drying heated electric hand dryer, with automatic sensor, adjustable speed and sound control [and HEPA filtration system].

1. Cover Material and Color: Stainless steel, No. 4 satin finish

2. Mounting: Recessed, with ADA-compliant recess kit.

3. Controls: Automatic, activated by sensor, with adjustable sound and speed control mechanism, and adjustable heat control with High, Medium, Low and Off settings. Sensor equipped with externally visible indicator that flashes error codes.

4. Heater: Nichrome wire element, mounted inside blower housing, 970 watts.

5. Safety Features:
   a. Heater Safeguard: Automatic resetting thermostat to open when airflow is restricted and close when airflow is resumed.
   b. Air Temperature: Upper limit 135 deg F (55 deg C) measured at 4 inches below air outlet.

6. Electrical Power Requirements:
   a. 110 - 120 Volts, 11.3 - 12.2 Amps, 50/60 Hz, 1240 - 1450 Watts
   b. 208 - 277 Volts, 5.6 - 6.2 Amps, 50/60 Hz, 1160 - 1490 Watts
   c. 230 Volts, 6.1 Amps, 50 Hz, 1410 Watts

7. Sound Level: Operational sound level not exceeding [80 dB] [72 dB with noise reduction nozzle].

2.4 ACCESSORIES

A. Recessed Mounting Kit for ADA Compliance: 18 ga 304 stainless steel with No. 4 satin finish, with all welded construction. 17-1/4 inches high by 56 inches wide by 1 inch deep.

B. Noise Reduction Nozzle: Reduces air deflection noise level by 9 db.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for suitability for installation of electric hand dryers. Proceed with installation once conditions are in accordance with manufacturer's written instructions.

B. Verify rough-in conditions for recessed mounting.

3.2 INSTALLATION

A. Install electric hand dryers in locations and heights indicated on Drawings, in accordance with manufacturer's written instructions, using manufacturer's recommended fasteners. Install units

B.

C. level, plumb, and firmly anchored in locations and at heights indicated. Connect to electrical power.

3.3 ADJUSTMENT

A. Adjust variable speed dryers as directed. Instruct Owner's personnel in operations to adjust variable speed dryers and to respond to unit error codes.

3.4 FINAL CLEANING

A. Clean electric hand dryer surfaces of handprints and finger marks.

END OF SECTION

SECTION 104413 - FIRE PROTECTION CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes fire-protection cabinets for portable fire extinguishers.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For fire-protection cabinets.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.4 COORDINATION

A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 FIRE-PROTECTION CABINET

A. Basis-of-Design Product : Subject to compliance with requirements, provide JL Industries, Inc.; 1537 “Clear VU FX2” or comparable product by one of the following:

1. Larsen’s Manufacturing Co.

B. Cabinet Construction: Nonrated.

C. Cabinet Material: Cold-rolled steel sheet.

D. Semirecessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).

1. Rolled-Edge Trim: 3 inch backbend depth.

E. Cabinet Trim Material: Stainless-steel sheet.

F. Door Material: Stainless-steel sheet.

G. Door Style: Full acrylic bubble with frame.

H. Door Glazing: Molded acrylic bubble.

1. Acrylic Bubble Color: Clear, transparent.

I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

J. Accessories:

1. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.
2. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated.

a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."

1) Location: Applied to cabinet glazing.
2) Application Process: Diecut vinyl letters.
3) Lettering Color: Red.
4) Orientation: Vertical.

K. Materials:

1. Cold-Rolled Steel: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.

a. Finish: Baked enamel or powder coat.
b. Color: White.

2. Stainless Steel: ASTM A 666, Type 304.

a. Finish: No. 4 directional satin finish.

2.2 FABRICATION

A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Prepare recesses for semi recessed fire-protection cabinets as required by type and size of cabinet and trim style.

B. Install fire-protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.

C. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.

D. Identification: Apply vinyl lettering at locations indicated.

E. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

END OF SECTION 104413

SECTION 104416 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 COORDINATION

A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.

1. Basis-of-Design Product: Subject to compliance with requirements, provide JL Industries, Inc.; Cosmic 10E or comparable product by one of the following:
   a. Ansul Incorporated.
   b. Guardian Fire Equipment, Inc.
   c. Kidde Residential and Commercial Division; Subsidiary of Kidde plc.
   d. Larsens Manufacturing Company.

2. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B, and bar coding for documenting fire-extinguisher location, inspections, maintenance, and recharging.

2.3 MOUNTING BRACKETS

A. Basis-of-Design Product: Subject to compliance with requirements, provide JL Industries, Inc.; MB846A or comparable product by one of the following:

1. Ansul Incorporated.
2. Guardian Fire Equipment, Inc.
3. JL Industries, Inc.; a division of the Activar Construction Products Group.
4. Larsens Manufacturing Company.

B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.

1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.

   a. Orientation: Vertical.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged fire extinguishers.

B. Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.

1. Mounting Brackets: 48 inches above finished floor to top of fire extinguisher.

C. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 104416

SECTION 107313.13 – WALL HUNG CANOPIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes wall hung canopies.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For each exposed product and for each color and texture specified.

D. Delegated-Design Submittal: For canopies.

1.3 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Sample Warranty: For special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

1.6 WARRANTY

A. Special Warranty: Manufacturer and fabricator agree to repair or replace components of awnings that fail in materials or workmanship within specified warranty period.

1. Canopy Warranty Period: Five years from date of Substantial Completion.
2. Fabric Warranty Period: (5) Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Mapes Architectural Canopies; Bracket Supported Cantilevered Canopy System or comparable products by one of the following

-

1. Dittmer Architectural Aluminum; 1-800-822-1755
2. MASA Architectural Canopies; 866-538-7610
3. AVAdek Walkway Covers & Canopies; 713-944-0988.

B. Source Limitations: Obtain awnings from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design awnings.

B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

C. Regulatory Requirements: Provide awnings complying with 2021 IBC and as designated by structural engineer.

2.3 MATERIALS

A. Sun Shading Elements: Extruded aluminum louver blades, 0.110 thickness minimum.
B. Intermediate Framing Member: Extruded aluminum, allow 6063-T6, profile and thickness as recommended by manufacturer.
C. Cantilever support brackets shall be as designed by delegated design engineer.
D. Fascia: Manufacturer’s standard extruded 8 inch J-style.
E. Finishes: As selected by Architect from manufacturer’s full range of standard colors.

2.4 FABRICATION

A. All canopies shall be shipped in preassembled sections for field installation.
B. All connections shall be mechanically assembled, utilizing 3/16 fasteners, with minimum sheer stress of 350 lbs. Pre-welded or factory-welded connections are not acceptable.

PART 3 - EXECUTION

3.1 INSPECTION

A. Confirm that surrounding area is ready for canopy installation.

B. Installer shall confirm dimensions and elevations to be as shown on shop drawings.

C. Erection shall be performed by an approved installer and scheduled after all concrete, masonry, cement plastering and roofing in area is completed.

3.2 INSTALLATION

A. Installation shall be in accordance with manufacturer’s shop drawings and written instrutions.

B. Remove and replace all damaged components.

END OF SECTION 107313

SECTION 10 7326 – EXTRUDED PROTECTIVE COVERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pre-engineered, pre-finished extruded aluminum walkway covers.

B. Pre-engineered, pre-finished extruded aluminum canopies over doors

1.2 RELATED SECTIONS

A. Section 03100 - Concrete Forms and Accessories.

B. Section 03300 - Cast-In-Place Concrete.

1.3 REFERENCES

A. American Architectural Manufacturers Association (AAMA):

AAMA 603 - Voluntary Performance Requirements and Test Procedures for Pigmented Organic Coatings on Extruded Aluminum.

AAMA 605 - Voluntary Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.

AAMA 607.1 - Voluntary Guide Specification and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum.

AAMA 608.1 - Voluntary Guide Specification and Inspection Methods for Electrolytically Deposited Color Anodic Finishes for Architectural Aluminum.

1.4 DESIGN REQUIREMENTS

A. Columns, Beams, Deck, and Trim: Aluminum extrusions.

B. Structural Framing: Interlocking deck sections secured by screws.

Heli-arc welded, one-piece rigid bents.

Mechanically fastened bents using internally concealed bolted connections.

C. Canopy: Self-draining from deck through bents to discharge point at ground level or as otherwise shown.

D. Building Code: IBC 2021.

E. Design Loads:

Comply with Building Code for site location.

F. Collateral Loads: Additional loads imposed by other materials or systems identified in contract documents.

G. Structural Design: Prepare complete structural design calculations for canopy members including footings.

H. Structural Design: Prepare complete structural design calculations for canopy members except footings. Provide reactions as required for footing design by a registered professional engineer.

1.5 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Manufacturer's catalog data, detail sheets, and specifications.

C. Shop Drawings: Layout and erection drawings showing roof framing, deck panels, cross sections, and trim details, clearly indicating proper assembly.

D. Samples: Color selection samples consisting of actual coating material or anodizing process on aluminum extrusions.

E. Quality Assurance/Control Submittals:

Qualifications: Letter certifying manufacturer's required qualifications.

Structural Design Calculations.

Manufacturer's Installation Instructions.

1.6 QUALITY ASSURANCE

A. Overall Standard: Structural engineering design documents stamped by a structural engineer registered to practice in the state of **Louisiana**.

B. Manufacturer Qualifications: Minimum five years’ experience in producing covers/canopies with welded bents and of the type specified.

C. Installer Qualifications: Minimum two years’ experience in erecting covers/canopies of the type specified.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Conform to Section 01660 - Product Storage and Handling Requirements.

B. Follow manufacturer's instructions.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design : Furnish and install Perfection Architectural Systems, Inc., 2310 Mercator Drive Orlando, FL 32807; ASD. Tel: (800) 238-7207, Fax: (407) 671-8252. Or by one of the following.

1. Ballew's Aluminum Products Inc. 367 Mayfield Rd. Duncan, SC 29334
   Phone 800.231.6666 or 864.272.4453
2. Peachtree Protective Covers 3255 S Sweetwater Rd. Lithia Springs, GA. 30122
   Phone: 800.341.3325.

B. Requests for substitutions will be considered in accordance with provisions of Section 01600.

C. Provide all protective covers from a single manufacturer.

2.2 MATERIALS

A. Aluminum Extrusions: 6063 alloy, T-6 temper.

B. Grout: 1 part portland cement, 3 parts masonry sand; 2,000 pounds per square inch (13.8 MPa) compressive strength.

C. Foam Block-Outs: Rigid foam blocks sized as required for column embedment depth and shape.

2.3 COMPONENTS

A. Columns:

Radius-cornered aluminum tubular extrusion as required by structural engineering design.

Grout Key: Provide two 1-1/2 inch (38 mm) diameter holes in column base, one each in opposite sides.

Provide clear acrylic protection coat on surfaces in contact with grout.

B. Beams: Open top aluminum tubular extrusions.

Size: As required by structural engineering design.

C. Deck: Rigid-Roll-Lock extruded aluminum, self-flashing, interlocking sections.

Size and Profile: As required by structural engineering design.

Provide welded endplate water dams where sections terminate at other than drainage channels.

Fascia: Manufacturer's standard extruded aluminum fascia sections as shown on drawings and as required to complete the installation resulting in a neat, finished appearance. Include manufacturer's standard extruded aluminum gutters.

D. Flashing: Aluminum sheet, thickness as recommended by manufacturer for specific condition.

2.4 ACCESSORIES

A. Fasteners:

Deck Screws: No. 14 by 1 inch (25 mm), self-tapping, Type 18-8 stainless steel with neoprene washers.

Trim Screws: No. 10 by 1/2 inch (13 mm), self-tapping, Type 18-8 stainless steel.

Trim Rivets: Aluminum, size recommended by manufacturer for specific condition.

Other Fasteners: Type 18-8 stainless steel, type recommended by manufacturer for specific condition.

2.5 FABRICATION

A. Shop Assembly: Fabricate cross beams and columns into one-piece rigid bents with corners mitered and heli-arc welded to the extent that completed bents can be shipped on local, state, and federal highways without special permit. Provide bolted connections for bents required to be shipped unassembled.

B. Shop Assembly: Fabricate cross beams and columns for field assembled bolted connections.

2.6 FINISHES

A. Bents:

Fluoropolymer Coating: 70 percent Custom PVDF resin based fluoropolymer, AA-C-12C-42R-1, field matched color to be approved by architect, comply with AAMA 605.

a. Two coat application color to match existing .

B. Deck:

Fluoropolymer Coating: 70 percent Custom PVDF resin-based fluoropolymer, AA-C-12C-42R-1, field matched color to be approved by architect, comply with AAMA 605.

a. Two coat application color to match existing.

C. Fascia/Gutter:

Fluoropolymer Coating: 70 percent Custom PVDF resin-based fluoropolymer, AA-C-12C-42R-1, field matched color to be approved by architect, comply with AAMA 605.

a. Two coat application color to match existing.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine footings in which bents will be set. Verify footing locations and elevations comply with shop drawings.

B. Examine building surfaces to which canopy will connect.

C. Coordinate with responsible trade to perform corrective work on unsatisfactory footings or surfaces.

D. Commencement of work by installer is acceptance of existing conditions.

3.2 ERECTION

A. Erect protective covers in accordance with manufacturer's installation instructions.

B. Set bents plumb, straight, and true to line, adequately braced to maintain position until grout has cured.

C. Keep aluminum surfaces from direct contact with ferrous metal or other incompatible materials by applying one coat of zinc chromate primer; follow with two coats of aluminum paint.

In lieu of aluminum paint, one coat of high-build bituminous paint applied to 1/16 inch (1.6 mm) thickness may be used.

3.3 CLEANING

A. Clean surfaces soiled by work as recommended by manufacturer.

B. Remove surplus materials and debris from the site.

3.4 PROTECTION

A. Protect finished aluminum surfaces from damage due to subsequent construction operations.

END OF SECTION

SECTION 114000 – FOODSERVICE EQUIPMENT

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 STANDARDS

A. Equipment and installation thereof shall meet all requirements of applicable portions of latest editions of Standards listed below.

1. American Society for Testing Materials (ASTM)
2. National Electrical Code (NEC)
3. American Gas Association (AGA)
4. Louisiana State Board of Health
5. National Sanitation Foundation (NSF)
6. Factory Mutual (FM)
7. Underwriters Laboratory (UL)
8. Occupational Safety and Health Administration (OSHA)
9. National Fire Protection Association (NFPA)
10. International Building Code (IBC)
11. American Disabilities Act (ADA)

1.3 DESCRIPTION OF WORK

A. Work in this Section includes the following:

1. Furnishing, delivery, un-crating, setting in place at locations indicated on Drawings. Installation to include mounting, leveling, adjusting, and cleaning all equipment specified herein.
2. Apply permanent foot/caster placement markings to building floor at all cooking equipment requiring coverage of fire suppression system in accordance with NFPA-96 codes.
3. All components required for a complete assembly to serve intended function when connected to mechanical and electrical services.
4. Coordination of all Work required for a complete installation with other trades and subcontractors.
5. Field verification of plumbing and electrical rough-ins by Food Service Equipment Contractor to ensure requirements and locations are correct. Said verification shall include all electrical characteristics (amperage, voltage, and phase) for all Existing, Contractor-Furnished, and Owner-Furnished Equipment. Field verification shall commence prior to release of equipment order and pouring of concrete slab by General Contractor.
6. Sink faucets, strainers, vacuum breakers, duo drains, lever handle drains and tailpieces specified under heading entitled Fabrication Standards.

7. Furnishing and mounting of all electrical starting switches, controls, light fixtures, and receptacles included in Itemized Equipment Specifications or as required for operation of equipment specified herein.
8. Cutting of all holes in equipment tops, shelves and bodies required for piping (gas, water and drains) and wiring.
9. Threaded hanger rods with brackets and turn buckles required to support Exhaust Hoods.
10. Threaded hanger rods with brackets and turn buckles required to support walk-in cooler and/or freezer ceiling panels (where applicable).

B. Related Work Specified Elsewhere:

1. Water/gas piping, line shut-off valves and final connections to equipment.
2. Drain piping, floor drains, floor sinks, “P” traps, grease traps and final connections to equipment.
3. Electrical wiring, overload protection devices, line-disconnect switches, and final connections to equipment.
4. Install cord/plug assemblies provided by Food Service Equipment Contractor.
5. Concrete pad for remote walk-in cooler/freezer condensing unit package located outside building.
6. Exhaust/supply fans (including magnetic starters/ductwork/roof curb) and welding exhaust ducts to exhaust duct collars of exhaust hoods to meet applicable fire codes.
7. Air balancing of exhaust/supply fans of Exhaust Hoods to meet project requirements.
8. Structural framing where required at hanger rod locations to support Exhaust Hoods and/or Walk-In Coolers and/or Freezers.
9. Wall blocking for support of wall-mounted equipment (where applicable).

1.4 DRAWINGS AND SPECIFICATIONS

A. Specifications and drawings shall be considered as a part of the Contract to be executed. Intent of said Drawings and Specifications is for all components required for a complete installation of food service equipment specified.

B. Should any error, omission or conflict occur in Drawings and Specifications, Contractor shall not avail himself of such error, omission or conflict but shall have same explained and adjusted prior to signing the Contract.

C. All addenda shall be considered as a part of original Contract Documents.

1.5 QUALITY AND WORKMANSHIP

A. All equipment shall be constructed in strict compliance with standards of National Sanitation Foundation and shall bear the NSF label. All equipment shall meet all standards set by state and local regulations.

B. All electrical equipment shall be approved by Underwriter's Laboratories and shall bear its seal of approval.

C. All electrical components of equipment shall meet requirements of National Electric Code.

D. All material shall be new (latest model at time of delivery) and of first quality. All equipment shall be installed in an undamaged condition. Where brands, materials, apparatus or equipment is specifically designated, no substitution shall be made without prior approval in writing.

E. Provide all Work in best manner in conformity with best standard practices. Employ qualified, efficient and skillful workers for installation in a first-class manner.

F. It is required that custom fabricated equipment be fabricated by a Food Service Equipment Fabricator who has plant, personnel and engineering facilities to design, detail and manufacture high quality equipment.

1.6 FOOD SERVICE EQUIPMENT CONTRACTOR QUALIFICATIONS

A. Contractor shall possess experience and ability to perform the necessary services for a complete and workmanlike installation of food service equipment.

B. Contractor experience shall include a minimum of five (5) years' experience as a successful Food Service Equipment Contractor and shall have successfully completed installation of at least five (5) comparable projects of similar size and nature.

C. Contractor's in-house capabilities shall include preparation of dimensioned mechanical/electrical rough-in Drawings, experienced personnel to coordinate with other trades the proper equipment installation, warranty services, and proper demonstration of equipment on operation, service and maintenance.

1.7 SUBMITTALS

A. Submittals shall include product data (manufacturer's specification sheets) of standard-manufactured equipment, shop drawings of custom-fabricated equipment and equipment modified to meet project requirements, and dimensioned mechanical and electrical rough-in drawings of equipment utility requirements. Partial submittals will be given no consideration.

1. Product data shall be submitted in electronic pdf format unless stated otherwise in Contract Documents and shall be in numerical order (by equipment item numbers). Each manufacturer's specification sheet shall be preceded with a type-written sheet that includes equipment description, quantity, brand/model number, accessories, and modifications to meet project requirements.
2. Shop drawings are not to be based upon reproduction of Contract Document drawings. Shop drawings shall be submitted in electronic pdf format unless stated otherwise in Contract Documents. Shop drawings for custom-fabricated equipment shall be drawn at a minimum scale of ¾" to the foot with cross-sections drawn at 1-1/2" to the foot. Sheet sizes shall be same size as sheet sizes of Contract Document drawings, not to exceed 30" x 42".
3. Equipment floor plan, mechanical, and electrical rough-in drawings are not to be based upon reproduction of Contract Document drawings. Drawings shall be submitted in electronic pdf format. Rough-in drawings shall show utility requirements of equipment specified, existing equipment to be re-used, future equipment (including vendor-furnished equipment), area clean-up floor drains, and electrical convenient outlets shown on Contract Document drawings. Rough-in requirements shall be accurately drawn to scale with

dimensions from centerline of columns or finished walls. Contractor shall be responsible for determining exact locations on building walls and floors and not connection points on equipment. Contractor shall visit project site to verify correct locations of utility stub-outs and floor recesses/block-outs prior to pouring of concrete slab and report discrepancies found to Architect and/or Consultant. Refer to certification requirements of Description of Work of this section.

4. Contractor shall be responsible for taking all field dimensions which affect equipment and installation thereof. At the time of taking field measurements and observation of existing conditions, Contractor shall report in writing to Architect all work performed by other trades which will prevent him from execution of his work required by Contract Documents and shall obtain Architect's instructions before proceeding with his work.

1.8 PROTECTION OF WORK AND MATERIALS

A. Contractor shall at all times cover and protect his Work, material and equipment to save same from damage. Contractor shall at all times exercise due care to protect the work of others. Cost of any repair or replacement of damaged Work, material and equipment shall be borne by Contractor.

1.9 BRANDS AND TRADE NAMES

A. Contractors are cautioned that only food service equipment and related items manufactured in accordance with Specifications will be acceptable. Where brand names and model numbers are specified, it is not intended that competition be limited, but to set standards of performance, design, capacity, durability and appearance. Bidders desiring to quote and/or supply brands of equipment other than those specified shall submit a written request to Architect with a copy to Consultant seven (7) days prior to bid date in order that such substitutions can be considered for approval and if approved, an addendum issued to all plan holders. It is understood that approval of substitutions does not relieve Contractor from furnishing equipment to meet intent and requirements of Specifications. Approval of substitutions does not relieve Contractor from additional costs of mechanical and electric utilities and other requirements not included in Contract Documents.

1.10 WARRANTIES

A. Contractor shall provide a one (1) Year Warranty from date of Substantial Completion or occupancy on all Work provided under these Specifications. Warranty shall cover replacement of defective material, transportation and labor, but does not include costs of replacement parts and labor caused by Owner's carelessness or misuse of equipment. An additional four (4) year warranty (labor included) shall be provided on all refrigeration compressors. Contractor shall provide a reputable and qualified service agency, located within fifty (50) miles of Project site, to provide immediate service for all refrigeration equipment.

PART 2 - PRODUCTS

2.1 CUSTOM FABRICATED EQUIPMENT MANUFACTURERS

A. Equipment manufacturers shall be Low Temp Industries, Inc.; Atlanta Custom Fabricators; and Stainless & Aluminum Fabrication, or a prior approved equivalent.

B. All fabricated equipment shall be manufactured by one (1) manufacturer to ensure uniformity in design and finish.

2.2 ELECTRICAL REQUIREMENTS

A. Refer to Drawings for specific requirements.

B. Fixtures wired for three-phase shall have loads balanced as equally as possible.

2.3 SWITCHES AND CONTROLS

A. A suitable control switch or starter of proper type in accordance with Underwriter's Code shall be supplied for each motorized appliance or electrically- heated unit.

B. Said switches and controls shall be mounted in recessed die-stamped stainless steel cups or otherwise indented to prevent damage.

2.4 METAL FABRICATION STANDARDS

A. Materials:

1. All stainless steel shall be type 302 or 304 with 18% chromium, 8% nickel and a maximum of 0.12% carbon. All sheets shall have a No. 4 finish with colors and finish uniform throughout.

B. Welding:

1. All welded parts shall be non-porous and free from imperfections, pits, cracks or discolorations.
2. Stainless steel joints and seams shall be heli-arc welded ground smooth and polished to a No. 4 finish. Tinning of welds is not acceptable. All welds shall be ground smooth and polished to original finish of metal.

C. Field Joints:

1. Field joints shall be located for practical construction with sizes convenient for shipping and entry into building spaces.
2. All field joints shall be fully (continuous) welded with same type metal, ground smooth and polished to original finish of metal.

D. Table and Counter Tops:

1. All tops, unless otherwise specified, shall be constructed of 14-gauge stainless steel. Exterior edges not adjacent to walls or other equipment shall be turned down on a 90-degree angle or rolled down 1-3/4" with corners bullnosed. Tops adjacent to walls shall be turned up 6" and back 1" (minimum) on a 90-degree angle to form a backsplash. Tops

adjacent to other equipment shall be flanged straight down 1-3/4". Sound deadening material shall be provided between frame members and stainless steel tops.

2. Edges of dishtable tops not adjacent to walls shall be turned up 3" and rolled down 1-1/2" with corners bullnosed. Dishtable tops adjacent to walls shall be turned up 10", back 2-1/2" on a 45-degree angle and down 2" to form a pipe chase. All horizontal edges and internal corners of dishtable tops shall be coved on a 5/8" minimum radius. Ends of backsplashes shall be closed, welded, ground smooth and polished.
3. Edges of preparation counter tops (with sinks) not adjacent to walls shall be turned up 7/8" on a 45-degree angle and turned down on a 90-degree angle or rolled down 2-5/8" to form a marine roll unless specified otherwise. Preparation counter tops (with sinks and cantilevered overshelf uprights) adjacent to walls shall be turned up 10", back 2-1/4" on a 45-degree angle and turned down 1" on 90-degree angle to form a backsplash with pipe chase. All horizontal edges and internal corners of preparation counter tops shall be coved on a 5/8" minimum radius. Ends of backsplashes shall be closed, welded, ground smooth and polished. Backsplashes of counter tops with sinks shall be pierced on 8" centers over sinks.
4. All tops shall be reinforced on the underside with 12-gauge (minimum) stainless steel hat channels running from front to back with center bracing where required to hold tops flat. Channels shall be stud welded and bolted to underside of tops with legs, bodies and drawer housings secured to channels so that bolts or rivets will not extend through work tops. Holes required for counter equipment shall be neatly die-punched with raised edges.

E. Backsplashes:

1. Backsplashes of table and countertop with 90-degree turnbacks adjacent to walls shall be turned down 1" at 90-degrees and secured to building walls with 4" long 14-gauge stainless steel "zee" clips on 36" centers. Cracks between backsplashes and building walls shall be sealed with clear silicone sealant.
2. Backsplashes of preparation counters and dishtables with 45-degree turnbacks adjacent to walls shall be turned down 1" at 135-degrees and secured to walls with 4" long 14-gauge stainless steel "zee" clips on 36" centers. Cracks between backsplashes and building walls shall be sealed with clear silicone sealant.

F. Open Bases:

1. Open bases shall be constructed of 1-5/8" OD 16-gauge stainless steel tubular uprights and crossbraces fully welded together, ground smooth and polished. Top of crossbraces shall be 12" above floor. Refer to Drawings for arrangement of crossbraces. Uprights shall be fitted at floor with adjustable, sanitary stainless steel bullet feet inserted into uprights with inside threads to eliminate any possibility of threading collecting dirt and other matter. Tops of legs shall be fitted into die-stamped fully enclosed stainless steel gussets equivalent to Component Hardware No. A20-0206-C welded to reinforcing channels on underside of stainless steel tops.
2. Tables 6'-0" long and under shall have four (4) legs, and tables 7'-0" long shall have six (6) legs. Legs shall be spaced not more than 5' 0" apart unless specified otherwise.

G. Undershelves:

1. All undershelves shall be constructed of 18-gauge stainless steel.

2. Undershelves on open base tables shall be sectional, removable and rolled down over crossbraces, unless specified in Itemized Equipment Specifications. Shelves adjacent to walls and other equipment shall turn up 2". Shelves shall be notched around table uprights and crossbraces, so that undershelves are easily removable. All edges of sections adjacent to each other shall be turned down 1" (minimum) for rigidity.

H. Elevated Shelves:

1. Elevated shelves shall be constructed of 16-gauge stainless steel and shall be turned down 1-1/2" on front and ends with sanitary semi-rolled edges with bullnosed corners. Rear sides of shelves shall be turned up 1-1/2".
2. Free-standing shelves, unless specified otherwise, shall be mounted on 1" OD stainless steel tubular uprights mounted to counter tops in a sanitary manner (tube inserts when accessible from bottom of counter). Wall mounted shelves shall be equipped with stainless steel angle wall brackets anchored to building wall.
3. Shelves, where specified to be mounted on cantilever brackets, shall be mounted on 1-5/8" diameter stainless steel tubular uprights welded to framing of table and counter tops.

I. Drawers:

1. All drawers shall be 20" x 20" x 5" deep unless specified otherwise. Removable pans shall be formed of one-piece die-stamped 18-gauge stainless steel with top edges flanged out 2". Faces of drawers shall be equivalent to Component Hardware No. J85-2000. Drawers shall operate on ball-bearing roller stainless steel extension slides to allow full opening and shall be fitted with adjustable stops to prevent drawers from being pulled out too far so they will drop down.
2. Drawers shall be completely enclosed in 18-gauge stainless steel housing attached to undersides of tops on open base tables and shall be attached to framework of cabinet base tables.

J. Casters:

1. Casters specified for open base tables shall be equivalent to Component Hardware Nos. C23-1250 (5” diameter non-braking) and C23-1251 (5” diameter braking).

K. Sinks:

1. Sinks shall be constructed of 14-gauge stainless steel having back, bottom and front formed of one (1) continuous sheet of metal with ends and partitions welded in place. All vertical and horizontal corners of sink compartments shall be coved with metal on a 5/8" (minimum) radius. No solder filleting will be acceptable. All edges of sink counter tops not adjacent to walls shall be turned up 7/8" on a 45-degree angle, and rolled down 2-5/8" to form a marine roll unless specified otherwise. Edges of sink counter tops adjacent to wall shall be turned up 10", back 2-1/4" on a 45-degree angle and down 2" to form a backsplash with pipe chase. All ends of backsplashes shall be closed, ground smooth and polished. Backsplashes shall be pierced on 8" centers over compartment dividers of two, three and four compartment sinks and over center of one compartment sinks unless specified otherwise. Bottom of each sink compartment shall be fitted with Component Hardware No. D50-7200 lever handle drain. Overflow drain assemblies when specified shall be Component Hardware No. D50-7215. Drains shall set into embossed openings in sink bottoms, gasketed and locked in place without use of rivets or bolts. Sinks shall be

mounted on 1-5/8" OD 16-gauge stainless steel legs with adjustable stainless steel feet (same as specified for open base tables). All sink partitions shall be 7/8" thick double wall construction. A model No. B-0231 T & S mixing faucet (12" spout) shall be mounted at center of each single compartment sink and over each partition of each multiple compartment sink. Preparation and utensil wash sinks shall be 12" and 14" deep respectively unless specified otherwise.

2. Sink inserts shall be constructed same as specified for sinks above with coved corners and 2" lever drains. Sink inserts shall be welded integral with stainless steel tops. Inserts unless otherwise specified, shall have a T & S model no. B-0222-059X faucet deck-mounted behind each compartment.

2.5 ITEMIZED EQUIPMENT SPECIFICATIONS

A. Item No. 1 Storage Shelving Units (Nine Required):

1. Metro Super Erecta Brite series or approved equal with components/features/accessories as follows:

a. Five (5) 21” wide x 36” and 48” lengths as indicated on drawings, zinc-plated adjustable wire shelves
b. 74” high zinc-plated tubular uprights with foot levelers

B. Item No. 2 Dunnage Racks (Two Required):
1. Metro No. HP2236PO or approved equal

C. Item No. 3 Floor Mop Sink – Division 22 (Plumbing)

D. Item No. 4 Mobile Hot Food Holding Cabinet (Existing Equipment)

E. Item No. 4A Mobile Hot Food Holding Cabinet (One Required):
1. CresCor No. H-137-WSUA-12D or approved equal with vinyl corner bumpers

F. Item No. 5 2-Section Reach-in Refrigerator (One Required):
1. Traulsen No. G20000

G. Item No. 6 3-Section Reach-in Freezer (One Required):
1. Traulsen No. G31003

H. Item No. 7 Hand Sinks (2) – Division 22 (Plumbing)

I. Item No. 8 Mobile Utensil Shelving Unit (One Required):

1. MetroSeal 3 series or approved equal, each with components/features/accessories as follows:

a. Four (4) 24” wide x 48” long (as indicated on drawings) epoxy-coated adjustable wire shelves
b. Four (4) 63” long epoxy-coated tubular uprights
c. Four (4) 5” diameter urethane swivel casters, two (2) with brakes

J. Item No. 9 3-Compartment Pot/Pan Sink w/Overshelf (One Required):

1. 30” wide x 12’-0” long (verify space) x 36” high, arrangement indicated on drawings, custom fabricated stainless steel open base type with components/features/accessories as follows:

    a. Three (3) 24” x 30” (side to side) x 14” deep sink compartments
    b. Two (2) splash-mounted faucets
    c. 34” long drainboard section on left end with provisions below for undercounter dishwasher
    d. 15” wide x 14’-0” long stainless steel overshelf mounted on stainless steel tubular uprights and cantilever brackets 24” above sink top
    e. Undershelf on right end

K. Item No. 10 Undercounter Dishwasher (One Required):
1. Hobart No. CUH-1 or approved equal with components/features/accessories as follows:
    a. Drain water tempering kit

L. Item No. 11 20-Quart Mixer (One Required):

1. Hobart No. HL200 or approved equal with components/features/accessories as follows:
    a. 20-quart stainless steel bowl
    b. 20-quart stainless steel “B” beater
    c. 20-quart “D” wire whip
    d. 20-quart “ED” dough hook

M. Item No. 12 Mobile Mixer Stand (One Required):
1. Advance Tabco No. MT-MS-303

N. Item No. 13 Preparation Counter w/Sink & Overshelf (One Required):

1. 30” wide x 8’-0” long x 36” high, arrangement indicated on drawings, custom fabricated stainless steel open base type with components/features/accessories as follows:

    a. Marine roll top edges on front and right end
    b. One (1) 20” x 24” x 12” deep sinks
    c. One (1) splash-mount faucet
    d. Two (2) drawers
    e. Undershelves, except at sinks
    f. 12” wide x full-length stainless steel overshelf mounted on tubular uprights and cantilever brackets 24” above counter top

O. Item No. 14 Ice Machine (Cuber) w/Storage Bin (One Required):

1. Manitowoc No. IDP0600A (air-cooled) or approved equal with components/ features/accessories as follows:

    a. No. D570 ice storage bin
    b. Artic Pure Pro No. AR-10000-P water filter and No. AR-PRE-P pre-filter

P. Item No. 15 Single Stack Convection Oven (One Required):

1. Southbend No. PCG50S or Blodgett No. DFG-100 (Single-deck) with components/ features/accessories as follows:

    a. Stainless steel front, sides, top, rear enclosure panel, 25” high legs, and glass doors
    b. Quick disconnect hose assembly kit

Q. Item No. 16 4-Burner Range w/Raised Broiler/Griddle & Oven Base (One Required):

1. Imperial No. IR-4-G36 or Southbend No. 4601DD-3G with components/features/ accessories as follows:

    a. Four (4) open burners with flame failure prevention
    b. 36” griddle on right end
    c. Two (2) standard ovens
    d. Stainless steel front and side panels
    e. 11” high stainless steel backguard
    f. 5” locking casters with brakes
    g. 48” long quick-disconnect gas hose assembly kit w/shut-off valve and restraining cable

R. Item No. 17 Tilting Braising Pan (One Required):

1. Groen No. TD-FPC 40-Quart electric braising pan or approved equal with components/ features/accessories as follows:

    a. No. TS/10S-3 (174981) stand with drain
    b. No. 146301 flanged feet
    c. No. Z079995 lip strainer
    d. No. Z013927 cover
    e. No. N25871 Single panty faucet with 48” spray hose

S. Item No. 18 Exhaust Hood (One Required):
1. Size: 4’-6” wide (plus make-up air plenum) x 12’-0” long (verify space) x 30” high
2. Construction Features: UL 710 Listed (without fire dampers in exhaust collars), constructed of all-welded 18-gauge type 304 no. 4 finish stainless steel on all surfaces with all exterior joints and seams continuously welded liquid tight, ground smooth and polished to a no. 4 finish to conform to the latest edition of NFPA 96. Exterior front and end panels shall include double panes with integral “v” bracing or 16-gauge double panes to strengthen flat surfaces. Hood shall include 3” wide barrier between rear of hood and building wall. UL Listed stainless steel baffle filters extending the entire length of the hood. Grease trough shall be concealed type (fully-enclosed) sloped to one (1) end and equipped with a removable stainless-steel grease cup.
3. Components/Features/Accessories:
    a. 14” wide x full-length x 8” high, stainless steel air curtain type double wall insulated make-up air plenum with air balancing dampers, baffles, and duct collars to ensure even air distribution along entire length of plenum
    b. Heat sensors for activation of exhaust fan whenever cooking operations occur in accordance with paragraph 507.2.1.1 of 2006 International Mechanical Code
    c. Five (5) UL-listed Component Hardware No. LED-L80-20DN recessed-type LED light fixtures with bulbs pre-wired in rigid conduit on top of hood to a junction box on each section of hood

d. Exhaust/supply fan control panel with fire system interface and light switch mounted on front of hood at right end
e. 18-gauge type 304 no. 4 stainless steel finish enclosure panels from top of hood to finished ceiling

4. Refer to Contract Document drawings for CFM requirements and duct sizes
5. Exhaust Hood shall be Avtec AFWO-PBB series or approved equal to meet above requirements
6. Stainless steel wall panels 12'-0" long (verify) x 6'-8" high, arrangement as indicated on drawings, custom fabricated 20-gauge type 304 stainless steel
   a. Individual panels shall be of equal size on common walls
   b. John Boos No. WF-CS7 or equivalent edge caps at panel perimeter edges
   c. John Boos No. WF-DB7 or equivalent divider bars at panel seams
7. Shop drawing required for approval

T. Item No. 19 Fire Suppression System (One Required):

1. System shall be designed to automatically suppress fire by spraying the exhaust hood plenum area, filters, exhaust ducts, and cooking surfaces with a predetermined flow rate of low pH liquid fire suppressant in compliance with the latest editions of NFPA 17A, NFPA 96, and Authority having Jurisdiction. System shall be Ansul R-102 pre-engineered wet chemical type or approved equivalent in compliance with UL Standard 300. System shall include components/features/accessories installed by a manufacturer certified installer as follows:

   a. Stainless steel nozzles and piping within Exhaust Hood
   b. Regulated release assembly which contains a release mechanism and agent tank within a stainless steel enclosed cabinet mounted on building wall where indicated on drawings
   c. Remote manual release station located on egress of cooking area

2. Submittal data and review fee by Fire Marshal's Office or Authority having Jurisdiction
3. This Contractor shall furnish and install a Class K portable fire extinguisher with wall bracket in kitchen in accordance with NFPA 10 and State Fire Marshal requirements.

U. Item No. 20 Work Table (One Required):

1. 30" wide x 60" long x 36" high, custom-fabricated stainless steel open base type with components/features/accessories as follows:

   a. One (1) drawer
   b. Undershelf

V. Item No. 21 Work Table W/Overhead Pot Rack (One Required):

1. 30" wide x 60" long x 36" high, custom-fabricated stainless steel open base type with components/features/accessories as follows:

   a. One (1) drawer
   b. Undershelf
   c. Overhead pot rack

W. Item No. 22 Serving Counter (One Required):

1. 30” wide x 18’-0” long x 36” high, custom-fabricated stainless steel open base type with components/features/accessories as follows:

a. Undershelf

X. Item No. 23 Coffee/Tea Brewer – (By Coffee Vendor)

1. Space and utilities for Bunn No. ITCB-DV (52200.0000) 120V

PART 3 - EXECUTION

3.1 ERECTION

A. Equipment specified herein shall be erected and set in place at location as indicated on Drawings. Equipment shall be fabricated so that it can be handled through finished openings or arrangements otherwise made with General Contractor. Equipment specified shall be located on floors as indicated on Drawings. A competent foreman shall be provided as supervisor of erections and installations.

3.2 ADJUSTMENT OF EQUIPMENT

A. Contractor shall adjust all equipment after erection and installation to satisfaction of Owner.

B. Contractor shall confirm in writing that all equipment is operational and in working condition prior to demonstration.

3.3 CLEANING OF EQUIPMENT

A. Clean up all debris caused by workmen immediately upon completion of Work in the area, and clean equipment after all others have completed their Work in the area.

3.4 DEMONSTRATION OF EQUIPMENT

A. Upon acceptance by Owner, provide full instructions to Owner's designated representative on proper methods of care, operation and maintenance of equipment.

B. Three (3) operating instructions, warranty cards/certificates and parts manuals on equipment in loose leaf hard cover binders shall be presented to Architect at this time. Operation and maintenance manuals shall be organized for easy reference by maintenance personnel, including index tabs of equipment item numbers.

END OF SECTION 114000

SECTION 116143 - STAGE CURTAINS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes stage curtains and draw-curtain tracks.

1.2 ACTION SUBMITTALS

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

B. Shop Drawings: Show fabrication and installation details for stage curtains. Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For each fabric and for each color and texture specified, full width by 36 inches in size, from dye lot to be used for the Work, with specified treatments applied.

D. Delegated-Design Submittal: For rigging indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.3 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of stage curtains.

B. Fire-Test-Response Characteristics: Provide stage curtains with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Flame-Resistance Ratings: Passes NFPA 701.

a. Permanently attach label to each fabric of curtain assembly indicating whether fabric is inherently and permanently flame resistant or treated with flame-retardant chemicals, and whether it requires retreatment after designated time period or cleaning.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of rigging equipment that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CURTAIN FABRICS

A. General: Provide fabrics inherently and permanently flame resistant or chemically flame resistant by immersion treatment to comply with requirements indicated. Provide fabrics of each type and color from same dye lot.

B. Heavyweight Woven Cotton Velour: Napped fabric of 100 percent cotton weighing not less than 25 oz./linear yd. before flame-retardant treatment, with pile height not less than 79 mils; 54-inch minimum width. Install school initials at top of valance (WR).

1. Products: Subject to compliance with requirements, provide one of the following:

a. Dazian LLC; Symphony.
b. Frankel/Fabric One; 950.
c. JB Martin Company; #2703 Overture.
d. J. L. de Ball America, Inc.; Metro.
e. KM Fabrics, Inc.; Memorable.
f. Valley Forge Fabrics, Inc.; 2525 Velour.

2. Color, Texture, and Pattern: As selected by Architect from manufacturer's full range.

C. Ranger Lining: 100 percent cotton fabric weighing not less than 13 oz./linear yd.; 54-inch minimum width; beige or black, as selected by Architect.

2.2 CURTAIN FABRICATION

A. General: Affix permanent label, stating compliance with requirements of authorities having jurisdiction, in accessible location on curtain not visible to audience. Provide vertical seams unless otherwise indicated. Arrange vertical seams so they do not fall on faces of pleats. Do not use fabric cuts less than one-half width.

1. Vertical Hems: Provide vertical hems not less than 2 inches wide, and not less than 4 inches wide at borders, valance, teasers, and tormentors, with not less than a 1-inch tuck, and machine sew with no selvage material visible from front of curtain. Sew open ends of hems closed.
2. Leading Edge Turnbacks: Provide turnbacks formed by folding back not less than 12 inches of face fabric, with not less than a 1-inch tuck, and secure by sewing turnbacks vertically.

3. Top Hems: Reinforce top hems by double-stitching 3-1/2-inch wide, heavy jute webbing to top edge on back side of curtain with not less than 2 inches of face fabric turned under.
4. Pleats: Provide 100 percent fullness in curtains, exclusive of turnbacks and hems, by sewing additional material into 6-inch double-stitched box pleats sewn flat and spaced at 12 inches o.c. along top hem reinforcement.
5. Grommets: Brass, No. 3 or No. 4; centered on each box pleat and 1 inch from corner of curtain; for snap hooks or S-hooks.
6. Bottom Hems: Provide hems not less than 6 inches deep with weight tape.
7. Lining: Provide lining for each curtain in same fullness as face fabric and finished 2 inches shorter than face fabric. Sew or otherwise securely attach lining to top hem of face fabric. Attach lining to face fabric along bottom and side seams with 4-inch long strips of heavy woven cotton tape. Sew lining to bottom edge of curtain allowing sufficient lining fabric for tucking to prevent shrinkage.

B. Scrim: Fabricate from scrim curtain fabric, sewn flat. Provide a continuous 6-inch (150-mm) pipe pocket at bottom with a 6-inch (150-mm) flap of same fabric in front of pocket. Provide double-stitched, 3-1/2-inch (89-mm) jute webbing at top with not less than No. 2 brass grommets spaced at 12 inches (300 mm) o.c. and 1 inch (25 mm) from corner of curtain. Provide not less than a 2-inch (50-mm) double-folded side hem and a 4-inch (100-mm) bottom hem.

C. Drop: Fabricate from muslin fabric, sewn flat, with either horizontal or vertical seams to suit Project and selvage to the rear. Provide 6-inch (150-mm) pipe pocket at bottom with a 6-inch (150-mm) flap of same fabric in front of pocket. Provide double-stitched, 3-1/2-inch (89-mm) jute webbing at top with not less than No. 2 brass grommets spaced at 12 inches (300 mm) o.c. and 1 inch (25 mm) from corner of curtain. Provide not less than a 2-inch (50-mm) double- folded side hem and a 4-inch (100-mm) bottom hem.

D. S-Hooks: Manufacturer's standard heavy-duty plated-wire hooks, not less than 2 inches (50 mm) long.

E. Snap Hooks: Manufacturer's standard heavy-duty hooks, blind sewn to top hem of curtain\.

2.3 ALUMINUM-CURTAIN TRACK

A. Aluminum Track: Fabricate of extruded aluminum; complying with ASTM B 221 (ASTM B 221M); alloy and temper recommended by manufacturer for strength and corrosion resistance, 0.125 inch (3.1 mm) thick; black paint finish.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Automatic Devices Company; Patriarc 500 series.
   b. H & H Specialties Inc.; 700 series.
   c. Tru-Roll, Inc.; Tru-Roll Model No. 2300.

B. Curtain Rails: Provide end stops for track rails.

C. Curtain Carriers: Standard carriers with a quantity of curtain carriers sufficient for track length, to suit curtain fabrication. Include one master carrier for each leading curtain edge.

D. Clamp and Bracket Hangers: Manufacturer's steel clamps and brackets of sufficient strength required to support loads for attaching track to overhead support.

E. Track Lap Clamp: Metal to match track channel for attaching double-sectioned track at center overlap.

F. Fold Guide: Equip carriers with rear-fold or backpack guide and rubber spacers to permit offstage curtain folding; sized for use with operating line if any.

G. Manual Operation: Fabricate curtain track with cord, pulleys, and floor block.

1. Operating Line: Manufacturer's standard 3/8-inch diameter, stretch-resistant operating cord consisting of braided synthetic-fiber jacket over solid, synthetic-fiber, linear filaments.
2. End Pulleys: One single dead-end and one double live-end pulley. Provide sheave(s) with shielded ball bearing(s) housed in plated-steel body finished to match track. Provide with bracket for securing off-stage curtain end.
3. Floor Block: Sheave with shielded ball bearing housed in plated-steel body finish painted black. Adjustable, with detachable base plate.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Examine areas and conditions, with Installer present, for compliance with requirements for supporting members, blocking, installation tolerances, clearances, and other conditions affecting performance of stage-curtain work. Examine inserts, clips, blocking, or other supports required to be installed by others to support tracks and battens.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Install stage-curtain system according to track manufacturer's and curtain fabricator's written instructions.

D. Ceiling-Mounted Tracks: Drill track at intervals not greater than manufacturer's written instructions for spacing, and fasten directly to structure.

E. Beam-Mounted Tracks: Install tracks by suspending from manufacturer's special beam clamps securely mounted to I-beam structure at spacing, according to manufacturer's written instructions.

F. Wall-Mounted Tracks: Install tracks by suspending from manufacturer's special bracket clamps securely mounted to wall construction at spacing, according to manufacturer's written instructions.

G. Install track for center-parting curtains with not less than 24-inch overlap of track sections at center, supported by special lap clamps.

H. Track Hung: Secure curtains to track carriers with S-hooks.

3.2 DEMONSTRATION

A. [Engage a factory-authorized service representative to Train Owner's maintenance personnel to adjust, operate, and maintain stage curtains and tracks.

END OF SECTION 116143

SECTION 11680 – OUTDOOR BACKLESS BENCHES

PART 1 — GENERAL

1.1 SUMMARY

A. Section includes a factory-fabricated, backless bench with recycled-plastic wood-grain slats and a powder-coated steel frame, complete with in-ground mounting components and installation.

B. Related Requirements:

1. Section 03 30 00 — Cast-in-Place Concrete: Concrete footings and mounting bases.
2. Section 31 20 00 — Earth Moving: Excavation and backfill for in-ground supports.
3. Section 32 93 00 — Plants: Coordination with adjacent landscape areas.

1.2 REFERENCES

A. ASTM D6108 — Standard Test Method for Compressive Properties of Plastic Lumber and Shapes.

B. ASTM A123 / A123M — Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products (where applicable).

C. ASTM D523 — Standard Test Method for Specular Gloss (powder-coat finish).

D. ADA Standards for Accessible Design — Where bench is located on accessible routes.

1.3 SUBMITTALS

A. Product Data: Manufacturer's data sheets for each product specified, including materials, finishes, dimensions, weights, and mounting details.

B. Shop Drawings: Show overall dimensions, slat layout, frame configuration, in-ground leg embedment depth, footing details, and anchorage.

C. Samples: Representative sample of recycled-plastic slat in the specified color and a color chart of available powder-coat frame finishes.

D. Manufacturer's Installation Instructions: Including recommended footing size and embedment depth for in-ground mounting.

E. Warranty: Executed copy of manufacturer's warranty.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm regularly engaged in the manufacture of site furnishings of the type specified, with a minimum of five (5) years of documented experience.

B. Single-Source Responsibility: Obtain benches and mounting components from a single manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original, undamaged packaging with labels intact.

B. Store products off the ground, under cover, and protected from damage, weather, and construction traffic until installation.

C. Handle products to prevent scratching, marring, or deformation of slats and frames.

1.6 WARRANTY

A. Manufacturer's Warranty: Provide manufacturer's standard 50-year guarantee against breakage of the recycled-plastic slats under normal use.

B. Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents.

PART 2 — PRODUCTS

2.1 MANUFACTURER

A. **Basis of Design:** Barco Products Company; Silhouette Backless Bench — Wood Grain Naturals.

1. Product SKU: KBC2335W-DW (8' Bench — Inground Mount).
2. Address / Contact: Barco Products, www.barcoproducts.com; 1-800-338-2697.

B. Approved Equals: Products of the following manufacturers, meeting all requirements of this Section, are approved for bidding purposes:

1. UltraSite (PlayCore, Inc.), Fort Payne, AL — recycled-plastic lumber backless park bench, 8 ft, in-ground mount.
2. Wabash Valley Manufacturing, Inc., Silver Lake, IN — recycled-plastic backless bench, 8 ft, in-ground mount.
3. DuMor, Inc., Mifflintown, PA — recycled-plastic backless bench, 8 ft, in-ground mount.

C. Approved-Equal Requirements: Products of listed approved-equal manufacturers shall match the basis-of-design product in overall length, seat depth and height, materials, finish, mounting method, and warranty. Contractor shall submit product data demonstrating compliance under Article 1.3 SUBMITTALS.

D. Substitutions: Manufacturers not named above may be submitted as substitutions only in accordance with Division 01 substitution procedures, and only upon the Architect's written approval prior to bid.

2.2 MANUFACTURED UNIT

A. **Bench Type:** Backless bench, factory-fabricated, for permanent in-ground installation.

B. **Overall Length:** 8'-0" (96 inches).

C. **Seat Depth:** 15-1/2 inches (15.5").

D. **Seat Height (above finished grade):** 16-3/4 inches (16.75").

E. **Overall Height (including in-ground legs):** 40-3/4 inches (40.75"), of which approximately 24 inches is embedded below finished grade.

F. **Approximate Unit Weight:** 92 lb.

G. **Mounting:** In-ground; extended steel legs set into concrete footings.

2.3 MATERIALS

A. **Slats:** Premium-quality recycled-plastic 2 x 4 profiles with a natural wood-grain tone and texture.
   1. Maintenance-free and weatherproof; requires no oiling, staining, or sealing.
   2. UV- and moisture-resistant; will not fade, chip, rust, warp, sag, or deteriorate over time.
   3. Color: Wood Grain Natural (Naturals series). Verify final color selection with Architect.

B. **Frame:** Heavy-duty steel, powder-coated black.
   1. Finish: Electrostatically applied polyester powder coat, oven-cured for durability and corrosion resistance.
   2. Color: Black (standard).

C. **Assembly Hardware:** Stainless steel fasteners, furnished by the manufacturer.

2.4 FABRICATION

A. Fabricate benches in the manufacturer's standard shop process, delivered ready for field assembly; some assembly required.

B. Slats shall be uniformly spaced and securely fastened to the steel frame with the supplied stainless-steel hardware.

C. In-ground legs shall be factory-configured for direct embedment into concrete footings.

D. All exposed edges and corners shall be free of burrs and sharp projections.

PART 3 — EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions where benches are to be installed. Verify that layout, grades, and adjacent construction are ready to receive the work.

B. Verify locations of underground utilities before excavating footings.

C. Do not begin installation until unsatisfactory conditions have been corrected. Commencement of work constitutes acceptance of conditions.

3.2 PREPARATION

A. Lay out bench locations as indicated on the Drawings and as approved by the Architect.

B. Excavate footing holes to the depth and diameter recommended by the manufacturer for in-ground mounting, typically sized to embed the legs approximately 24 inches below finished grade.

3.3 INSTALLATION

A. Assemble bench in accordance with the manufacturer's written instructions using the supplied stainless steel hardware.

B. Set in-ground legs plumb and level into excavated holes; brace as required to maintain alignment.

C. Place concrete footings around embedded legs in accordance with Section 03 30 00. Confirm footing size and concrete strength with manufacturer's recommendations.

D. Verify that the finished seat is level and at the specified height of 16-3/4 inches above finished grade.
E. Allow concrete to cure fully before permitting use of the bench.

3.4 TOLERANCES

A. Maximum variation from level of seat surface: 1/8 inch.
B. Maximum variation from plumb of legs: 1/8 inch in 24 inches.
C. Maximum variation from indicated location: 1 inch.

3.5 CLEANING AND PROTECTION

A. Clean bench surfaces of dirt, grease, and construction residue using mild soap and water; do not use abrasive cleaners or solvents.
B. Touch up damaged powder-coat finish with manufacturer-approved coating.
C. Protect installed benches from damage during subsequent construction operations until Substantial Completion.

END OF SECTION 11680

SECTION 119113 – PREFABRICATED BAPTISTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Prefabricated fiberglass baptistry assembly.
2. Dry-minister style baptistry with integral minister platform.
3. Acrylic viewing window.
4. Double-entry stair configuration.
5. Integral water containment vessel.
6. Stainless steel Access stairs and handrails.
7. Water circulation and filtration system.
8. Electric water heating system.
9. Associated controls and accessories.

B. Related Sections:

1. Division 03 - Cast-in-Place Concrete supports and pads.
2. Division 06 - Rough Carpentry for framing, blocking, & support const.
3. Division 09 - Finishes.
4. Division 22 - Plumbing.
5. Division 26 - Electrical.

1.2 REFERENCES

A. Americans with Disabilities Act (ADA) where applicable.

B. ASTM International Standards:

1. ASTM C582 - Contact-Molded Reinforced Thermosetting Plastic.
2. ASTM D2563 - Fiberglass-Reinforced Plastic Products.

C. National Electrical Code (NEC).

D. Uniform Swimming Pool, Spa, and Hot Tub Code, where applicable.

E. All applicable state, plumbing, electrical, and building codes.

1.3 SUBMITTALS

A. Product Data:

1. Include Manufacturer's literature, construction details, and equipment specifications, electrical requirements, and plumbing requirements.

B. Shop Drawings:

1. Overall dimensions. Include fabrication/installation details
2. Structural support requirements.
3. Mechanical and electrical connection locations.
4. Stair and handrail details.

C. Samples:

1. Finish color selections.
2. Surface texture samples.

D. Include Operation and Maintenance Data/Manufacturer’s warranty.

1.4 QUALITY ASSURANCE

A. Manufacturer shall have minimum five years documented experience manufacturing prefabricated baptistries.

B. Fabrication shall be performed in a controlled factory environment.

C. Installer shall be experienced in installation of pre-fabricated baptistries and approved by manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver components in manufacturer's protective packaging.

B. Store materials in dry conditions and protect from damage and direct sunlight.

C. Handle units according to manufacturer's written recommendations.

1.6 WARRANTY

A. Manufacturer's standard warranty, minimum one year from date of Substantial Completion.

B. Structural vessel warranty: Minimum five years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

1. Piedmont Composites INC.
2. Fiberglass Unlimited, Inc.
3. Baptistry Pools, Inc.
4. Approved Equal.

2.2 PREFABRICATED BAPTISTRY

A. Description: basis of design Piedmont composites series 8 dry-minister baptistry model 8-de-w

Factory-fabricated complete one-piece baptistry consisting of molded reinforced fiberglass vessel with integral seating, viewing window, steps, circulation equipment, heating system, and finish accessories.

B. Construction:

1. Fiberglass reinforced plastic (FRP) construction.
2. Minimum wall thickness as recommended by manufacturer for size specified.
3. One-piece molded watertight shell.
4. Reinforced structural floor, walls, & framing where required.
5. Factory-installed reinforcement as required by manufacturer.

C. Dimensions:

1. Overall Width: Approximately 8 feet 5 inches.
2. Overall Depth: Approximately 4 feet 11 ¾ inches.
3. Overall Height: Approximately 3 feet 7 ½ inches.
4. Water depth: Approximately 36 inches.
5. Water Capacity Approximately 475 Gallons.

C. Viewing Window

1. Factory installed viewing acrylic viewing window.
2. Clear, transparent, impact-resistant construction.

3. Permanently sealed to provide water-tight operation.

4. Fully integrated into front face of baptistry

D. Finish:

1. Gel-coat finish.
2. Color selected by Architect from manufacturer's standard colors.
3. Non-porous, stain-resistant smooth surface.

2.3 STAIRS AND HANDRAILS

A. Integral molded slip-resistant stairs. Located on opposite sides of baptistry.

B. Handrails:

1. Type 304 stainless steel.
2. Satin finish.
3. Securely Anchored per manufacturer's recommendations.

2.4 WATER CIRCULATION SYSTEM

A. Circulation Pump:

1. Corrosion-resistant construction.
2. Sized for complete circulation and turnover of baptistry water volume per manufacturer recommendations.

B. Filtration System:

1. Manufacturer’s standard cartridge filtration system.
2. Removable and serviceable filter elements and components.

C. Suction and return fittings. Drain assembly. Plumbing connections/fittings.

D. Plumbing connections for complete operation.

2.5 WATER HEATING SYSTEM

A. Electric immersion heater provided by baptistry manufacturer, thermostatically controlled.

C. Maintain water temperature between 80°F and 100°F, including Safety high-temperature limit controls. High temperature safety limit protection. Grounded and code compliant.

2.6 CONTROLS

A. Factory-supplied control panel with Temperature adjustment controls.

B. Indicator lights.

C. Provide Pump operation controls.

D. Ground-fault protection as required by code.

2.7 ACCESSORIES

A. Drain assembly with Overflow protection.

C. Fill connections, Water fill connection.

D. Access panels for maintenance.

E. Safety signage where required.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify dimensions and conditions of support structure prior to installation.

B. Do not begin installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install baptistry in accordance with manufacturer's written instructions.

B. Provide required structural supports.

C. Connect plumbing, electrical, and mechanical systems.

D. Level unit and secure in place.

E. Seal penetrations and connections watertight.

3.3 FIELD QUALITY CONTROL

A. Inspect all connections for proper installation, Fill vessel and test for leaks.

B. Verify operation of:

1. Heating system.
2. Filtration system.

3. Circulation pump.
4. Temperature controls.

C. Correct deficiencies and retest.

3.4 CLEANING

A. Clean surfaces of dirt, debris, and construction residue.

B. Remove temporary protection upon completion.

C. Leave installation in a clean and fully operational condition.

3.5 DEMONSTRATION

A. Provide owner's personnel with operating and maintenance instruction.

B. Demonstrate:

1. Filling and draining procedures.
2. Temperature control adjustment.
3. Filter maintenance.
4. Routine cleaning procedures.

END OF SECTION 11 14 33

SECTION 123661 - SIMULATED STONE COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Solid-surface-material countertops and backsplashes.

1.2 ACTION SUBMITTALS

A. Product Data: For countertop materials.

B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.

C. Samples: For each type of material exposed to view.

1.3 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of simulated stone countertop systems that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace simulated stone materials that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Ten years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOLID-SURFACE-MATERIAL COUNTERTOPS

A. Basis Of Design: Provide countertops with the following front and backsplash style. Solid Surface Countertop shall be **Wilsonart .** Color to be determined by architect from Manufacturer’s full line.

1. Front: 3/4-inch.
2. Backsplash: Straight, slightly eased at corner.
3. Endsplash: Matching backsplash.

B. Countertops: 3/4-inch thick, solid surface material with front edge built up with same material

C. Backsplashes: 3/4-inch thick, solid surface material.

2.2 COUNTERTOP MATERIALS

A. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.

B. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

C. Solid Surface Material: Homogeneous solid sheets of filled plastic resin complying with ANSI SS1.

1. Manufacturers: Subject to compliance with requirements, provide products indicated by the drawings or comparable products by one of the following:

   a. Avonite Surfaces.
   b. Dupont Co.
   c. Formica Corporation.
   d. Wilsonart International.

2. Type: Provide Standard Type or Veneer Type made from material complying with requirements for Standard Type, as indicated unless Special Purpose Type is indicated.
3. Colors and Patterns: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

END OF SECTION 123661

SECTION 123661a – SOLID SURFACE VANITY SINKS

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. Solid surface acrylic vanity sinks.
2. Sink accessories and components required for a complete installation.
3. Fabrication and installation of solid surface sink assemblies.

B. Related Sections:

1. Section 123661 – Solid Surfacing Fabrications.
2. Division 22 Sections – Plumbing.
3. Architectural Drawings for countertop and sink locations.

1.2 REFERENCES

A. ANSI Z124.6 – Plastic Plumbing Fixtures.

B. ANSI Z124.3 – Plastic Lavatories.

C. Applicable requirements of the Americans with Disabilities Act (ADA) where indicated by the Contract Documents.

1.3 SUBMITTALS

A. Product Data:

1. Submit manufacturer's current product data for solid surface vanity sinks.
2. Identify sink model, dimensions, color, overflow configuration, and accessories.

B. Shop Drawings:

1. Submit sink cutout dimensions and locations where required.
2. Coordinate sink locations and dimensions with countertop fabricator.

C. Samples:

1. Submit color samples upon request.
2. Coordinate sink color with adjacent solid surface countertop material.

1.4 QUALITY ASSURANCE

A. Manufacturer:

1. Provide products manufactured by an established manufacturer regularly engaged in manufacturing solid surface acrylic sinks and bowls.
2. Basis of Design: Wilsonart LLC, Temple, Texas.

B. Manufacturer's Installation Requirements:

1. Fabricate and install sink assemblies in accordance with the manufacturer's current fabrication and installation instructions.
2. Sink installation shall be performed by personnel experienced in fabrication and installation of solid surface materials.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in manufacturer's original protective packaging.

B. Protect sinks from damage, staining, scratching, and other conditions that may adversely affect appearance or performance.

C. Store products in a clean, dry location and in accordance with manufacturer's recommendations.

PART 2 – PRODUCTS

2.1 SOLID SURFACE ACRYLIC VANITY SINK

A. Basis of Design:

1. Manufacturer: Wilsonart LLC.
2. Product: Wilsonart Solid Surface Acrylic Sink.
3. Model: AV1812.
4. Model Name: Rectangle Ramp Vanity.
5. Basis of Design Product: AV1812 Rectangle Ramp Vanity.
6. Interior Dimensions: 18 inches long x 12-3/4 inches wide x 5 inches deep.
7. Overall Dimensions: 19-1/2 inches long x 14-5/16 inches wide x 6-7/8 inches deep.

8. Weight: 12.6 pounds.
9. Overflow: Provide integral overflow as manufactured.
10. ADA: Product shall be an ADA-designated model.

B. Material:

1. Sink shall be manufactured from solid surface acrylic material composed of acrylic resin and minerals.
2. Material shall be homogeneous throughout the sink.
3. Color pigment shall be consistent throughout the thickness of the bowl.
4. Sink shall have a matte solid surface finish.
5. Sink shall be suitable for bonding to compatible solid surface countertop material to provide a seamless appearance.

C. Color:

1. Color: Designer White, unless otherwise indicated.
2. Other available colors may include Clean White, Calm White, and Antique White, subject to manufacturer's current availability.
3. Coordinate sink color with countertop selection.

D. Performance:

1. Solid surface sink shall be hygienic, stain resistant, and durable.
2. Sink shall conform to or exceed ANSI Z124.6 based on manufacturer's independent laboratory testing.
3. Product shall be certified for use by Underwriters Laboratories (UL) in the United States and Canada.
4. Sink shall comply with applicable manufacturer certifications and requirements indicated for the product.

E. Environmental:

1. Product shall be GREENGUARD Indoor Air Quality Certified.
2. Product shall comply with the manufacturer's stated GREENGUARD Product Emission Standard for Children and Schools.

2.2 SEAMING MATERIALS

A. Seam Kit:

1. Provide manufacturer's approved solid surface seam kit compatible with the sink and adjacent solid surface countertop.
2. Seam kit shall be Wilsonart Solid Surface Seam Kit or manufacturer's approved compatible material.
3. Provide materials in a color compatible with the sink and countertop assembly.

2.3 ACCESSORIES

A. Provide sink accessories necessary for a complete and functional installation as indicated by the Plumbing Drawings and manufacturer's requirements.

B. Drain, faucet, supply fittings, and other plumbing components shall be as specified in Division 22 and coordinated with the sink and countertop installation.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine countertops, cabinetry, supports, plumbing rough-ins, and adjacent construction prior to sink installation.

B. Verify dimensions and conditions are suitable for installation of the specified sink.

C. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 FABRICATION

A. Fabricate countertop openings to accommodate the specified Wilsonart AV1812 sink.

B. Sink cutouts and fabrication dimensions shall be in accordance with the manufacturer's current sink drawings and fabrication/installation manual.

C. Provide smooth, accurately formed openings and finished edges.

D. Coordinate sink location with faucet, drain, backsplash, cabinetry, and other adjacent construction.

E. Bond sink to solid surface countertop using manufacturer's recommended fabrication methods and compatible seam materials.

3.3 INSTALLATION

A. Install sink in accordance with:

1. Manufacturer's current fabrication and installation manual.
2. Approved shop drawings.
3. Plumbing requirements.
4. Applicable building and accessibility requirements.

B. Secure and support sink to prevent movement, separation, cracking, or damage during normal use.

C. Seal and finish joints between sink and countertop to provide a smooth, sanitary, and watertight installation.

D. Install plumbing connections without imposing stress on the sink or countertop assembly.

E. Coordinate overflow and drain connections with the plumbing system.

3.4 CLEANING

A. Remove protective materials, adhesive residue, construction debris, and other contaminants from sink surfaces.

B. Clean sink using warm water and mild soap or other cleaning products recommended by the manufacturer.

C. Mild abrasive cleaners may be used in accordance with manufacturer's recommendations.

D. Do not use harsh chemicals, including paint remover, turpentine, acetone/nail polish remover, or stove and drain cleaners, on sink surfaces.

3.5 PROTECTION

A. Protect completed sink installations from damage during subsequent construction operations.

B. Do not place hot cookware or other excessively hot objects directly into the sink.

C. When pouring boiling water into the sink, run warm water concurrently in accordance with manufacturer's recommendations.

D. Repair or replace damaged sink components that cannot be satisfactorily restored to original condition.

END OF SECTION

SECTION 21 05 00 – COMMON WORK RESULTS FOR FIRE SUPPRESSION

Part 1 – GENERAL

1.1 SUMMARY

A. Provide all labor, materials, equipment, and services necessary for the general requirements of fire suppression work for this project. Work includes coordination, design assistance, submittals, quality assurance, sleeves and penetrations, hangers and supports, painting and identification, testing, closeout documents, and other common provisions required for a complete and operable system.

B. This Section establishes requirements common to all Division 21 Sections. System-specific requirements are specified in 21 13 13 – Wet-Pipe Sprinkler Systems.

1.2 Related Documents

A. Requirements of Divisions 00 and 01 apply to this Section.

B. Related Sections: 21 13 13 – Wet-Pipe Sprinkler Systems; 26 05 00 – Common Work Results for Electrical; 07 84 00 – Firestopping; 22 05 00 – Common Work Results for Plumbing.

1.3 REFERENCES

A. Use the latest applicable edition adopted by the Authority Having Jurisdiction of the following, unless noted otherwise:

A. NFPA 13 – Standard for the Installation of Sprinkler Systems.
B. NFPA 14 – Standard for the Installation of Standpipe and Hose Systems.
C. NFPA 20 – Standard for the Installation of Stationary Pumps for Fire Protection.
D. NFPA 24 – Standard for the Installation of Private Fire Service Mains and Their Appurtenances.
E. NFPA 25 – Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.
F. NFPA 72 – National Fire Alarm and Signaling Code.
G. NFPA 101 – Life Safety Code.
H. ASTM A53/A53M – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
I. ASTM A135/A135M – Standard Specification for Electric-Resistance-Welded Steel Pipe.
J. ASTM A234/A234M – Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
K. ASTM A795/A795M – Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use.
L. AWWA C510 – Double Check Valve Backflow Prevention Assemblies.
M. AWWA C111 – American National Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
N. AWWA C151 – American National Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water.
O. ASSE 1015 – Performance Requirements for Double Check Valve Backflow Prevention Assemblies.
P. AWS A5.8 – Specification for Filler Metals for Brazing and Braze Welding

Q. AWS D1.1 – Structural Welding Code - Steel
R. UL and FM listings as applicable.
S. International Building Code (IBC) and local amendments, as applicable.

1.4 DEFINITIONS
A. “Provide”: Furnish and install complete, ready for use.

B. “Approved equal”: Product approved in writing by the Engineer that is equivalent in form, fit, function, and listing/approval.

C. “Contractor”: Licensed Fire Suppression Contractor responsible for this scope of work.

1.5 SUBMITTALS
A. Shop Drawings: Prepare per NFPA 13. Include scaled layouts, pipe sizes and materials, hanger/seismic bracing details, hydraulic calculations, device schedules, interface points, and coordination with other trades. Submit water supply information and hydraulic demand summary.

B. Product Data: Valves, pipe, fittings, hangers, sprinklers, backflow preventers, alarm devices, FDC assemblies, gauges, identification, and accessories.

C. Certificates and Reports: Hydrostatic test certificates, flushing records, and acceptance test results.

D. Operation and Maintenance Data: O&M manuals for all equipment and devices; manufacturer recommendations for inspection and maintenance; spare parts lists.

E. Record Documents: As-built drawings reflecting final routing, sizes, elevations, and device locations.

1.6 QUALITY ASSURANCE
A. Contractor Qualifications: Licensed Fire Protection Contractor with a minimum of five (5) years of experience on similar size and complexity projects.

B. Designer Qualifications: NICET Level III (minimum) Water-Based Systems Layout technician preparing shop drawings and calculations.

C. Listings/Approvals: Materials and devices shall be UL listed and/or FM approved for intended service.

D. Regulatory Compliance: Install in accordance with the latest applicable edition of referenced NFPA standards and state/local amendments under jurisdiction of the Authority Having Jurisdiction. Installation shall be in compliance with the requirements and regulations of the Louisiana State Fire Marshal, Property Insurance Association of Louisiana, the City of Monroe, and Local Fire Prevention Bureau.

1.7 INSPECTION OF THE SITE
A. Drawings are based on the best available information but may not reflect all field conditions. Prior to bidding and again prior to installation, visit the site to verify locations, sizes, pressures, and depths of existing utilities and to become familiar with grades, soil conditions, hazards, and obstructions that may affect the work.

B. Notify the Architect/Engineer in writing of conditions that may impair proper system operation or conflict with the Contract Documents before proceeding.

C. Proposals and bids shall account for existing conditions and revisions required as a result of site inspection.

1.8 CONSTRUCTION REQUIREMENTS

A. Install piping and equipment in a neat and workmanlike manner that fits the building structure, maintains required clearances, and provides coordinated access for operation, testing, and maintenance.

B. Conceal piping in finished areas unless otherwise indicated. Install exposed piping parallel or perpendicular to building lines and grouped wherever possible for orderly appearance.

C. Avoid interferences with structural members, ceiling systems, ductwork, lighting, and other building components. Where conflicts occur, notify the Architect/Engineer and obtain resolution prior to proceeding.

D. Provide adequate clearances around valves, drains, test connections, flow switches, and supervisory devices to allow full access for operation, inspection, and replacement.

E. Provide sleeves and escutcheons at all penetrations of walls, floors, and ceilings in accordance with Section 1.9 – Sleeves and Penetrations.

F. Support piping independently of other trades' systems. Do not use ductwork, conduit, or equipment of other trades as support for sprinkler piping.

G. Protect building finishes, equipment, and utilities from damage during installation. Repair or replace damage to match adjacent conditions at no additional cost to the Owner.

H. Perform cutting and patching required for installation in a manner that preserves structural integrity and appearance of adjoining work. Coordinate with Division 01 requirements.

I. Ensure all openings in fire-rated or smoke-rated assemblies are restored to the required rating following installation. Firestopping shall be performed with tested assemblies approved for the penetrated construction type.

J. Install all materials plumb and level unless noted otherwise. Provide straight, true pipe runs without sag or offset, except where required by building conditions.

K. Coordinate routing with other trades and with reflected ceiling plans to maintain consistent layout of sprinkler heads relative to ceiling tiles, light fixtures, diffusers, and architectural features.

1.9 SLEEVES AND PENETRATIONS

A. Provide sleeves for all piping passing through walls, floors, roofs, or other structural elements. Sleeves shall be sized to allow for free movement of the pipe and insulation, and to permit proper sealing.

B. For piping above grade and in dry locations, sleeves shall be 20 gauge galvanized steel and shall be flush on both sides of the wall surface penetrated; sleeves through the floor in piping chases, the sleeve shall extend up two inches (2") above the floor slab. For piping passing through floors/walls on or below grade and/or in moist areas, sleeves shall be schedule 40 galvanized steel

pipe with flange to make installation waterproof. Provide caulk around in void around pipe
C. Firestop all penetrations of fire-rated assemblies with systems tested in accordance with ASTM E814/UL 1479 and approved for the type of assembly penetrated. Fire stop material shall be equal to BIO Fireshield, Inc., BIOTHERM 200 or BIO K-2 mortar as applicable.
D. Provide escutcheons on both sides of finished walls, ceilings, and floors where piping is exposed to view.
E. Do not embed piping directly in concrete or masonry without sleeves.
F. All penetrations shall be sealed watertight in areas subject to moisture.

1.10 COORDINATION

A. Coordinate routing and elevations with structural systems, mechanical and electrical systems, and architectural ceilings. Align sprinkler heads with ceiling tile patterns where applicable.

B. Coordinate electrical requirements for flow and supervisory devices with Division 26.

C. Provide access clearances for operation, testing, and maintenance of valves, drains, and devices.

1.11 DAMAGE TO OTHER WORK

A. Take all necessary precautions to protect existing building elements, equipment, and utilities from damage during installation of the fire suppression system.
B. Any damage caused by this work shall be promptly repaired or replaced at no additional cost to the Owner. Repairs shall restore the damaged area to a condition equal to or better than that which existed prior to damage, matching adjacent finishes and construction.
C. Temporary supports, coverings, and protection shall be provided as required to safeguard finishes, furnishings, and equipment.

1.12 CONSTRUCTION SAFETY

A. Perform all work in compliance with OSHA regulations, state and local safety codes, and project safety requirements.
B. Provide and maintain temporary guards, barricades, signage, and warning devices as required to protect workers and occupants during installation.
C. Keep access routes, exits, and egress paths free from obstruction at all times.
D. Cutting, welding, and hot work shall be performed in accordance with NFPA 51B, with hot work permits issued through the Contractor’s safety program and coordinated with the Owner.
E. Do not leave piping or equipment in an unsafe, unsupported, or inoperable condition overnight or when unattended.

1.13 WARRANTY

A. The Contractor shall warrant all materials, equipment, and workmanship furnished under this Section to be free from defects for a period of one (1) year from the date of final acceptance by the Owner.
B. During the warranty period, any defects in materials or workmanship shall be corrected by the Contractor at no additional cost to the Owner. Corrective work shall be initiated within five (5) calendar days of notification unless otherwise directed by the Owner.
C. The Contractor shall be responsible for the cost of repairing or replacing any adjacent

construction, finishes, or equipment damaged as a result of leaks, failures, or deficiencies in the sprinkler system installed under this Contract.
D. Manufacturer warranties providing coverage beyond one year shall remain in effect and shall be assigned to the Owner at project closeout.

PART 2 - PRODUCTS

2.1 GENERAL MATERIALS
A. Provide new materials, free of defects. Repaired or damaged materials are not acceptable.

B. All materials shall be UL listed and/or FM approved for fire protection service, compatible with system type.

C. See Section 21 13 13 – Wet-Pipe Sprinkler Systems for detailed material requirements.

2.2 SERVICE AND REPAIR PARTS
A. All equipment installed on this project shall have local representation, local factory authorized service, and local stock of repair parts.

2.3 HANGERS AND SUPPORTS
A. Provide hangers, inserts, and supports per NFPA 13 spacing and type requirements. Components shall be UL listed/FM approved.

B. Provide seismic bracing where required by code or project documents.

2.4 IDENTIFICATION
A. Provide valve tags, pipe markers, and signage in accordance with NFPA 13 and NFPA 25.

2.5 ACCESS PANELS
A. Provide flush mounted metal access panels and frames with concealed hinges and key actuated locks for all concealed and otherwise inaccessible valves, parts, fittings, equipment, etc. and as required for inspection or service.

PART 3 – EXECUTION

3.1 EXAMINATION
A. Verify field conditions and dimensions prior to installation.

3.2 PAINTING AND FINISHES
A. Paint exposed sprinkler piping red in unfinished areas unless noted otherwise. Finish in architectural spaces to match adjacent construction as directed.

3.3 FIELD QUALITY AND CONTROL
A. Flush piping per NFPA 13 prior to hydrostatic testing.

B. Perform hydrostatic tests and acceptance tests per NFPA 13. Correct leaks and defects and retest until satisfactory.

C. Demonstrate operation of flow and supervisory devices in presence of the Architect/Engineer and AHJ.

3.4 CONFLICTS, INTERFERENCES AND COORDINATION BETWEEN TRADES

A. The Contract Drawings are diagrammatic in nature and are not to be construed as shop drawings. They establish design intent, required capacities, and approximate routing. The Fire Suppression Contractor shall prepare coordinated shop drawings indicating actual dimensions, offsets, elevations, and field conditions, and shall be responsible for coordination with structural members, ceilings, lighting, ductwork, plumbing, electrical, and other building systems. Where interferences occur, promptly notify the Architect/Engineer and obtain written direction before proceeding. Structural members shall not be cut or modified without written approval. Maintain clearances required for access to valves, drains, test connections, and other components.

B. Each trade shall coordinate its work with that of other trades so that the installation may be completed in a direct, workmanlike manner without delaying or obstructing others. Piping and equipment interferences shall be resolved by giving precedence to systems that require a specific grade or slope for proper operation. Where space conflicts remain, the following order of precedence shall apply:

1. Building lines
2. Structural Members
3. Soil and drain piping
4. Vent piping
5. Refrigerant piping
6. Condensate piping
7. Supply ductwork
8. Exhaust ductwork
9. Return ductwork
10. Domestic water
11. Electrical conduit
12. Natural gas piping
13. Automatic sprinkler piping
14. Compressed air piping

C. Where conflicts between specifications and drawings arise, drawings shall take precedence over specifications except in matters pertaining to quality, applications, and coordination between trades, which shall be governed by specifications.

D. The Contract Documents (drawings, specifications, addenda, and written directives) are complementary; what is required by one is as binding as if required by all. Provide all work that is reasonably inferable from the documents or necessary to deliver a complete, code-compliant system consistent with the design intent, even if every component is not explicitly called out. Minor omissions or discrepancies do not relieve the Contractor of this responsibility.

E. Where the Contract Documents conflict with applicable codes and standards, as interpreted by the Authority Having Jurisdiction (AHJ), the codes shall govern. When differing requirements exist, provide the more stringent requirement as determined by the AHJ and notify the Architect/Engineer before proceeding.

F. Where the drawings/specifications differ from a manufacturer's published installation instructions, listings/approvals, or warranty conditions, install in accordance with the manufacturer's instructions necessary to maintain the UL/FM listing and warranty and to comply with NFPA and code. Advise the Architect/Engineer of the conflict and obtain direction prior to fabrication or installation.

G. When a discrepancy or need for interpretation is discovered, submit a written request for information and do not proceed with the affected work until clarification is issued. If the Contractor proceeds without written direction, the Contractor shall furnish the work to meet the more stringent interpretation at no additional cost to the Owner and shall be responsible for all corrections. Document precedence is set forth in the order-of-precedence that follows.

3.5 CUTTING AND PATCHING

A. Perform all cutting required for installation of sleeves, piping, valves, equipment, and appurtenances in a neat, workmanlike manner. Coordinate all cutting with the General Contractor prior to proceeding. Do not cut or alter any structural member without written approval from the Architect/Engineer. This Contractor shall cut and patch all paving as required for the installation of buried piping, including utilities.

B. Cutting of concrete, masonry, or structural members shall be accomplished by core drilling, saw cutting, or other methods appropriate for the material. Impact methods such as hammer drilling or chipping shall not be used unless specifically approved by the Architect/Engineer.

C. Provide sleeves or built-in openings where possible to minimize field cutting. Where field cutting is required, perform work to avoid damage to adjacent construction and restore openings to maintain fire resistance, smoke resistance, and structural integrity.

D. Perform patching of paving, concrete, roofing, walls, ceilings, and other building elements affected by sprinkler piping installation. Patching shall restore the surface to its original condition, free of cracks, depressions, or visible repair lines, and shall match adjacent finishes.

E. Responsibility for patching:

1. The Sprinkler Contractor shall perform all cutting necessary for his work and provide sleeves for penetrations.
2. Finish patching shall be performed by the General Contractor unless otherwise noted.
3. The Sprinkler Contractor shall be responsible for repairing, at no cost to the Owner, any damage caused by improper, uncoordinated, or excessive cutting.

F. Restore all penetrations of fire-rated and smoke-rated assemblies to their required rating using listed firestop systems in accordance with ASTM E814/UL 1479.

3.6 CONCRETE WORK

A. This contractor shall provide all concrete work in conformance with applicable portions of Division 03 as required for his scope of work.

3.7 TRENCHING AND BACKFILL

A. Perform excavation, trenching, and backfill for underground fire service piping in accordance

with Division 31 – Earthwork and NFPA 24.
B. Coordinate trenching and backfill with the General Contractor.

3.8 FLASHING AND WATERPROOFING
A. Seal piping penetrations watertight. Flash and counterflash to eliminate leaks in accordance with Division 07.

3.9 TESTS
A. General
1. Perform all tests required by NFPA 13, NFPA 24, and the Authority Having Jurisdiction (AHJ).
2. Furnish all labor, materials, equipment, and temporary piping necessary to conduct tests at no additional cost to the Owner.
3. Notify the Architect/Engineer and AHJ at least four (4) days prior to testing.
4. Tests shall be repeated shall be made by this contractor and repeated until approved by the Architect.
5. Piping systems shall not be covered or otherwise concealed until tests have been performed by this Contractor and subsequently approved by the Architect.

3.10 CLEANUP
A. General
1. Maintain the job site in a safe and orderly condition at all times.
2. Remove debris, scrap materials, and packaging daily. Do not allow waste to accumulate.
B. Tools and Equipment
1. At the end of each workday, store tools, equipment, and materials in a secure and orderly manner.
2. Do not leave tools, cords, ladders, or piping unsecured where they could create a hazard to occupants, workers, or visitors.
C. Protection of Work
1. Protect adjacent construction, finishes, and Owner’s property from damage and dirt due to fire suppression work.
2. Clean surfaces soiled or damaged as a result of this work to the satisfaction of the Architect.
D. Final Cleaning
1. Upon completion of the installation and prior to final acceptance, remove all debris, unused materials, tools, and equipment from the site.
2. Leave all areas broom-clean and in a condition acceptable to the Owner and Architect.

3.11 FINAL OBSERVATIONS
A. At the completion of the fire suppression installation and prior to final acceptance, this Contractor shall carefully inspect the entire project to assure himself that the project is ready for final acceptance. This inspection shall occur prior to requesting final observations from the Architect/Engineer.

B. Deliver all test certificates, as-built drawings, operation and maintenance manuals, warranty information, etc, with a letter of transmittal at or before the final observation.
C. Acceptance will not be granted until all required documentation and corrective work have been completed.

3.6 CLOSEOUT
A. Deliver as-built drawings, O&M manuals, spare parts lists, and test certificates.
B. Conduct final observation and training with Owner's personnel.

End of Section 21 05 00

SECTION 21 13 13 – WET-PIPE SPRINKLER SYSTEM

PART 1 – GENERAL

1.1 SUMMARY

A. Provide a complete wet-pipe automatic sprinkler system, including design, materials, equipment, fabrication, installation, testing, and commissioning from the base of the riser to the final sprinkler head.

1.2 SCOPE

A. The scope of this Section includes the engineering, layout, furnishing, installation, and complete testing of the wet-pipe automatic fire sprinkler system. The Sprinkler Contractor shall provide a complete system from the base of the riser to the final installation of each head, in accordance with NFPA 13 and the requirements of the Authority Having Jurisdiction (AHJ).

B. Where sprinkler protection is required in areas subject to freezing, including attics, unheated shafts, exterior canopies, exterior projections, or similar areas, provide listed dry-type sprinklers, auxiliary heat, heat tracing, insulation, dry-pipe sprinkler system components, or other AHJ-approved freeze-protection measures as required by NFPA 13 and the Authority Having Jurisdiction.

C. Provide all piping, fittings, valves, hangers, alarms, air compressors (where required), and accessories necessary for a complete system installation. Coordinate with the Electrical Contractor for power supply to air compressors and alarms.

D. Temperature Conditions: Wet-pipe sprinkler system piping shall be installed only in areas maintained at not less than 40°F unless freeze protection is provided in accordance with NFPA 13 and approved by the AHJ. Where areas cannot be maintained at not less than 40°F, provide approved freeze-protection measures, which may include listed dry-type sprinklers, auxiliary heat, heat tracing, insulation, or dry-pipe system components where required.

E. Sprinkler piping shall be coordinated with ceiling systems, ductwork, lighting, piping, and other building components. Sprinkler heads shall be centered in ceiling tiles unless otherwise indicated. Final exact head locations shall be verified with the Architect/Engineer on coordinated shop drawings and prior to installation.

F. All exposed piping, valves, hangers, and accessories shall be painted in accordance with Section 21 05 00 and coordinated with architectural finish schedules. Piping in unfinished areas shall be primed and painted red unless otherwise directed.

G. Provide caulking and sealing at sleeves and penetrations through floors, walls, and rated assemblies. All penetrations shall be restored to the required fire/smoke rating using tested firestop assemblies in accordance with ASTM E814/UL 1479.

1.3 RELATED DOCUMENTS

A. Section 21 05 00 – Common Work Results for Fire Suppression.

B. Section 21 30 13 – Electric-Drive Fire Pumps

C. Section 28 31 00 – Fire Detection and Alarm System

D. Division 26 - Electrical

E. Division 07 – Firestopping.

1.4 DESIGN CRITERIA

A. Hazard Classification and Design Density: As shown on drawings and in coordination with the AHJ. Unless noted otherwise, use the density/area method per NFPA 13.

B. Remote Area Adjustments: Apply quick-response reductions, sloped ceiling adjustments, and other permitted modifications as allowed by NFPA 13 and as approved by the AHJ.

C. Water Supply: Utilize available fire service water supply. Fire-service backflow preventer is indicated under Civil/site utility documents where applicable. Sprinkler Contractor shall include backflow preventer pressure loss in hydraulic calculations based on the device indicated or submitted. Document static, residual, flow, and backflow preventer pressure loss data used for calculations.

D. Temperature Conditions: Wet-pipe sprinkler system piping shall be installed only in areas maintained at not less than 40°F unless freeze protection is provided in accordance with NFPA 13 and approved by the Authority Having Jurisdiction. Where areas cannot be maintained at not less than 40°F, provide approved freeze-protection measures, including listed dry-type sprinklers, auxiliary heat, heat tracing, insulation, dry-pipe system components, or other AHJ-approved measures as required for the installed condition.

PART 2 – PRODUCTS

2.1 SPRINKLERS

A. Sprinklers shall be UL listed and FM approved where applicable, of type, orientation, temperature rating, K-factor, response type, finish, and coverage required by NFPA 13, the Drawings, ceiling conditions, and hazard classification. Sprinklers shall be installed using manufacturer’s listed sprinkler wrench. Acceptable manufacturers: Victaulic, Viking, Reliable, Tyco, or approved equal.

B. Provide recessed, pendent, upright, and concealed sprinklers of appropriate temperature ratings, K-factors, and response types to suit hazards and ceiling conditions. Where furred or finished ceilings occur, the piping shall be installed above the ceiling with the sprinkler heads nippled to the ceiling and set in white polyester coated metal escutcheon plates. Sprinkler heads shall be recessed type with white polyester coated finish in all finished ceilings unless noted or specified otherwise. Escutcheons for semi-recessed sprinkler heads in rigid ceilings shall be painted to match ceiling finishes; coordinate with the Architect accordingly.

C. Provide spare sprinklers and wrench in a listed cabinet; minimum six (6) heads representative of types installed.

D. Provide listed sprinkler guards in areas where sprinklers are subject to mechanical damage, including gymnasiums, multipurpose spaces with athletic activities, equipment rooms, storage rooms, and other locations as required by NFPA 13 and the AHJ. Guards shall be specifically listed for use with the sprinkler model, orientation (pendent/upright/sidewall), and temperature rating installed. Install guards in accordance with the guard manufacturer’s instructions and the

sprinkler manufacturer's requirements. Guards shall not interfere with sprinkler discharge pattern or required clearances.

2.2 RISER ASSEMBLY

A. Provide riser assemblies equipped with a check valve (non-slamming type), upstream and downstream pressure gauges, waterflow detector switch, test/drain valve, retarding chamber, and supervisory switches on indicating valves.

B. Provide a separate wet-pipe sprinkler zone control assembly for the remote fire-pump building. Provide a separately identifiable waterflow detector and supervisory switch on each valve controlling the water supply to the fire-pump-building sprinkler zone. Furnish and install waterflow and valve supervisory devices under this Section. Coordinate monitoring, annunciation, supervising-station transmission, and testing with Section 28 31 00.

2.3 ELECTRIC BELLS/GONGS

A. Provide electric bells, gongs, pressure switches, and alarm devices for wet-pipe alarm valves and for dry-pipe valves where dry-pipe portions of the system are required. Locate devices as required by NFPA 13, NFPA 72, and AHJ. Coordinate monitoring with Division 28.

2.4 VALVES

A. System Valves: UL listed/FM approved

B. Gate Valves

1. Up to and including 2 inches: Bronze body and trim, rising stem, hand wheel, solid wedge or disc, threaded ends.
2. Over 2 inches: Iron body, bronze trim, rising stem pre-grooved for mounting tamper switch, hand wheel, OS&Y, solid bronze or cast iron wedge, grooved ends.
3. Over 4 inches: Iron body, bronze trim, non-rising stem with bolted bonnet, solid bronze wedge, flanged ends, iron body indicator post assembly.

C. Globe or Angle Valves:

1. Up to and including 2 inches: Bronze body, bronze trim, rising stem and hand wheel, inside screw, renewable rubber disc, threaded ends, with back seating capacity.
2. Over 2 inches: Iron body, bronze trim, rising stem, hand wheel, OS&Y, plug-type disc, flanged ends, renewable seat and disc.

D. Ball Valves:

1. Up to and including 2 inches: Bronze two piece body, brass, chrome plated bronze, or stainless steel ball, Teflon seats and stuffing box ring, lever handle and balancing stops, threaded ends.
2. Over 2 inches: Cast steel body, chrome plated steel ball, Teflon seat and stuffing box seals, lever handle flanged.

E. Check Valves:

1. Up to and including 2 inches: Bronze body and swing disc, rubber seat, threaded ends.
2. Over 2 inches: Iron body, bronze trim, swing check with rubber disc, renewable disc and seat, flanged ends.

3. 4inches and over: Iron body, bronze disc with stainless steel spring, resilient seal, threaded, wafer, or flanged ends.

F. Drain Valves:

1. Compression Stop: Bronze with hose thread nipple and cap.
2. Ball Valve: Brass with cap and chain, ¾ inch hose thread.

2.5 ALARM CHECK VALVE

A. UL and FM labeled

B. Black enamel coated ductile iron body conforming to ASTM A-536, grade 65-45-12, aluminum bronze clapper, stainless steel spring and shaft, EPDM seal, and nitrile seat o-rings. Valve internal parts shall be replaceable without removing the valve from the installed position. Water working pressure is 300 psi. Suitable for constant and variable pressure systems with Series 752 retard chamber. Victaulic Firelock Series 751 or equal.

1. Accessories:
   i. Series 752 Retard Chamber: High strength ductile iron body with corrosion resistant exterior and interior coating, suitable for operating pressure to 300 psi.
   ii. Series 752V Retard Vent Kit: For use with series 752 retard chamber when an electric alarm pressure switch is installed without a water motor alarm.
   iii. Alarm Pressure Switch: System Sensor Model “EPS”.
   iv. Waterflow Detectors: System Sensor Model “WFD”.

2.6 DRY-PIPE SYSTEM COMPONENTS, WHERE REQUIRED

A. Where dry-pipe sprinkler system components are indicated on the Drawings, required by NFPA 13, or required by the Authority Having Jurisdiction for sprinkler protection in areas subject to freezing, provide dry-pipe valve, trim, air maintenance equipment, compressor, accelerator where required, galvanized piping, drains, alarms, supervisory devices, and accessories required for a complete and operable dry-pipe portion of the sprinkler system. Dry-pipe system components shall be UL listed and FM approved for fire protection service.

B. Dry-pipe valve assembly shall be low-differential, latched-clapper type with ductile iron body, corrosion-resistant internal components, externally resettable clapper, factory trim, air and water pressure gauges, alarm connections, supervisory switches, drain connections, and accessories required for operation. Valve working pressure shall be not less than 300 psi. Basis of design: Victaulic FireLock NXT Series 768 or approved equal.

C. Provide air maintenance device, pressure-reducing regulator, restrictor, check valve, strainer, gauges, flexible connections, and associated trim required to maintain system air pressure in accordance with valve manufacturer’s requirements and NFPA 13.

D. Provide listed air compressor sized for the dry-pipe system volume and fill-time requirements of NFPA 13. Compressor shall be coordinated with the dry-pipe valve manufacturer and shall be furnished with required controls, pressure switch, disconnecting means where integral to the package, and accessories. Coordinate electrical power requirements with Division 26.

E. Provide dry accelerator where required by NFPA 13, system volume, valve manufacturer’s requirements, or AHJ. Accelerator shall be compatible with the dry-pipe valve assembly and system air pressure range.

F. Provide low-point drains, auxiliary drains, drum drips, inspector's test connections, and signage for dry-pipe portions of the system in accordance with NFPA 13. Locate drains where accessible for maintenance and where discharge will not damage building finishes or create a hazard.
G. Piping for dry-pipe portions of the sprinkler system shall be Schedule 40 galvanized steel unless otherwise permitted by NFPA 13, approved by the AHJ, and accepted by Engineer.
H. Dry-pipe portions of the system shall be hydrostatically tested, air tested, flushed, commissioned, and documented in accordance with NFPA 13, manufacturer's requirements, and AHJ requirements.

2.7 FIRE DEPARTMENT CONNECTIONS (FDCs)
A. Wall connections shall be equal to Potter Roemer 5025-D, chrome-plated cast brass body with drop clappers, 6" x 2.5" x 2.5" back inlet, polished chrome-plated brass plate, "AUTOMATIC SPRINKLER", polished chrome-plated brass 2.5" double female snoots with rigid end N.P.T. x pin lug hose thread swivels, pin lug plugs and chains.

B. Pedestal connections shall be equal to Potter Roemer 5763-D, polished chrome-plated free-standing cast brass pedestal body, with drop clappers, two way 2.5" x 2.5" x 6" inlet, polished chrome-plated brass plate "AUTOMATIC SPRINKLER", polished chrome-plated brass 2.5" double female snoots with rigid end N.P.T. x pin lug hose thread swivels, pin lug plugs and chains.

2.8 PIPING
A. Overhead Piping

1. General: Provide black steel pipe conforming to ASTM A795, ASTM A53, or ASTM A135, UL listed and FM approved for fire protection service. Fittings and joints shall likewise be UL/FM approved. Installation shall comply with NFPA 13, as well as state and local code requirements. Lay out piping to minimize conflicts with lighting, ceilings, and other building systems, and to avoid unnecessary offsets or multiple parallel runs. Do not route piping in a manner that interferes with equipment or systems outside the scope of this contract. Where piping locations are critical, they shall be indicated or detailed on the drawings.
2. Threaded Pipe: Schedule 40 pipe 1" through 6" NPS and Schedule 30 pipe 8" NPS and larger may be threaded as approved by UL, FM, and NFPA 13.
3. Roll-Grooved Pipe: Schedule 10 pipe 1-1/4" through 12" NPS may be roll-grooved and joined with UL listed rubber-gasketed couplings as approved by UL, FM, and NFPA 13.
4. In applicable sizes, fittings shall be short-pattern, with flow equal to standard pattern fittings. Basis of Design: Victaulic FireLock.
5. Grooved joint couplings shall consist of two ductile iron housing segments, pressure responsive elastomer gasket, and ASTM A449 zinc-electroplated steel bolts and nuts.
6. Rigid: Coupling housings with offsetting, angle-pattern bolt pads shall be used to provide system rigidity and support and hanging in accordance with ANSI B31.1 and B31.9. Installation-Ready, for direct stab installation without field disassembly. Basis of design: Victaulic Style 107N.
7. Flexible: use in locations where vibration attenuation and stress relief are required. Basis of design: Victaulic Style 177 Installation-Ready, and Style 77.

8. Other Piping, Fittings/Joints: Schedule 10, 30, or 40 pipe with welded outlets and joints are acceptable in accordance with UL, FM, and NFPA 13.
9. Piping for dry-pipe portions of the sprinkler system, where required, shall be Schedule 40 galvanized steel unless otherwise permitted by NFPA 13, approved by the AHJ, and accepted by Engineer.
10. Flexible Sprinkler Drops
    -In lieu of rigid pipe offsets or return bends for sprinkler drops, a flexible stainless steel sprinkler drop system may be used to facilitate final sprinkler location within finished ceilings and walls. The drop system shall consist of braided Type 304 stainless steel flexible hose, zinc-plated steel male threaded nipple, and a captured coupling assembly (Victaulic FireLock VicFlex IGS Series with Style 108 coupling or approved equal). The coupling shall connect to branch-line piping, and the reducer shall be zinc-plated steel with a female thread for sprinkler head connection.

    -Coupling: Victaulic FireLock IGS Groove Style 108, single-bolt, with ductile iron housings, EPDM gasket, and zinc-electroplated steel bolt and nut conforming to ASTM A449.

    -Hose: UL listed and FM approved braided stainless steel hose, Series AH2 or AH2-CC, with 3” or 2” minimum bend radius as required for confined space installation.

    -Fittings: Provide UL/FM approved union joints for ease of installation and removal.

    -Brackets: Flexible drop shall attach to the ceiling grid using UL/FM approved Series AB1 or AB2 open-gate brackets, allowing installation before ceiling tile placement.

    -Ratings: Braided drop assembly shall be UL listed for sprinkler service at 175 psi (1207 kPa) and FM approved to 200 psi (1379 kPa).

B. Underground Piping

1. Provide ductile iron pipe (DIP) conforming to AWWA C151, cement-mortar lined per AWWA C104, and UL/FM listed for fire protection service. Fittings shall be ductile iron, mechanical joint type, conforming to AWWA C110 or C153, UL/FM listed, and rated for a minimum working pressure of 350 psi. Joints shall comply with AWWA C111 (mechanical joint) or be restrained as permitted by NFPA 24.
2. PVC pipe may be used where permitted by the AHJ, conforming to AWWA C900 DR18, UL/FM listed for fire protection service, and installed in accordance with NFPA 24.
3. Install all piping with thrust restraint at changes in direction, tees, plugs, caps, and dead ends using concrete thrust blocks in accordance with NFPA 24, or approved restrained joint systems.

4. All installation, trenching, and backfilling shall comply with NFPA 24 and Division 31 – Earthwork.

2.9 Trenching and Backfill (Underground Piping)

A. Perform trenching and backfill for underground fire service piping in accordance with NFPA 24 and Division 31 – Earthwork.

B. Provide uniform bedding for pipe, proper compaction of backfill, and protection against settlement.

C. Provide concrete thrust blocks or restrained joints at all changes of direction, tees, plugs, caps, and as otherwise required by NFPA 24.

D. Dewater excavations as necessary and maintain trenches free of water until backfilling is complete.

E. Backfill shall be placed in lifts and compacted to match adjacent undisturbed soil conditions.

2.10 HANGERS AND SUPPORTS

A. Hangers: UL listed for sprinkler service; spacing and types per NFPA 13. Provide seismic bracing where required. All inserts and supports shall be installed prior to fireproofing. Coordinate with other trades.

2.11 DRAINS AND TEST CONNECTIONS

A. Provide inspectors' test connections, main drains piped to the exterior or to dedicated plumbing drains as indicated, and auxiliary drains where required.

2.12 BACKFLOW PREVENTERS

A. Fire-service backflow preventer shall be as indicated on the Drawings. Where fire-service backflow preventer is indicated under Civil/site utility documents, it is not furnished or installed under this Section. Fire Sprinkler Contractor shall coordinate connection to the fire service, available pressure, flow test data, device pressure loss, valve locations, drain requirements, testing requirements, and acceptance requirements with the Civil documents, site utility contractor, and Authority Having Jurisdiction.

B. Where fire-service backflow preventer is not indicated under Civil/site utility documents, fire-service backflow preventer shall be furnished by the Plumbing Contractor and installed by the Fire Sprinkler Contractor unless indicated otherwise. Plumbing Contractor and Fire Sprinkler Contractor shall coordinate procurement, submittals, scheduling, connection details, testing, certification, and warranty responsibility so the installation is complete, operational, and accepted by the Authority Having Jurisdiction.

C. Fire-service backflow preventer shall be complete with test cocks, drain elbow, OS&Y gate valves, supervisory switches where required, and accessories required for a complete and accepted installation. Backflow preventer shall be UL listed or UL classified, as applicable, and FM approved for fire protection service.

D. Where a detector assembly is indicated or required, backflow preventer shall be a double check detector assembly complying with ASSE 1048 and AWWA C510. Where a non-detector

double check valve assembly is indicated or accepted by the Authority Having Jurisdiction, assembly shall comply with ASSE 1015 and AWWA C510.

E. Backflow preventer body shall be ductile iron, ASTM A536, Grade 65-45-12 minimum, with fusion-bonded epoxy coating on internal and external surfaces suitable for potable water service. Provide stainless steel check seat disc holders, shafts, and springs. Provide resilient seats and seals suitable for continuous potable water service.

F. Field testing, certification, and all required startup and acceptance documentation shall be coordinated by the Fire Sprinkler Contractor where the backflow preventer is installed by the Fire Sprinkler Contractor, unless indicated otherwise.

PART 3 – EXECUTION

3.1 TESTING

3.1.1 Hydrostatic Test
A. All aboveground sprinkler piping shall be hydrostatically tested at 200 psi (1380 kPa) for a duration of two (2) hours, or at 50 psi (345 kPa) in excess of maximum system working pressure (whichever is greater), in accordance with NFPA 13.
B. Testing shall be performed in the presence of the Owner’s representative, the Architect/Engineer, and the Authority Having Jurisdiction (AHJ).
C. Any leaks, defective materials, or unsatisfactory workmanship shall be corrected at no additional cost to the Owner, and the test repeated until satisfactory.

3.1.2 Underground Piping Test
A. Underground fire service piping shall be tested in accordance with NFPA 24 at 200 psi (1380 kPa) for two (2) hours, or 50 psi (345 kPa) above maximum static pressure, whichever is greater.
B. All flushing and hydrostatic tests for underground piping shall be coordinated with the AHJ and witnessed by the Architect/Engineer and Owner’s representative.

3.1.3 Flushing
A. All aboveground and underground piping shall be thoroughly flushed in accordance with NFPA 13 and NFPA 24 prior to connection of sprinklers or system devices.
B. Contractor shall provide temporary piping, hoses, drains, and water disposal as necessary.

3.1.4 Alarm and Supervisory Tests
A. Demonstrate proper operation of waterflow alarms, supervisory devices, and monitoring components in the presence of the Architect/Engineer, Owner, and AHJ.
B. Coordinate with Division 28 – Fire Alarm for acceptance testing of fire alarm interface.
C. Test the remote fire-pump-building sprinkler waterflow detector and each valve supervisory switch through individual annunciation at the main-building fire-alarm control unit and receipt by the supervising station. Point descriptions shall clearly identify the remote fire-pump building and the associated device or valve.

3.1.5 Certification
A. Following successful completion of all required tests and inspections, and prior to project

occupancy, submit a completed “Contractor’s Material and Test Certificate for Aboveground Piping” and “Contractor’s Material and Test Certificate for Underground Piping” as required by NFPA 13 and NFPA 24.

B. Certificates shall be signed by the installing contractor and witnessed/approved by the AHJ.

END OF SECTION

SECTION 22 05 00 - COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 SCOPE
The work of this Division includes all labor, materials, equipment, and services necessary to provide a complete and operational plumbing system as described in the Contract Documents. Work includes coordination with other trades and compliance with all applicable codes and standards.

1.2 RELATED DOCUMENTS
A. Requirements of Divisions 00 and 01 apply to this Division.
B. Drawings and specifications are complementary; what is required by one shall be binding as if required by all.

1.3 CODES AND STANDARDS
A. All work shall be performed in accordance with the latest applicable edition of the respective code, including but not limited to:
   1. 2021 International Plumbing Code (IPC)
   2. 2021 International Energy Conservation Code (IECC)
   3. 2021 International Fuel Gas Code (IFGC)
   4. NFPA 101, Life Safety Code
   5. Americans with Disabilities Act (ADA)
   6. NSF International Standards
   7. Local Plumbing Codes and Ordinances
   8. Applicable ASTM, ANSI, ASME, and UL Standards

1.4 FEES, PERMITS AND TAXES
A. The Contractor shall obtain and pay for all permits, licenses, inspections, and connection fees required. The Contractor shall pay all taxes levied in connection with the work.

1.5 SUBMITTALS
A. The symbol "<S>" indicates a requirement for submittals.
B. Submit product data and shop drawings as soon as practicable and within thirty (30) days of contract award and prior to fabrication or installation.
C. Submittals shall include:
   1. Manufacturer’s name and model number
   2. Performance ratings, compliance with codes/standards, and third-party listing where applicable.
   3. Catalog data, diagrams, performance curves, dimensions, weights, and installation instructions.
   4. Identification of all deviations from the Contract Documents.
   5. Side-by-side comparison to basis-of-design product for any proposed substitution.
D. Accompany each submittal with a certification that the data has been checked for compliance with contract requirements and field conditions.

E. Incomplete submittals shall be returned without review.
F. Proof of equality for substitutions is the responsibility of the Contractor; Architect's decision is final.
G. Provide sufficient copies for distribution to Owner, Architect, Engineer, and Contractor.
H. Approval of submittals signifies general conformance only and does not relieve the Contractor from full responsibility for compliance with the Contract Documents, applicable codes, required dimensions, proper coordination with other trades, and the specified performance of the work.
I. Resubmittals due to incompleteness or errors shall be at no cost to the Owner.
J. The size of plumbing equipment shown on the drawings is based on the dimensions of a specific manufacturer. Other manufacturers may be acceptable; however, it is the Contractor's responsibility to verify that proposed equipment will fit within the available space. Where required by the Architect/Engineer or Owner, provide shop drawings indicating the final arrangement and clearances.

1.6 PRIOR APPROVAL
A. Requests for substitution ("or equal") shall be submitted via email to the Architect/Engineer no later than ten (10) calendar days before bid date.
B. Requests shall include manufacturer's published data, performance comparisons, and side-by-side documentation showing equivalency to the specified basis-of-design product.
C. Incomplete substitution requests will not be considered.
D. Proof of equality rests solely with the Contractor.
E. Where the Contract Documents reference a specific manufacturer or product, such reference is intended to establish a standard of quality, performance, configuration, and appearance. It shall not be construed as limiting competition. Products of other manufacturers will be considered provided they meet or exceed the specified standard and are approved in writing by the Architect/Engineer.
F. Decisions of the Architect/Engineer regarding substitutions are final.

1.7 OPERATING AND MAINTENANCE MANUALS AND INSTRUCTIONS
A. Provide PDF format plus one (1) hard copy of operating and maintenance manuals.
B. Manuals shall include manufacturer's installation and service instructions, lubrication schedules, parts lists, wiring diagrams, and supplier contact information.
C. Instruct Owner's personnel in operation of systems including draining, filling, venting, and location of concealed valves.
D. Identify components not to be adjusted except by manufacturer's representatives.

1.8 COMMISSIONING
A. Coordinate with Owner's Commissioning Authority where applicable.
B. Provide startup, testing, documentation, functional performance testing support, deficiency correction, and Owner training required by the Contract Documents and applicable commissioning requirements.
C. Provide documentation and system performance verification required by applicable code and project commissioning requirements.

D. Participate in functional performance testing for domestic water systems, domestic hot water systems, hot water recirculation systems, plumbing fixtures, water heaters, pumps, mixing valves, trap primers, and related controls where applicable.
E. Correct deficiencies identified during commissioning and retest at no additional cost to Owner.

1.9 WARRANTY
A.The Contractor shall warrant all workmanship, materials, equipment, and systems for one (1) year following substantial completion. Defects shall be corrected at no cost to the Owner. Manufacturer warranties do not relieve the Contractor of obligations.
B. Warranty shall include repair or replacement of defective items at no cost to Owner.

1.10 DEFINITIONS
A. “Provide”: Furnish and install, complete and ready for operation.
B. “As Required”: Furnish and install per manufacturer’s instructions, code, and industry practice.
C. “Or Equal”: Substitution permitted only if approved in writing by Architect/Engineer.

1.11 INSPECTION OF THE SITE
The Contractor shall visit the site to verify existing conditions, utility locations, and constraints prior to bid. Notify the Architect of discrepancies that may affect the work.

1.12 QUALITY ASSURANCE
A. Perform work in accordance with recognized industry standards and codes.
B. Use skilled craftsmen experienced in plumbing installations.
C. Install systems to permit proper maintenance and future replacement.
D. Coordinate installation with other trades to avoid conflicts.

1.13 DELIVERY, STORAGE, AND HANDLING
A. Deliver products in manufacturer’s original unopened packaging.
B. Store materials in clean, dry, protected areas. Do not store directly on the ground.
C. Protect equipment with polyethylene or tarpaulin covers and allow air circulation to prevent condensation.
D. Replace damaged materials with new at no cost to Owner.

1.14 CONSTRUCTION REQUIREMENTS
A. The Contractor shall be responsible for fitting all plumbing materials and equipment into the building. Layout shall conform to structural conditions, provide proper grading of piping, avoid conflicts, and follow manufacturer installation requirements. Furnish pilot lines, vents, drains, and controls whether shown or not. Piping elevations shall give precedence to systems requiring positive grade for operation.
B. Plumbing drawings shall be coordinated with those of other trades. Work shall be laid out and installed to allow orderly, direct, and efficient progress for all trades.
C. The Contractor shall be responsible for providing correct size and location of sleeves, openings, and inserts in the structure. If departures from the drawings are required, submit detailed drawings with written justification to the Architect. Do not proceed without written approval.

D. In finished areas, plumbing piping shall be concealed unless specifically noted otherwise. If concealment is not feasible, immediately notify the Architect. In equipment rooms and unfinished spaces, install piping as high as possible, at a continuous grade, and grouped wherever practical.
E. Cut and fit plumbing piping accurately to measurements established on site. Do not spring or force pipe into place. Exposed piping shall run parallel to building lines and be sloped as required. Close all open ends during construction until final connections are made.
F. Review architectural and structural drawings prior to bidding. No allowances will be made for unfamiliarity. Provide drilled-in inserts only, unless otherwise approved. Openings in concrete or masonry shall be core-drilled or saw-cut using proper equipment; explosive or impact-driven inserts are prohibited unless specifically approved. Concealed plumbing shall be installed in sequence with the general construction.
G. The plumbing drawings do not show exact locations of outlets, fixtures, or equipment. The Contractor shall determine exact locations by reference to general and detail drawings, equipment shop drawings, rough-in diagrams, and field measurements in coordination with other trades. Minor relocations required due to field conditions or as directed by the Owner shall be made without additional cost to the Owner.

1.15 ISOLATION
Install equipment and piping to prevent transmission of vibration and objectionable noise into occupied areas.

1.16 DAMAGE
The Contractor shall be responsible for damage to the structure, concealed utilities, and finishes caused by negligence. Repair damage at no cost to the Owner.

1.17 SAFETY GUARDS
Provide guards for rotating shafts, belts, and other moving equipment parts.

1.18 MANUFACTURER’S DIRECTIONS
Install equipment and materials in accordance with manufacturer’s published instructions. Report conflicts between contract documents and manufacturer’s directions to the Architect.

1.19 CLOSEOUT SUBMITTALS
A. Provide record drawings, warranties, spare parts lists, test reports, and O&M manuals organized by specification section in PDF format plus one (1) hard copy.
B. Submit prior to final payment.

PART 2 - PRODUCTS

2.1 MATERIALS: All materials shall be new, free of defects, and meet the requirements of these specifications.

2.2 MANUFACTURER’S REQUIREMENTS: Standard catalog items shall meet full specification requirements.

2.3 SERVICE AND REPAIR PARTS: Provide equipment with local service and repair parts

availability.

2.4 FLAME SPREAD PROPERTIES: Materials for insulation and adhesives shall comply with NFPA and UL requirements: maximum flame spread 25, smoke developed 50.

2.5 ACCESS PANELS: Provide flush-mounted metal access panels with concealed hinges and key-operated locks at all locations where valves, fittings, equipment, or filters are concealed or otherwise inaccessible. Access panels shall be provided as required to permit inspection, maintenance, and service.

2.6 FLOOR, CEILING, AND WALL PLATES: Provide chromium-plated escutcheons at pipe or hanger rod penetrations in finished spaces (including mechanical spaces), fitted tight to pipe or insulation. Material and Type: Chrome plated brass or chrome plated steel, one piece or split type with concealed hinge, with set screw for fastening to pipe, or sleeve. Use plates that fit tight around pipes, cover openings around pipes and cover the entire pipe sleeve projection.

2.7 EQUIPMENT NAMEPLATES: Provide engraved metal nameplates with manufacturer's name, equipment model number, serial number, capacity, voltage, horsepower, manufactured date, and equipment designation corresponding to designation on the plans.

2.8 IDENTIFICATION:

A. Each piece of equipment, every valve not immediately identifiable by service, and every piping system other than cast iron sewer lines shall be permanently and clearly identified.

1. Interior (Indoor) Equipment: Engraved nameplates, with letters not less than 3/16 inch high of brass with black-filled letters, or laminated phenolic nameplates. Equipment designations shall be correlated to the designation shown on the drawings.
2. Exterior (Outdoor) Equipment: Brass nameplates, with engraved black filled letters, not less than 3/16 inch high riveted or bolted to the equipment.

B. Valve Tags shall be 19 gauge 1-1/2" round brass disc, attached with brass "S" hook or brass chain, and shall have engraved black filled numbers and letters.

C. Piping systems shall be identified at intervals not exceeding ten feet (10'-0") and at all points necessary to ensure clear identification, including changes in direction, branches, and penetrations. Identification shall include service designation and direction of flow, applied with permanent pipe markers conforming to ANSI/ASME A13.1 'Scheme for the Identification of Piping Systems.' Flow arrows shall use the same ANSI background colors as their corresponding pipe markers. Markers shall be rated for the operating temperature range. High-temperature applications shall use materials such as Brady UltraTemp™ or equivalent. All-weather, vinyl-based markers (e.g., Brady B-595 or equivalent) are acceptable for general environments.

2.9 SLEEVES AND PENETRATIONS

A. Refer to AIA General Conditions.

B. Provide where piping passes entirely through walls, ceilings, roofs, and floors. Sleeves are not required where drain, waste, and vent (DWV) piping passes through concrete floor slabs located

on grade, except where penetrating a membrane waterproof floor. Sleeves shall be sized to allow free passage of pipe and, where insulated, large enough to pass insulation without damage. Provide sleeves of sufficient length to pass through entire thickness of walls, ceilings, roofs, and floors.
C. Above-grade dry-location sleeves shall be fabricated from 20 to 22 gauge galvanized steel, flush with both sides of wall or partition penetrated. Floor sleeves in pipe chases shall extend a minimum of two inches (2") above the finished floor.
D. Below-grade or wet-location sleeves shall be Schedule 40 galvanized steel pipe with integral mid-wall water stop collar. After installation of pipe, annular space shall be caulked with non-shrink grout or approved sealant to provide a waterproof seal.
E. Sleeves passing through floors in wet areas such as mechanical equipment rooms, lavatories, kitchens, and other plumbing fixture areas must extend a minimum of 4 inches above the finished floor.
F. Where sleeves pass through fire-rated assemblies, provide firestop systems tested in accordance with ASTM E814 or UL 1479 and listed in the UL Fire Resistance Directory. Firestopping materials shall be BIO Fireshield BIOTHERM 200, BIO K-2 mortar, or approved equal.
G. All penetrations shall be sealed for smoke, sound, weather, and thermal resistance as required. Coordinate firestopping with Division 07 – Firestopping.
H. Where waterproofing membranes or vapor barriers are penetrated, provide compatible mechanical sleeve seals or Link-Seal modular seals to ensure watertight integrity. Provide two modular seals (one each side of the sleeve) for exterior wall penetrations below grade.
I. Sleeves must not be installed in structural members, except where indicated and approved by the Structural Engineer. Core drilling shall be performed with diamond-tipped equipment specifically designed for that purpose. Impact or explosive methods are prohibited.

J. Responsibility for coordination of sleeve location rests with the Plumbing Contractor. Where sleeves are omitted or mislocated, cutting, patching, and repair shall be provided at no additional cost to the Owner.

PART 3 - EXECUTION

3.1 WORKMANSHIP: Work shall be performed by skilled tradespeople. Deficient work shall be corrected at no cost.

3.2 PROTECTION OF EQUIPMENT: Protect equipment and piping with covers. Do not use for scaffolding supports. Clean all equipment at completion.

3.3 PROTECTION OF STRUCTURE: Protect building finishes and structure during construction. Cover finished floors and stairs.

3.4 LARGE EQUIPMENT: Deliver and install equipment too large for normal access before building is closed in.

3.5 FOUNDATIONS

A. Provide reinforced concrete equipment bases as indicated. Align, level, and grout bases. Concrete foundations required by mechanical equipment shall be constructed by this contractor. See concrete work.
B. Set equipment on bases, align and level using shims, connect piping, and grout in place in that order specified. After grouting, remove forms and finish foundation surfaces smooth. Concrete work shall comply with Division 3 – Concrete.

3.6 CONFLICTS, INTERFERENCES AND COORDINATION BETWEEN TRADES
A. The Contract Drawings are diagrammatic in nature and are not to be construed as shop drawings. They establish design intent, required capacities, and approximate routing. The Plumbing Contractor shall prepare coordinated shop drawings indicating actual dimensions, offsets, elevations, and field conditions, and shall be responsible for coordination with structural members, ceilings, lighting, ductwork, plumbing, electrical, and other building systems. Where interferences occur, promptly notify the Architect/Engineer and obtain written direction before proceeding. Structural members shall not be cut or modified without written approval. Maintain clearances required for access to valves, drains, test connections, and other components.
B. Each trade shall coordinate its work with that of other trades so that the installation may be completed in a direct, workmanlike manner without delaying or obstructing others. Piping and equipment interferences shall be resolved by giving precedence to systems that require a specific grade or slope for proper operation. Where space conflicts remain, the following order of precedence shall apply:

1. Building lines
2. Structural Members
3. Soil and drain piping
4. Vent piping
5. Refrigerant piping
6. Condensate piping
7. Supply ductwork
8. Exhaust ductwork
9. Return ductwork
10. Domestic water
11. Electrical conduit
12. Natural gas piping
13. Automatic sprinkler piping
14. Compressed air piping

C. Where conflicts between specifications and drawings arise, drawings shall take precedence over specifications except in matters pertaining to quality, applications, and coordination between trades, which shall be governed by specifications.
D. The Contract Documents (drawings, specifications, addenda, and written directives) are complementary; what is required by one is as binding as if required by all. Provide all work that is reasonably inferable from the documents or necessary to deliver a complete, code-compliant system consistent with the design intent, even if every component is not explicitly called out. Minor omissions or discrepancies do not relieve the Contractor of this responsibility.

E. Where the Contract Documents conflict with applicable codes and standards, as interpreted by the Authority Having Jurisdiction (AHJ), the codes shall govern. When differing requirements exist, provide the more stringent requirement as determined by the AHJ and notify the Architect/Engineer before proceeding.

F. Where the drawings/specifications differ from a manufacturer's published installation instructions, listings/approvals, or warranty conditions, install in accordance with the manufacturer's instructions necessary to maintain the UL/FM listing and warranty and to comply with NFPA and code. Advise the Architect/Engineer of the conflict and obtain direction prior to fabrication or installation.

G. When a discrepancy or need for interpretation is discovered, submit a written request for information and do not proceed with the affected work until clarification is issued. If the Contractor proceeds without written direction, the Contractor shall furnish the work to meet the more stringent interpretation at no additional cost to the Owner and shall be responsible for all corrections. Document precedence is set forth in the order-of-precedence that follows.

3.7 CUTTING AND PATCHING

A. This Contractor shall perform all cutting required; patching shall be performed by General Contractor. Do not cut structural members or finished work without approval from the Architect.
B. This Contractor shall cut and patch all paving as required by the installation of buried piping, including utilities.

3.8 PAINTING: Leave exposed piping clean, primed, and painted per Division 9. Touch up damaged finishes of equipment with matching color touch-up paint from the equipment's manufacturer.

3.9 TRENCHING AND BACKFILL

A. Provide all excavation and backfill required for installation of plumbing systems under this Division. Work shall include removal of materials encountered, placement of bedding, shoring, compaction, and restoration of surfaces. Each trade is responsible for trenching and backfilling required for its own work.
B. Excavate trenches to the required depth and width with banks as near vertical as practical. Where required, provide sheeting, bracing, or shoring to prevent cave-ins. Trenches shall be a minimum of 12 inches wider than the outside diameter of the pipe. The trench bottom shall be uniformly graded and tamped to provide proper slope. Provide bell holes at joints. Excavate 6 inches below the pipe and backfill to grade with compacted sand or pea gravel. Where trenches are cut in fill, extend excavation to undisturbed load-bearing soil and support pipe accordingly. Do not backfill until piping has been tested and accepted.
C. Within six feet (6'-0") of building foundations, provide a minimum of six inches of bedding above the crown of the pipe using pea gravel or approved sand. Subsequent layers of backfill may consist of excavated earth, loam, sand, or gravel free of debris, organic matter, or stones larger than 1-1/2 inches. Place backfill in layers not exceeding 6 inches, compacting and moistening each layer before placing the next. Furnish all additional material required for backfilling and remove excess materials and debris from the site. Special backfill shall be provided where shown on drawings or required by the specifications.

D. Perform all excavation and backfilling in a manner that does not endanger adjacent structures, utilities, or work. Provide shoring and bracing as required for safety and stability.

3.10 LUBRICATION: Provide lubricants for all equipment bearings and extend fittings to accessible locations where required.

3.11 ELECTRICAL WORK: Electrical Contractor shall provide power wiring, disconnects, starters, and final power connections to plumbing equipment unless indicated otherwise. Plumbing Contractor shall provide factory control wiring, low-voltage control wiring, control devices furnished with plumbing equipment, and interlock wiring required for plumbing equipment operation unless indicated otherwise. Coordinate voltage, phase, MCA/MOCP, controls, and connection requirements with Division 26 and approved equipment submittals.

3.12 SCHEDULE OF PLUMBING BRANCHES
The size of branches or runouts to each fixture shall be as indicated on the drawings. Where no size of connection is indicated, connection shall be not less than in accordance with the following schedule or local plumbing code, whichever is more stringent:

Fixture	**Waste**	**Vent**	**C.W.**	**H.W.**
Water Closet	4″	3″	1″	—
Lavatories	1-1/2″	2″	1/2″	1/2″
Urinals (Wall Mounted)	2″	2″	3/4″	—
Sinks	1-1/2″	2″	1/2″	1/2″
Service Sinks	3″	2″	1/2″	1/2″
Floor Drains	4″	3″	—	—
Wall Faucets/Hose Bibbs	—	—	3/4″	—
Water Coolers	1-1/2″	1-1/2″	1/2″	—

3.13 EQUIPMENT CONNECTIONS: Bring required services to equipment, make final connections, and ensure ready for operation.

3.14 EQUIPMENT AND AIR INTAKE ARRANGEMENTS: Install equipment to permit access for service. Locate intakes minimum 15 feet from plumbing vents and exhausts.

3.15 EXECUTION OF WORK: Schedule and execute work to avoid interference with other trades.

3.16 FLASHING AND WATERPROOFING: Provide flashing and waterproof seals at all penetrations through exterior walls and roofs.

3.17 TESTS: Perform tests required by code, Authority Having Jurisdiction, Contract Documents, and individual Division 22 sections. Notify Architect/Engineer at least four (4) days in advance of

tests requiring observation. Do not conceal piping until required testing is complete and accepted. Correct deficiencies and retest at no additional cost to Owner.

3.18 CLEAN-UP: Maintain a clean work area daily. Flush piping systems and clean exposed surfaces at project completion.

3.19 FINAL OBSERVATIONS

A. At the completion of the installation of the plumbing systems and prior to final acceptance, this Contractor shall carefully inspect the entire project to assure himself that the project is ready for final acceptance. This inspection shall occur prior to requesting final observations from the Architect/Engineer.

B. Deliver all test certificates, as-built drawings, operation and maintenance manuals, warranty information, etc, with a letter of transmittal at or before the final observation.

C. Acceptance will not be granted until all required documentation and corrective work have been completed.

END OF SECTION

SECTION 22 05 29 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

Provide pipe hangers, supports, anchors, inserts, and accessories required for supporting plumbing piping and equipment.

1.2 SUBMITTALS
A. Product Data: Submit manufacturer's catalog data for hangers, supports, and accessories.
B. Shop Drawings: Submit drawings where support coordination is required with other trades.
C. Certificates: Submit certification of MSS compliance for hangers and supports.

1.3 DELIVERY, STORAGE, AND HANDLING
A. All hangers, supports, inserts, and accessories shall be delivered to the site new and properly packaged.
B. Materials shall be stored off the ground, under cover, and protected from dirt, moisture, and mechanical damage.
C. All materials shall be handled in such a manner as to prevent any damage. Materials found to be damaged shall be removed from the site and replaced at no additional cost to the Owner.

1.4 ENVIRONMENTAL REQUIREMENTS – FIRESTOPPING
A. Install firestopping materials only under environmental conditions recommended by the manufacturer.
B. Do not install firestopping when ambient conditions are below manufacturer's minimum temperature requirements or when surfaces are wet or frosted.
C. Provide adequate ventilation during and after installation of firestopping to facilitate proper curing and to protect building occupants.

1.5 QUALITY ASSURANCE
A. Provide hangers and supports manufactured in accordance with MSS SP-58 and MSS SP-69.
B. Manufacturer shall have a minimum of 5 years' experience producing hangers and supports of the types specified.
C. Installer shall have a minimum of 3 years' experience installing plumbing hangers and supports.

1.6 WARRANTY
Provide one (1) year warranty on workmanship and materials from date of substantial completion.

1.7 REFERENCES
A. MSS SP-58 – Pipe Hangers and Supports – Materials, Design, Manufacture, Selection, Application, and Installation.
B. MSS SP-69 – Pipe Hangers and Supports – Selection and Application.

C. NFPA 13 – Installation of Sprinkler Systems (coordination only).
D. ASTM E814 – Fire Tests of Through-Penetration Fire Stops.
E. UL 1479 – Fire Tests of Through-Penetration Firestops.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
Subject to compliance with specifications, provide products by B-Line, Carpenter & Paterson, Globe, Michigan Hanger, Tolco, or approved equal.

2.2 PIPE HANGERS AND SUPPORTS
A. Clevis Hangers: Adjustable type, carbon steel, sized for pipe.
B. Trapeze Hangers: Channel type, sized for multiple pipes, with threaded rod supports.
C. Riser Clamps: Carbon steel, sized for pipe.
D. Floor Supports: Adjustable steel base with U-bolt or clamp.
E. Copper Pipe Hangers: Clevis or strap type, copper-plated to prevent galvanic action.
F. Shields: Provide protective shields for insulated piping at all hanger locations. Shields shall be sized to prevent compression of insulation.
G. Expansion Anchors and Inserts: For attachment to concrete and structural steel.
H. Formed Steel Channel Supports: Galvanized 12-gauge steel, continuous, with 1-5/8 inch wide channel and holes 1-1/2 inches on center. Provide manufacturer's fittings and accessories as required for a complete system. Manufacturers: Unistrut, Kindorf, B-Line, or approved equal.

2.3 ACCESSORIES
A. Hanger Rods: Threaded carbon steel rods, sized for load.
B. Inserts: Steel inserts designed for attachment of hanger rods to concrete.
C. Sleeves: As specified in Section 22 05 00 – Common Work Results for Plumbing.

2.4 FIRESTOPPING
A. Firestopping materials shall be UL-listed systems, tested in accordance with ASTM E814 and UL 1479.
B. Materials shall provide an effective barrier to the passage of flame, smoke, and gases, and maintain the fire-resistance rating of the penetrated assembly.
C. Firestop systems shall be installed in accordance with manufacturer's instructions and approved by the Authority Having Jurisdiction.
D. Firestopping is further specified in Division 07 – Firestopping; this section provides coordination requirements only.

PART 3 – EXECUTION

3.1 PREPARATION
A. Coordinate hanger and support installation with other trades to avoid interference.
B. Verify that structural openings and substrates are ready to receive hangers and supports.
C. Provide required inserts and sleeves prior to concrete placement.

D. Confirm clearances for insulation thickness and access to valves and equipment before installing hangers.

3.2 INSTALLATION
A. Install hangers and supports in accordance with MSS SP-58 and MSS SP-69.
B. Hangers for pipe sizes ½" to 2": Carbon steel, adjustable swivel, split ring.
C. Hangers for pipe sizes 2-1/2" and larger: Carbon steel, adjustable, clevis.
D. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
E. Wall support for pipes 3" and smaller: Cast iron hook.
F. Wall support for pipe sizes 4" and larger: Welded steel bracket and wrought steel clamp.
G. Vertical support: Steel riser clamp.
H. Floor support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
I. Copper pipe support: Copper-plated, carbon steel adjustable ring.
J. Provide clearance for insulation and access to valves and fittings.
K. Provide hangers within 12 inches of each horizontal elbow.
L. Provide independent support for equipment connections; do not support equipment from connected piping.
M. Install trapeze hangers where multiple parallel pipes occur.
N. Install firestopping at penetrations in accordance with Division 07 – Firestopping.
O. Install inserts for placement in concrete forms.
P. Install insets for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
Q. Provide hooked rod to concrete reinforcement section for inserts carrying pipe 4" and larger.
R. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
S. 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.
T. Provide hangers with 1-1/2" minimum vertical adjustments.
U. Design hangers for pipe movement without disengagement of supported pipe.
V. Provide clearance in hangers and from structure and other equipment for installation of insulation.
W. Install hangers with minimum ½" space between finished covering and adjacent work.
X. Where piping is installed in parallel and at same elevation, provide multiple pipe or trapeze hangers.

3.3 ADJUSTMENT
A. Adjust hangers to provide uniform line and grade of piping after installation.
B. Re-adjust hangers and supports after system testing and insulation installation.

3.4 SECURING AND SUPPORTING OF PIPE
A. All pipe shall be supported from the building structure by means of approved hangers and supports. Piping shall be supported to maintain required grade and pitch, prevent vibration, and provide for expansion and contraction.

B. All hangers shall be secured to approved inserts wherever possible and practicable. Hanger inserts shall be set in place before concrete is poured. Where hangers attach to the structural steel framing, approved beam clamps shall be employed. Where required, the Mechanical Subcontractor shall install channels to span between framing members.
C. Hanger spacing for horizontal piping shall not exceed the following:

FERROUS (SCHEDULE 40) PIPING
- 1/2 inch: 5′-0″
- 3/4 inch: 6′-0″
- 1 inch: 7′-0″
- 1-1/2 inch: 8′-0″
- 2 inch and larger: 10′-0″

COPPER PIPING/TUBING
- Up to 1-1/2 inch: 6′-0″
- 2 inch and larger: 8′-0″

PLASTIC (PVC) PIPING
- All sizes: 4′-0″

CAST IRON PIPING
- All sizes: One hanger per length of pipe, not exceeding 5′-0″ intervals.

D. Vertical lines shall be adequately supported at their bases, either by a suitable hanger placed in the horizontal line near the riser, or by a base fitting set on a pedestal or foundation, and from each floor slab by means of approved clamp type supports bearing on the slab or beam. In no case shall spacing of supports for vertical piping be greater than the following:

FERROUS (SCHEDULE 40) PIPING
- At the base and at each story level, not exceeding 30′-0″ intervals.

COPPER PIPING/TUBING
- Up to 1-1/4 inch: 4′-0″
- 1-1/2 inch and larger: At the base and at each story level, not exceeding 15′-0″ intervals.

PLASTIC (PVC) PIPING
- Up to 1-1/2 inch: 4′-0″
- 2 inch and larger: At the base and at each story level, not exceeding 20′-0″ intervals.

CAST IRON PIPING
- At the base and at each story level, not exceeding 15′-0″ intervals.

E. Hangers for piping 2 inches and smaller shall be of the split cast ring type with fastening device. Hangers for piping larger than 2 inches shall be of the adjustable clevis hanger type. Hanger rods shall be minimum 3/8 inch diameter and shall have machine threads. Brackets of approved type may be used along walls. Hanger rods for individually suspended horizontal pipes shall be steel rods of size indicated on the following table:

NOMINAL PIPE SIZE – ROD SIZE

- 1/2 inch to 2 inch: 3/8 inch
- 2-1/2 inch to 3 inch: 1/2 inch
- 4 inch: 5/8 inch
- 6 inch: 3/4 inch
- 8 inch to 12 inch: 7/8 inch
- 14 inch and larger: 1 inch

END OF SECTION

SECTION 22 07 19 - PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 SUMMARY
Provide thermal and condensation-control insulation for plumbing piping and specialties, including jackets, fittings, and accessories necessary for a complete installation.

1.2 REFERENCES
A. 2021 International Energy Conservation Code (IECC), Section C404 – Service Water Heating
B. ASTM E84 – Surface Burning Characteristics of Building Materials.
C. ASTM C547 – Mineral Fiber Pipe Insulation.
D. ASTM C534 – Elastomeric Cellular Insulation.
E. ASHRAE 90.1 – Energy Standard for Buildings Except Low-Rise Residential Buildings.

1.3 RELATED SECTIONS
A. Section 22 05 00 – Common Work Results for Plumbing
B. Section 22 11 16 – Domestic Water Piping
C. Section 22 13 16 – Sanitary Waste and Vent Piping
D. Section 22 14 13 – Storm Drain Piping, where applicable

1.3 QUALITY ASSURANCE
A. Insulation systems shall have composite flame spread index of 25 or less and smoke developed index of 50 or less, tested in accordance with ASTM E84.
B. Installer shall have a minimum of 3 years of documented experience with plumbing insulation systems.

1.4 SUBMITTALS
A. Product Data: Insulation material, jacketing, adhesives, mastics, and fitting covers.
B. Shop Coordination: Indicate insulation thicknesses by system and location; show jacketing in equipment rooms and exterior exposures.
C. Operation and Maintenance Data.

1.5 WARRANTY
Provide one (1) year warranty on insulation materials and installation from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS
A. All domestic cold water piping, domestic hot water piping, and domestic hot water recirculating piping above grade shall be insulated as follows:
1. Mineral fiber pipe insulation, ASTM C547, preformed fiberglass. This insulation material shall be furnished with a “Universal” white vapor barrier jacket with flap. All jacket materials shall be factory applied. Provide manufactured rigid fitting covers.

2. Minimum nominal thickness: piping 1-1/2” and smaller – 1” insulation; piping 2” and greater – 1-1/2” insulation.

3. Where piping is installed outdoors, in unconditioned spaces, or in areas subject to freezing, provide insulation thickness, vapor barrier, weatherproof jacketing, heat tracing, and accessories as required for freeze protection, condensation control, and code compliance.

B. Storm Drain Piping (indoors above conditioned areas where sweating may occur):

1. Mineral fiber pipe insulation, ASTM C547, preformed fiberglass. This insulation material shall be furnished with a “Universal” white vapor barrier jacket with flap. All jacket materials shall be factory applied. Provide manufactured rigid fitting covers.

2. Minimum nominal thickness: 1 inch unless greater thickness is required for condensation control.

C. Valves, Strainers, and Fittings: Provide preformed PVC or metal fitting covers or field-fabricated insulation. Insulation thickness shall be equal to the adjacent pipe insulation, but not less than 1 inch. Maintain vapor barrier continuity.

D. Jacketing:

1. Exterior: Aluminum jacket, 0.019 inch minimum, sealed seams.

2. Equipment Rooms/Abuse Areas: Rigid PVC jacket with sealed seams.

E. Adhesives/Mastics/Tapes: Compatible with insulation and jacketing; low-perm vapor-retarder mastics for all vapor-barrier systems.

F. Sanitary waste piping receiving air-conditioning condensate, where subject to condensation:

1. Mineral fiber pipe insulation, ASTM C547, preformed fiberglass, with factory-applied white vapor barrier jacket with flap. Provide manufactured rigid fitting covers.

2. Minimum nominal thickness: 1 inch unless greater thickness is required for condensation control.

3. Insulate horizontal piping, traps, and fittings from the condensate receptor to the change in direction to vertical, unless indicated otherwise.

PART 3 - EXECUTION

3.1 PREPARATION

A. Do not insulate until piping has been tested, cleaned, and dried.

B. Prime ferrous piping where required before applying adhesives or mastics.

3.2 INSTALLATION – GENERAL

A. Install insulation per manufacturer’s instructions; finish smooth, tight, and continuous.

B. Bevel or taper insulation neatly at valves, unions, and flanges. Seal jackets and vapor barriers continuous across fittings. Provide mastic and bands as required to maintain vapor-tight system.

C. Jackets: Lap longitudinal seams down to shed water; seal seams with manufacturer’s recommended sealant; secure bands at ≤ 9 inch centers.

D. Outdoor elastomeric insulation that cannot be jacketed shall receive manufacturer’s UV/weather-resistant coating.

E. Extend insulation a minimum of 1″ beyond walls, floors, and ceilings where piping passes through.

F. Do not install insulation until piping systems have been pressure tested, cleaned, and found tight.
G. All vapor barrier terminations shall be sealed continuous to the surface being insulated; no raw edges or unsealed ends permitted.
H. Elastomeric Insulation: Where rigid fiberglass insulation cannot be applied due to piping geometry, provide flexible closed-cell elastomeric insulation. Apply manufacturer's UV/weather-resistant coating for all elastomeric insulation installed outdoors or in areas exposed to sunlight.

3.3 FIELD QUALITY CONTROL
A. Replace any damaged, wet, or delaminated insulation.
B. Work that is unsightly, poorly sealed, or does not provide vapor-tight systems shall be rejected and corrected.

END OF SECTION

SECTION 22 08 00 - CLEANING AND TESTING OF PLUMBING SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY
Provide cleaning, flushing, disinfection, testing, and adjustment of all plumbing systems, complete and operable, in accordance with these specifications.

1.2 REFERENCES
A. International Plumbing Code (IPC), latest edition.
B. AWWA C651 – Disinfecting Water Mains.
C. NSF/ANSI 61 – Drinking Water System Components – Health Effects.
D. State and local health department requirements.

1.3 DELIVERY, STORAGE, AND HANDLING
Deliver disinfecting chemicals in manufacturer’s sealed containers. Store in a cool, dry, and secure location per manufacturer’s recommendations. Protect materials from contamination, damage, and deterioration.

1.4 ENVIRONMENTAL REQUIREMENTS
Do not perform disinfection or testing when ambient temperatures are below 40°F unless adequate provisions are made to maintain test and disinfection conditions.

1.5 QUALITY ASSURANCE
A. Perform all testing at the Contractor’s expense.
B. Correct all leaks and defects with new materials. Caulking of defective work will not be permitted.
C. Do not cover or conceal piping until inspections and approvals are complete.
D. Operate and adjust all systems to demonstrate satisfactory performance.

1.6 WARRANTY
Provide one (1) year warranty on cleaning and testing procedures from date of Substantial Completion.

1.7 CLOSEOUT SUBMITTALS
A. Submit test reports documenting hydrostatic tests, drainage tests, and disinfection results.
B. Submit verification of disinfection by the local health authority, where required.
C. Submit record documents in accordance with Division 01, indicating actual locations of test connections, drains, and any deviations from design.

PART 2 - PRODUCTS

2.1 DISINFECTION MATERIALS

A. Provide disinfecting agents capable of producing a minimum free chlorine residual of 50 ppm.
B. Acceptable agents: liquid chlorine, calcium hypochlorite, or chlorinated lime, conforming to applicable federal and state standards.

PART 3 - EXECUTION

3.1 WATER PIPING TESTS
A. Test domestic water piping hydrostatically at a pressure of not less than 150 psi for a period of 4 hours with zero leakage permitted.
B. Conduct tests before insulation or concealment of piping.
C. Correct any defects or leaks and repeat test until satisfactory results are obtained.

3.2 SANITARY DRAINAGE TESTS
A. Test sanitary waste and vent piping in accordance with IPC requirements.
B. Test drainage and vent piping in sections with a water head of 10 feet.
C. Maintain test for a minimum of 4 hours with no measurable drop in water level permitted.
D. Correct any defects or leaks and repeat test until satisfactory results are obtained.
E. Submit written test results to Architect/Engineer.

3.3 DISINFECTION OF DOMESTIC WATER PIPING
A. After successful completion of hydrostatic testing, disinfect the entire domestic water system.
B. Introduce chlorine solution through a 3/4 inch opening on the building side of the water meter.
C. Provide a minimum free chlorine residual of 50 ppm throughout the system and maintain for not less than 8 hours.
D. Operate all valves and outlets during contact period to ensure chlorine reaches all parts of the system.
E. After contact period, flush the system thoroughly until the residual chlorine concentration is reduced to not more than 0.2 ppm.
F. Perform disinfection under the direction of the local health authority, with verification testing as required.

3.4 NOTIFICATION
A. Provide written notice to the Architect not less than four (4) days prior to conducting any hydrostatic tests, drainage/vent tests, storm drainage tests, or disinfection/flushing operations. Notice shall indicate the system/area to be tested, test method, start time, expected duration, and responsible personnel.
B. Do not commence the test or disinfection until the Architect has had the opportunity to witness. If the Architect elects not to attend or is not present at the scheduled time, the Contractor may proceed.
C. If the scheduled time changes, provide a new 48-hour notice.
D. Provide calibrated gauges/instruments and all labor and materials necessary to perform the test or disinfection.

3.5 FINAL ACCEPTANCE

A. Final acceptance will be granted only after satisfactory completion of testing, disinfection, and flushing of all systems.
B. Submit written test results and verification of disinfection to the Architect/Engineer.

END OF SECTION

SECTION 22 11 16 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SUMMARY
Provide a complete domestic water piping system, including piping, fittings, valves, specialties, supports, and accessories required for a functional system.

1.2 SUBMITTALS
A. Product Data:
1. Piping: Submit data on pipe materials, fittings, and accessories.
2. Valves: Submit manufacturer's catalog information with valve data and ratings.
3. Domestic Water Specialties: Submit manufacturer's catalog data, component sizes, rough-in requirements, service sizes, and finishes.
B. Shop Drawings: Provide coordination drawings where required.
C. Certificates: Submit manufacturer certification that products meet or exceed requirements.

1.3 CLOSEOUT SUBMITTALS
A. Operation and Maintenance Data: Submit O&M manuals for valves, backflow preventers, strainers, thermostatic mixing valves, expansion tanks, trap seal primers, and other specialties, in accordance with Division 01 requirements.
B. Record Drawings: Submit as-built drawings showing actual routing of piping, valve and cleanout locations, equipment connections, and service entrance details.

1.4 DELIVERY, STORAGE, AND HANDLING
A. Provide temporary end caps and closures on piping and fittings. Maintain until installation.
B. Protect piping from entry of foreign materials by using temporary covers and isolating completed sections.
C. Store materials above grade, protected from weather and damage.

1.5 ENVIRONMENTAL REQUIREMENTS
Do not install underground piping when trench bedding is wet, frozen, or unsuitable for proper compaction.

1.6 EXTRA MATERIALS
Provide two (2) packing kits for each size valve and two (2) loose keys for outside hydrants.

1.7 WARRANTY
Provide one (1) year warranty on workmanship, materials, and equipment from date of substantial completion.

PART 2 - PRODUCTS

2.1 WATER PIPING BELOW GRADE

A. Copper Tubing: ASTM B88, Type L soft drawn for piping 1-1/2" and smaller in size, and under building slab; piping larger than 1-1/2" shall be Type L hard copper.
1. Fittings: ASME B16.22 wrought copper.
2. Joints: AWS A5.8 silver brazing alloy. Joints shall be avoided beneath building slab, and shall be permitted only to the extent of longs runs where a single roll of length of copper tubing is not of sufficient length to complete the piping run. Should a joint be required, the joint shall be made with AWS A5.8 silver brazing alloy and wrought solder joint copper fittings.
B. PVC Pressure Pipe, Where Permitted by Code and Authority Having Jurisdiction: ASTM D1785, Schedule 40 or Schedule 80, or AWWA C900 where indicated for service size and application; NSF 61 listed for potable water service.
1. Provide tracer wire at all non-metallic underground piping.
2. Fittings: Compatible pressure fittings listed for potable water service and suitable for system pressure.
3. Joints: Solvent-cemented joints using primer and solvent cement listed for potable water service and compatible with pipe and fittings.

2.2 WATER PIPING ABOVE GRADE
A. Copper Tubing: ASTM B88, Type L, hard drawn.
1. Fittings: ASME B16.18 cast copper alloy or ASME B16.22 wrought copper.
2. Joints: ASTM B32 and NSF/ANSI 372, lead-free solder (95-5 tin/antimony or tin/silver). At the contractor's option, Victaulic grooved or Nibco "PressFit" copper systems may be used per manufacturer's recommendations for sizes 2" and larger.
B. Provide dielectric fittings between dissimilar metals.
C. Fixture Connections: Brass pipe or nipples, chrome-plated where exposed. Ferrous piping connections shall not be used in copper piping systems.

2.3 PEX DOMESTIC WATER PIPING
A. Cross-linked polyethylene piping may be used for domestic cold water, domestic hot water, and domestic hot water recirculation piping where permitted by code, Authority Having Jurisdiction, and manufacturer's listing.
B. PEX tubing shall comply with ASTM F876 and ASTM F877 and shall be listed for potable water service. Tubing shall be rated for the operating temperature and pressure of the system served.
C. Fittings, rings, sleeves, manifolds, valves, and accessories shall be listed for use with the PEX piping system furnished and shall be installed in accordance with manufacturer's instructions.
D. Acceptable jointing methods include ASTM F1960 cold-expansion fittings, ASTM F1807 copper crimp fittings, ASTM F2159 plastic insert fittings, ASTM F2080 cold-expansion compression-sleeve fittings, or other listed fitting system approved by the tubing manufacturer and Authority Having Jurisdiction.
E. Do not mix tubing, fittings, rings, sleeves, tools, or accessories from different manufacturers unless specifically permitted by the manufacturers' published instructions.

F. PEX piping shall not be installed where exposed to direct sunlight, outdoors, on roofs, in return air plenums unless specifically listed for such installation, or where subject to physical damage unless protected.
G. PEX piping shall not be connected directly to water heater outlets, boilers, or other high-temperature equipment unless permitted by manufacturer's instructions and code. Provide transition to metallic piping for minimum distance required by manufacturer and Authority Having Jurisdiction.
H. Provide supports, guides, bend supports, sleeves, protection plates, expansion loops, and offsets required by manufacturer's instructions to accommodate thermal expansion and prevent abrasion, kinking, sagging, or damage.
I. Concealed PEX piping shall be installed with continuous tubing runs where practical. Joints shall be accessible where required by code or Authority Having Jurisdiction.
J. PEX piping shall be protected from contact with incompatible materials, solvents, petroleum products, excessive heat, sharp edges, and construction damage.
K. Acceptable manufacturers: Uponor, Viega, Rehau, Zurn, or approved equal.

2.4 FLANGES, UNIONS, AND COUPLINGS
A. Two (2) inches and smaller:
1. Ferrous pipe: Class 150 malleable iron threaded unions.
2. Copper tube: Class 150 bronze unions with soldered joints.
B. 2-1/2 inches and larger:
1. Ferrous pipe: Class 150 malleable iron threaded or steel slip-on flanges, neoprene gaskets.
2. Copper tube: Class 150 bronze slip-on flanges, neoprene gaskets.
C. Dielectric Connections: Provide dielectric unions or flanges where connecting dissimilar metals.

2.5 VALVES
A. Ball Valves:
1. Sizes 4 inches and smaller: Bronze body, full port, MSS SP-110, 400 psi CWP, two-piece body, blowout-proof stem, reinforced TFE seats. Where piping is insulated, provide extended handles and protective sleeve that allows operation of the valve without breaking the vapor seal or disturbing the insulation. Memory stops, which are fully adjustable after insulation is applied, shall be included. Solder or threaded ends with union.
2. ball valves installed outdoors or in-ground shall have stainless steel handle.
3. Manufacturers: Nibo, Milwaukee, or approved equal.
B. Swing Check Valves:
1. Sizes 2 inches and smaller: Bronze body, Class 125, MSS SP-80, stainless steel and thermoplastic internal parts, fabric reinforced diaphragm strainer, and soldered ends.
2. Sizes 2-1/2 inches and larger: MSS SP 71, cast iron body, bronze fitted, elastomeric diaphragm and seat disc, flange.
3. Manufacturers: Nibco, Milwaukee, or equal.
C. Gate Valves:

1. equal to Nibco S-111 or Milwaukee Gate 149, solder joint, 125lb., rising stem, solid wedge disc.

D. Temperature and Pressure Relief:

1. ANSI Z21.22 certified, bronze body, Teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees Fahrenheit, capacity ASME Section IV certified and labeled. Watts Industries or approved equal.

E. Vacuum Relief Valves: Bronze body, integral vacuum breaker. Watts N36 or equal.

2.6 SPECIALTIES

A. Strainers:

1. Sizes 2 inches and smaller: Threaded brass body, Y-pattern, 175 psi CWP, 1/32” stainless steel perforated screen.
2. Sizes 2-1/2 inches and larger: Class 125 flanged iron body, Y-pattern, 1/16” stainless steel perforated screen.
3. Mueller Steam Specialty or equal.

B. Water Hammer Arrestors: ANSI A112.26.1, piston type, sized per PDI WH-201, copper construction. Pre-charged suitable for operation in temperature range 33 to 180 degrees Fahrenheit and maximum 150 psi working pressure. Manufacturers: Watts or equal. Provide access panels equal to Acorn Model 8292 or equal.

2.7 BACKFLOW PREVENTERS

A. Reduced Pressure Backflow Preventers:

1. ASSE 1013 compliant, 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 opening under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two gate valves, strainer, and four test cocks.
2. Manufacturers: Watts or equal

B. Double Check Valve Assemblies:

1. Comply with ASSE 1015; bronze, stainless steel, ductile iron, or other body material listed for potable water service and suitable for installed location and system pressure; two independently operating spring-loaded check valves; shutoff valves; and test cocks.
2. Manufacturers: Watts, wilkins/Zurn, Febco, Apollo/Conbraco or equal

2.8 THERMOSTATIC MIXING VALVES

A. Manufacturers: Lawler, Leonard, Powers, Watts, or approved equal.

B. Certification: Comply with ASSE 1017 for hot water distribution temperature control. Provide separate ASSE 1070 point-of-use mixing valves or ASSE 1016 shower/tub/shower valves where required by code or indicated.

C. Valve Construction:

1. Chrome-plated cast brass body.
2. Stainless steel or copper alloy bellows.
3. Integral temperature adjustment.

D. Capacity: Sized in accordance with manufacturer's published data. Minimum performance equal to Lawler 1000 Series, 2 gpm at 50 psi pressure drop.
E. Accessories:
1. Check valves on inlets.
2. Volume control shut-off valve on outlet.
3. Stem thermometer on outlet.
4. Strainer stop checks on inlets.
F. Cabinet: 16 gauge stainless steel with concealed hinges and keyed lock, for recessed mounting.
G. Mechanical Rooms: Cabinet not required; surface mount acceptable.
H. Installation: Install at designated distribution points or near water heaters as shown. Provide isolation valves and unions for service and maintenance

2.9 POINT-OF-USE THERMOSTATIC MIXING VALVES
A. Manufacturers: Lawler, Leonard, Powers, Watts, or approved equal.
B. Certification: Comply with ASSE 1070 for individual fixture applications.
C. Valve Construction:
1. Chrome-plated brass body.
2. Integral check valves on hot and cold inlets.
3. Maximum outlet temperature limit adjustment screw.
D. Capacity: Sized for connected fixture(s). Minimum 0.5 gpm flow.
E. Installation:
1. Install under lavatories or as required by code for public handwashing fixtures.
2. Provide shut-off stops and unions on hot and cold water supplies.
3. Insulate exposed piping and valves where subject to user contact.

2.10 DIAPHRAGM-TYPE EXPANSION TANKS
A. Manufacturers: Bell & Gossett PT Series, Amtrol, Wessels, or approved equal.
B. Construction:
1. Welded steel shell, stamped in accordance with ASME Section VIII, National Board registered.
2. Flexible EPDM diaphragm sealed to shell.
3. Rated for minimum working pressure of 125 psig.
4. Factory pre-charged to 12 psig.
C. Accessories:
1. Pressure gage.
2. Air-charging fitting.
3. Tank drain connection.
4. Support legs or steel saddles for floor mounting.
D. Installation:
1. Install expansion tank on cold water supply, downstream of shutoff valve and backflow preventer.
2. Provide structural support suitable for operating weight of tank when filled.
3. Isolate tank with full port ball valve and union.

4. Locate in accessible area for maintenance and inspection.

2.11 INSULATION

A. Insulate all domestic water piping in accordance with Section 22 07 19 – PLUMBING PIPING INSULATION.

2.12 TRAP SEAL PRIMERS

A. Manufacturers: Precision Plumbing Products (PPP), Zurn, Sioux Chief, Josam, or approved equal.

B. Trap seal primers shall be provided where floor drains or other trapped fixtures are not subject to regular flow. Units shall automatically deliver a prime charge of water to the trap in accordance with local code requirements.

C. Types:

1. Electronic Trap Seal Primers:
    a) Solenoid-operated, self-monitoring units.
    b) Adjustable discharge frequency.
    c) Factory-assembled with transformer, distribution unit, and fittings.
    d) Provide stainless steel recessed cabinet with concealed hinges and keyed lock.
2. Pressure-Drop Type Trap Seal Primers:
    a) Activated by supply line pressure fluctuations.
    b) Bronze body, integral check valve, threaded inlet/outlet.
    c) Minimum 1/2 inch supply connection.
3. Water-Saver Trap Primers (Lavatory-Connected):
    a) Connected to lavatory P-trap arm or waste connection.
    b) Discharges small quantities of water into trap primer line during lavatory use.
    c) Chrome-plated where exposed.

D. Accessories:

1. Distribution units or manifolds for serving multiple traps from a single primer.
2. Air gap fittings.
3. Piping and fittings necessary for complete installation.

E. Installation:

1. Connect trap seal primer to cold water branch line, flush valve, flush tank, or lavatory waste arm as indicated.
2. Provide shutoff stop, union, and backflow prevention device where required.
3. Discharge piping shall be minimum 1/2 inch diameter, sloped to drain, and run to floor drain trap or distribution unit.
4. Keep discharge piping runs as short and direct as possible, with minimal fittings.
5. Insulate exposed primer lines to prevent condensation and freezing.
6. Coordinate cabinet locations with architectural drawings.
7. Install per manufacturer’s instructions and authority having jurisdiction.

2.13 DOMESTIC HOT WATER CIRCULATION PUMPS
A. Hot water circulating pumps shall be manufactured by Bell & Gossett, Taco, Grundfos, or approved equal, with capacities as scheduled on the Drawings. Pumps shall be bronze or stainless steel construction suitable for potable water service. Provide electrical characteristics, controls, aquastat/timer, starter, disconnect, or control panel as indicated on the Drawings or required by Division 26 and pump manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Verify excavations are at required grade, dry, and not over-excavated.
B. Confirm clearances for routing piping before starting work.
C. Do not proceed with installation until unsatisfactory conditions are corrected.

3.2 PREPARATION
A. Ream and deburr pipe ends.
B. Remove scale, slag, and dirt from interior and exterior surfaces before assembly.
C. Bevel plain ends of ferrous pipe for welding.

3.3 INSTALLATION – GENERAL
A. Where branch sizes are not indicated on the drawings, provide minimum sizes in accordance with Section 22 05 00 – Common Work Results for Plumbing, Schedule of Plumbing Branches.

3.4 INSTALLATION – BURIED PIPING
A. Verify size, location, and invert elevation prior to installation.
B. Install with not less than 24 inches of cover unless otherwise indicated.
C. Maintain minimum separation from other utilities as required by code.
D. Install on prepared sand bedding, minimum 2 inches below pipe springline.
E. Backfill evenly in uniform compacted layers not exceeding 6 inches to 12 inches above pipe. Do not use wheeled or tracked vehicles for tamping.
F. Provide tracer wire on all non-metallic buried piping and all piping underslab. Locate wire leads in accessible location for use in future line troubleshooting.
G. Route piping in straight line.

3.5 INSTALLATION – ABOVE GRADE PIPING
A. Insulate all piping installed in exterior walls, above food service areas, and in any areas exposed to temperatures below 40°F. Refer to Section 22 07 19 – Plumbing Piping Insulation.
B. Install dielectric connections where joining dissimilar metals. Use non-conducting unions or flanges.
C. Insulate all domestic hot water supply and return piping. Refer to Section 22 07 19 – Plumbing Piping Insulation.
D. Install piping to maintain headroom and avoid interfering with use of space or access to equipment.
E. Group piping at common elevations wherever practical.

F. Install piping to allow for expansion and contraction without stressing pipe, joints, or equipment. Provide offsets, loops, or flexible connections. Refer to Section 22 05 00 – Common Work Results for Plumbing.
G. Provide expansion tank at each domestic water heater, installed per manufacturer's recommendations. Refer to Part 2.10 – Diaphragm-Type Expansion Tanks
H. Provide clearance in hangers and from structure to allow for insulation thickness and access to valves and fittings. Refer to Section 22 05 00.
I. Provide access where valves and fittings are not exposed. Coordinate size and location of access panels with Architect.
J. In equipment rooms, insulate and protect all exposed plumbing piping with aluminum jacketing system. Provide color-coded pipe labels at 10-foot intervals indicating service type. Refer to Section 22 07 19 – Plumbing Piping Insulation
K. Where pipe supports are welded to structural steel, clean surface and apply one coat of zinc-rich primer before welding.
L. Install domestic water piping in accordance with manufacturer's instructions.
M. Provide sleeves at all partitions, walls, and floor penetrations. Refer to 22 05 00 – Common Work Results for Plumbing
N. Install unions downstream of valves and at equipment or apparatus connections.
O. Install valves upright or horizontal, not inverted.
P. Install brass male adapters at each side of valves in copper piping systems. Solder adapters to pipe.
Q. Install ball valves for shutoff and to isolate equipment at branch piping to each fixture group, plumbing appliance, or water heater in accessible locations. Provide access doors required for concealed valves. Coordinate valve and access panel locations with the General Contractor. Refer to Part 2.5 – Valves.
R. Install check valves on discharge of all water-circulating pumps. Refer to Part 2.5 – Valves.
S. Provide potable water protection devices where contamination may occur, including boiler feed water lines, janitor rooms, fire sprinkler systems, irrigation, flush valves, and hose bibbs. Refer to Part 2.6 – Specialties.
T. Provide manufactured water hammer arrestors on cold water supplies serving water closets and urinals, and on all other hot and cold water branch supplies serving quick-closing or solenoid-operated valves. Arrestors shall comply with PDI WH-201, be sized per manufacturer's recommendations, and be installed as close as practical to the fixture or equipment served. Install arrestors with accessible isolation valve, located to allow inspection and service. Refer to Part 2.6 – Specialties.
U. Provide relief from valves, backflow preventers, and drains to nearest floor drain or indirect receptor.
V. Route all domestic water piping inside the building in conditioned spaces not subject to freezing.
W. Do not use lead-bearing solder materials. Joints shall be soldered at such time that the system is not under strain.

X. Provide drain valves at the low points of all risers to permit complete system drainage. Drain valves shall be 1/2 inch minimum size, full-port, equipped with hose-end connection. Install domestic water piping level unless otherwise indicated.
Y. Conceal domestic water piping in finished spaces unless specifically noted otherwise. Exposed piping shall only be installed in equipment rooms and unfinished spaces. Piping shall not be installed exposed in finished spaces without approval from the Architect.
Z. Provide protective sleeves or pipe shields where piping passes through masonry or concrete to prevent abrasion and electrolysis, including foam plastic sleeves at slab-on-grade penetrations.
AA. Locate and suspend piping to minimize vibration and noise transmission. Provide isolation hangers where piping is adjacent to acoustically sensitive spaces.
AB. Install flanges or unions at all equipment and fixtures, whether shown on drawings or not, to allow easy removal for maintenance.
AC. Install PEX piping in accordance with tubing manufacturer's instructions, fitting manufacturer's instructions, code requirements, and Authority Having Jurisdiction requirements. Maintain manufacturer-required support spacing, bend radius, expansion allowance, UV exposure limitations, temperature limitations, and protection from physical damage.
AD. Install nail plates, sleeves, grommets, isolators, bend supports, and protection devices where PEX passes through framing, metal studs, masonry, or other construction.
AE. Do not install PEX piping exposed in equipment rooms, outdoors, on roofs, or in locations subject to physical damage unless specifically indicated or approved.

3.6 INSTALLATION – SERVICE CONNECTIONS
A. Provide reduced pressure principle backflow preventer at incoming domestic water service where backflow preventer is indicated to be located inside the building on the plumbing drawings. Provide complete assembly, including strainer, shutoff valves, test cocks, and drain piping to the nearest floor drain or indirect receptor.
B. Sleeve service mains where passing through foundation walls with minimum 2 inches of insulation between pipe and sleeve.
C. Provide drain piping for relief valves and backflow preventers, piped to nearest floor drain or indirect receptor.

3.7 INSTALLATION – BACKFLOW PREVENTERS

A. Provide backflow preventers at each makeup water connection to boilers, cooling towers, chilled water systems, kitchen equipment, laboratory equipment, and other points of use where potable water connects to non-potable systems.
B. Fire-Service Backflow Preventer: Where fire-service backflow preventer is not indicated under Civil/site utility documents, the backflow preventer shall be furnished by the Plumbing Contractor and installed by the Fire Sprinkler Contractor unless indicated otherwise. Plumbing Contractor shall coordinate device type, size, accessories, submittals, delivery, warranty, and connection requirements with the Fire Sprinkler Contractor, Fire Protection Drawings, Civil/site utility documents, and Authority Having Jurisdiction. Refer to Section 21 13 13 for fire-service backflow preventer installation, testing, certification, and acceptance requirements.

C. Provide a floor drain within six (6) feet of each reduced pressure principle backflow preventer, piped to receive relief discharge.
D. Install backflow preventers in accordance with manufacturer's instructions and authority having jurisdiction. Provide clearance for inspection, testing, and maintenance. Install devices in upright horizontal position unless specifically listed otherwise.
E. Backflow preventers shall be tested and certified by a licensed tester in accordance with local authority requirements. Certification reports shall be submitted to the Architect/Engineer and to the authority having jurisdiction.

3.8 INSTALLATION – TRAP SEAL PRIMERS
A. Connect trap seal primer to cold water branch line, flush valve, flush tank, or lavatory waste arm as indicated.
B. Provide shutoff stop, union, and backflow prevention device where required.
C. Discharge piping shall be minimum 1/2 inch diameter, sloped to drain, and connected directly to floor drain trap primer port or distribution unit.
D. Keep discharge piping runs short and direct with minimal fittings.
E. Insulate exposed primer lines to prevent condensation and freezing.
F. Coordinate recessed cabinet locations for electronic primers with architectural drawings.
G. Install in accordance with manufacturer's instructions and authority having jurisdiction.

3.9 HOT WATER CIRCULATION PUMPS
A. Install in accordance with manufacturer's instructions and arrange to provide access for periodic maintenance, including removal of motors, impellers, couplings, and accessories.
B. Provide isolation valves, check valves, unions, and drain valves at each pump for service and removal.
C. Support pumps and piping separately so that the weight of the piping system does not rest on the pump.
D. Align and balance pumps after installation; lubricate and test run.
E. Coordinate with Division 26 for electrical connections.

3.10 FIELD QUALITY CONTROL
A. Hydrostatic test all domestic water piping at 150 psig for not less than 4 hours. Conduct tests before insulation or concealment of piping.
B. Repair leaks and retest until system passes.
C. Disinfect potable water piping in accordance with IPC, Authority Having Jurisdiction requirements, and AWWA C651 where applicable to water service/main piping. Flush with clean potable water until system is clear and chlorine residual is acceptable to Authority Having Jurisdiction.
D. Submit written test reports including date, time, results, and corrective actions.

3.11 TRAP SEAL PRIMER TESTING AND VERIFICATION
A. After installation, test each trap seal primer to confirm water delivery to connected floor drains or traps.

B. For distribution units, confirm that each outlet leg receives flow.
C. Demonstrate operation of electronic primers by activating control module through multiple cycles.
D. Adjust settings on electronic and water-saver primers as required for proper trap seal maintenance.
E. Submit written verification of test results to Architect/Engineer.

3.12 CLEANING AND PROTECTION
A. Flush all piping systems with clean potable water after testing and disinfection.
B. Cap or plug open piping during construction to prevent contamination.
C. Protect installed piping from damage until final acceptance.

END OF SECTION

SECTION 22 13 16 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 SUMMARY
Provide a complete sanitary waste and vent piping system including piping, fittings, traps, cleanouts, floor drains, roof drains, vent terminals, sleeves, supports, and accessories required for a functional system.

1.2 SUBMITTALS
A. Product Data:
1. Pipe, fittings, and couplings.
2. Cleanouts, floor drains, roof drains, and vent terminals.
3. Specialty piping systems (chemical waste, if applicable).
B. Shop Drawings: Coordination drawings where required to resolve field conflicts.
C. Certificates: Manufacturer certification of compliance with standards and code requirements.
D. Operation and Maintenance Data: For cleanouts, floor drains, roof drains, and trap seal devices.

1.3 DELIVERY, STORAGE, AND HANDLING
A. Deliver pipe, fittings, and accessories with factory-applied end caps or closures. Maintain until installation.
B. Store materials under cover, off the ground, and protected from weather and damage.
C. Handle pipe and fittings carefully to prevent damage. Reject damaged materials.

1.4 QUALITY ASSURANCE
A. Perform work in accordance with 2021 International Plumbing Code (IPC) and applicable local amendments.
B. Provide products listed and labeled by recognized testing agencies.
C. Installer shall have a minimum of 3 years documented experience installing sanitary waste and vent piping systems.

1.5 WARRANTY
Provide one (1) year warranty on workmanship, materials, and equipment from date of substantial completion.

1.6 ENVIRONMENTAL REQUIREMENTS
Do not install underground piping when trench bedding is wet, frozen, or otherwise unsuitable for proper compaction. Do not install piping or fittings when ambient temperatures are outside manufacturer’s recommended limits for solvent welding or jointing methods.

1.7 EXTRA MATERIALS
Provide two (2) sets of trap seals, cleanout plugs, and roof drain domes for each size and type installed.

1.8 REFERENCES
A. 2021 International Plumbing Code (IPC).
B. ASTM A74 – Cast Iron Soil Pipe and Fittings.
C. ASTM A888 – Hubless Cast Iron Soil Pipe and Fittings.
D. CISPI 301 – Hubless Cast Iron Soil Pipe and Fittings.
E. ASTM D1784 – Rigid Polyvinyl Chloride (PVC) Compounds.
F. ASTM D2665 – PVC Plastic Drain, Waste, and Vent Pipe and Fittings.
G. ASTM D3034 – PVC Sewer Pipe and Fittings.
H. CISPI 310 – Couplings for Hubless Cast Iron Soil Pipe and Fittings.
I. ASME A112.6.3 – Floor and Trench Drains.
J. ASME A112.6.4 – Roof, Deck, and Balcony Drains.
K. PDI G101 – Testing and Rating Procedure for Grease Interceptors.
L. SMACNA – Firestopping and Sleeving.

1.9 CLOSEOUT SUBMITTALS
A. Operation and Maintenance Data: Submit O&M manuals for cleanouts, floor drains, roof drains, traps, trap seal primers, and other specialties, in accordance with Division 01 requirements.
B. Record Drawings: Submit as-built drawings showing actual routing of piping, cleanout locations, vent terminations, and connections to fixtures and equipment.

PART 2 - PRODUCTS

2.1 CAST IRON SANITARY WASTE AND VENT PIPING
A. Cast Iron Soil Pipe and Fittings: ASTM A74 service weight, hub and spigot with rubber compression gaskets. Pipe and fittings shall bear manufacturer's mark for quality and permanence.
B. Hubless Cast Iron: ASTM A888, CISPI 301, with CISPI 310 stainless steel shielded couplings. 'No-hub' joints only where approved by Authority Having Jurisdiction and only for use above grade.

2.2 PVC SANITARY WASTE AND VENT PIPING (OPTIONAL)
A. At the Contractor's option, and where permitted by the Authority Having Jurisdiction, PVC Schedule 40 DWV piping conforming to ASTM D2665 may be used in lieu of cast iron.
B. PVC piping shall not be installed in return air plenums or other spaces prohibited by code.
C. Joints shall be solvent-welded, using fittings conforming to ASTM D2665.
D. Transition to cast iron shall be made with approved transition couplings or brass fittings.

2.3 CLEANOUTS
A. Floor Cleanouts:
1. In finished areas: Wade #W-6000 or Josam 56000-96-Y with satin nickel bronze top and bronze plug.

2. In tile floors: Wade #W-6000-T or Josam 5600012-96-Y with bronze plug.
3. In terrazzo floors: Wade #W-6000-U or Josam 56040-1-96-Y with bronze plug.
4. In unfinished utility or storage areas: Wade #W-8550-D or Josam 58500-22-96 with bronze plug.

B. Wall Cleanouts: Wade #W-8480R or Josam 58610 with stainless steel cover plate and bronze plug.
C. Cleanouts shall be the same size as the pipe up to 4 inches; not less than 4 inches for larger pipe sizes.
D. Cleanout plugs shall be heavy brass or nickel-bronze, threaded, gas-tight, and furnished with raised or countersunk heads as required. Plastic cleanout plugs shall not be used.
E. Cleanouts in exposed piping: Wade #W-8550-R or Josam 58500-96 with bronze plug.
F. Exterior cleanouts: Wade #W-6000-X-5 or Josam 56070-1-15 with heavy-duty nickel bronze top and bronze plug.

2.4 FLOOR DRAINS
A. Floor Drains: ASME A112.6.3, cast iron body with seepage pan, adjustable strainer, satin nickel bronze top and vandal proof hardware.
B. Strainer sizes shall be as follows: 8” x 8” square on 3” and 4” drains
C. Manufacturers: Jay R. Smith, Zurn, Josam or equal.

2.5 TRAPS
A. Each fixture and equipment requiring connection to the sanitary drainage system, except fixtures with integral traps, shall be equipped with a deep seal trap.
B. Each trap shall be placed as near to the fixture as possible.
C. No fixture shall be double trapped unless permitted by governing codes.
D. Provide trap seal primers in accordance with Section 22 11 16 – Domestic Water Piping.

PART 3 - EXECUTION

3.1 EXAMINATION
Verify that excavations are at required grade, dry, and not over-excavated. Confirm clearances for routing piping.

3.2 INSTALLATION - PIPING
A. Install sanitary waste and vent piping in accordance with code and manufacturer’s instructions.
B. Provide slope of 1/4 inch per foot for pipe sizes 2-1/2 inches and smaller, and 1/8 inch per foot for pipe sizes 3 inches and larger, unless otherwise required by code.
C. Provide cleanouts at base of stacks, at changes in direction greater than 45 degrees, and at intervals not exceeding 80 feet in horizontal piping runs 4 inches and smaller, and 50 feet for runs larger than 4 inches.

1. Cleanouts shall be located in accessible areas. Where cleanouts occur in pipe chases, they shall be placed above the floor and accessible through access doors, or extended to an adjacent wall with flush covers.
2. Cleanouts in finished floors shall be specifically designed for the type of floor construction in which they are installed.
3. Exterior cleanouts shall be encased in concrete pads not less than 14 by 14 inches and 6 inches thick, unless located in paved drives or walk areas.
4. All cleanouts in walls or painted surfaces shall be furnished with cover plates painted to match adjacent finishes. Cover plates shall be attached with vandal-resistant screws.
5. Exact cleanout locations shall be subject to Architect/Engineer approval prior to installation.
6. The size of cleanouts shall be identical with the size of waste lines in which they are placed, but they shall not be required to be larger than 4" in diameter.
7. Cleanout plugs shall be brass or nickel-bronze, threaded, and gas-tight. Cover plates shall not compromise the plug seal.

D. Vent piping shall rise vertically to a point above flood level rim before offsetting. Terminate vents not less than 18 inches above roof.
E. Flash vent pipes passing through roof in accordance with roofing manufacturer's requirements. Coordinate with Division 07 – Roofing.
F. Provide sleeves at all penetrations of floors, walls, and partitions. Firestop in fire-rated assemblies with UL-listed systems.
G. Provide expansion joints or offsets where piping crosses building expansion joints.
H. Cap or plug open ends of piping during construction.
I. Conceal piping in finished spaces unless otherwise noted. Exposed piping in unfinished spaces shall be installed neatly and parallel to building lines.
J. Provide hub drains, open-sight drains, and floor drains with deep seal P-traps and trap primer valve connected to 1/2 inch cold water supply. Coordinate condensate drain terminations with HVAC contractor. Terminate within 10 feet of HVAC equipment unless otherwise indicated.
K. Where branch sizes are not indicated on the drawings, provide minimum sizes in accordance with Section 22 05 00 – Common Work Results for Plumbing, Schedule of Plumbing Branches.

3.3 INSTALLATION – BURIED PIPING SYSTEMS
A. Verify connection size, location, and invert as indicated on the Drawings. Establish invert elevations. Install buried drainage piping at slopes required by Paragraph 3.2.B unless greater slope is indicated on the Drawings or required by code. Maintain continuous gradients.
B. Establish elevations of buried piping with not less than two (2) feet of cover.
C. Establish minimum separation from other services piping in accordance with code.
D. Remove scale and dirt on inside of piping before assembly.
E. Install pipe on prepared bedding of bank sand, minimum 2" depth on bottom of trench up to centerline of pipe.
F. Route pipe in straight line.

G. Pipe Cover and Backfilling:

1. After hydrostatic test, evenly backfill entire trench width by hand placing backfill material and hand tamping in two (2) inch compacted layers to 12 inches minimum cover.
2. Evenly and continuously backfill remaining trench depth in uniform layers with backfill material.
3. Do not use wheeled or tracked vehicles for tamping.

3.4 INSTALLATION – ABOVE GROUND PIPING

A. Verify connection size, location, and invert as indicated on the Drawings. Establish invert elevations. Install aboveground drainage piping at slopes required by Paragraph 3.2.B unless greater slope is indicated on the Drawings or required by code. Maintain continuous gradients.
B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Provide clearances at cleanout for snaking drainage system.
C. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
D. Route piping in orderly manner, parallel and perpendicular to walls.
E. Install piping to maintain headroom and avoid interfering with use of space or access to equipment.
F. Group piping at common elevations wherever practical.
G. Install piping penetrating roofed areas to maintain integrity of roof assembly.
H. Where pipe support members are welded to structural building framing, scrape, brush, clean, and apply one coat of zinc rich primer to welding.
I. Burred ends of all pipe and tubing shall be reamed to the bore of the pipe or tube and all chips shall be removed before installation.
J. Install bell and spigot pipe with bell end upstream.
K. Provide sleeves at all partitions, walls, and floor penetrations. Refer to 22 05 00 – Common Work Results for Plumbing.
L. Support cast iron drainage piping at every joint.
M. Water test all piping per code.
N. Insulate all above slab horizontal sanitary waste piping carrying air-conditioning condensate with minimum 1” fiberglass insulation with jacket from floor drain, including traps, all the way to change in direction to vertical.
O. Slope all vent piping to allow drainage back to the drainage system, in accordance with IPC Section 905.1.

3.5 INSTALLATION - TRAPS AND PRIMERS

A. Install traps as close to the fixture as practical.
B. Connect trap seal primers to maintain water seal in traps subject to evaporation. Coordinate primer connection with Section 22 11 16 – Domestic Water Piping.
C. Verify operation of trap seal primers and confirm water delivery to connected traps.

3.6 FIELD QUALITY CONTROL

A. Test sanitary waste and vent piping in accordance with IPC requirements.
B. Test drainage and vent piping in sections with a water head of 10 feet.
C. Maintain test for a minimum of 4 hours with no measurable drop in water level permitted.
D. Correct any defects or leaks and repeat test until satisfactory results are obtained.
E. Submit written test results to Architect/Engineer.

3.7 CLEANING AND PROTECTION
A. Clean interior of piping system prior to final acceptance.
B. Remove debris and foreign material.
C. Protect installed piping from damage until final acceptance.

3.8 RODDING SEWERS
A. All sanitary drain piping, both inside the building and out, shall be rodded out after completion of the installation.
B. This work shall be done as part of the contract to make certain that all lines are clear, and that any obstruction that may be discovered shall be removed immediately. Rodding shall be accomplished by utilizing a rotary cutter, which shall be full size of pipe being cleaned.

END OF SECTION

SECTION 22 40 00 - PLUMBING FIXTURES

PART 1 - GENERAL

1.1 SUMMARY
A. Provide plumbing fixtures, trim, supports, and accessories as required for complete installation in accordance with the Contract Documents.
B. Plumbing fixture schedule, including fixture types, capacities, and model numbers, is shown on the drawings.

1.2 REFERENCES
A. Americans with Disabilities Act (ADA) Standards for Accessible Design.
B. International Plumbing Code (IPC).
C. Uniform Plumbing Code (UPC), where adopted.
D. ICC A117.1 – Accessible and Usable Buildings and Facilities.
D. ANSI A117.1 – Accessible and Usable Buildings and Facilities.
E. Energy Policy Act of 1992 (EPAct).
F. ASME A112 Series – Plumbing Fixture Standards.

1.3 RELATED SECTIONS
A. Section 22 05 00 – Common Work Results for Plumbing.
B. Section 22 05 29 – Hangers and Supports for Plumbing Piping and Equipment.
C. Section 22 07 19 – Plumbing Piping Insulation.
D. Section 22 08 00 – Cleaning and Testing of Plumbing Systems.
E. Section 22 11 16 – Domestic Water Piping.
F. Section 22 13 16 – Sanitary Waste and Vent Piping.
G. Section 22 14 13 – Storm Drain Piping.

1.4 SUBMITTALS
A. Product Data: Submit manufacturer’s catalog data for each fixture and accessory specified on drawings, including trim, carriers, fittings, and related components.
B. Shop Drawings: Indicate rough-in dimensions, mounting heights, supports, and accessories.
C. Operation and Maintenance Data: Provide for each type of fixture and trim.
D. Closeout Submittals: Submit record documents in accordance with Division 01.

1.5 DELIVERY, STORAGE, AND HANDLING
A. Deliver plumbing fixtures in manufacturer’s protective packaging.
B. Store in a clean, dry location and protect from damage.
C. Handle fixtures to prevent breakage, chipping, or other damage. Replace damaged fixtures at no additional cost.

1.6 WARRANTY
Provide one (1) year warranty on all plumbing fixtures, trim, and accessories from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL
A. Fixture types, sizes, and flow rates shall be as scheduled on the drawings.
B. Provide fixtures complete with trim, carriers, stops, escutcheons, seals, and supports.
C. Exposed trim shall be chrome-plated brass unless otherwise specified.
D. Provide stop valves at all fixtures.
E. Provide carriers for wall-hung fixtures.
F. Fixtures, faucets, flush valves, and trim shall comply with applicable IPC, ADA, ICC A117.1, EPAct, ASME, and NSF requirements. Where scheduled flow rates, flush volumes, or mounting heights are more restrictive than code minimums, the scheduled requirements shall govern.
G. Water closets, urinals, lavatories, drinking fountains, and other accessible fixtures shall be mounted in accordance with the Drawings and applicable ADA/ICC A117.1 requirements. Where children's mounting heights are indicated, provide fixtures, trim, carriers, rough-ins, and accessories suitable for the indicated age group and mounting height.
H. Verify fixture rough-in dimensions, carrier requirements, sensor clearances, flush valve clearances, reach ranges, knee/toe clearances, and mounting heights before installation. Notify Architect/Engineer of conflicts before rough-in.
I. Provide ASSE 1070 point-of-use thermostatic mixing valves at public handwashing lavatories and other fixtures where indicated on the Drawings or required by code. Coordinate valve location, stops, piping, insulation, accessibility, and service access with Section 22 11 16.
J. Where sensor-operated faucets, flush valves, bottle fillers, or similar devices are indicated, provide complete power supply, batteries, transformers, solenoids, control modules, mixing valves, stops, strainers, escutcheons, and accessories required for complete operation. Coordinate electrical requirements with Division 26 before rough-in.

2.2 MANUFACTURERS
A. Fixtures: American Standard, Kohler, Toto, Zurn, Elkay, Sloan, or approved equal.
B. Faucets and Flush Valves: Sloan, Zurn, Chicago Faucet, Delta Commercial, American Standard, Kohler, or approved equal.
C. Fixture Supports: Josam, Smith, Wade, Zurn, or approved equal.
D. Fixture Drains and Accessories: Josam, Smith, Wade, Zurn, or approved equal.

2.3 ACCESSORIES
A. Water Hammer Arrestors: PDI WH-201 certified, sized per manufacturer's recommendations.
B. Trap Seal Primers: Electronic, pressure drop, or water saver type, as indicated.
C. Insulation Kits: ADA-compliant covers for hot and cold supply and waste piping at accessible lavatories.
D. Cleanouts: Provide where indicated, with chrome-plated cover plates in finished areas.
E. Vacuum Breakers and Backflow Preventers: ASSE listed, where required by code.

F. Drinking Fountains and Bottle Fillers: As scheduled on drawings, complete with filters and chillers where indicated.
G. Fixture Carriers:
Provide adjustable, heavy-duty steel carriers for the following wall-hung fixtures as scheduled on the drawings:

1. Water closets
2. Urinals
3. Lavatories
4. Electric water coolers and drinking fountains
5. Other wall-hung fixtures where indicated

Carriers shall be designed and rated to support the fixture with occupant load, concealed within wall construction, and provided with adjustable faceplates, bearing plates, studs, and hardware. Carriers shall be manufacturer's standard product for the specific fixture model scheduled.

Manufacturers: Josam, Smith, Wade, Zurn, or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Verify rough-in dimensions, elevations, and locations of plumbing fixtures with drawings and manufacturers' data.
B. Examine walls, floors, and supports to ensure adequate structure for fixture installation.
C. Notify Architect of any conditions that may impair proper installation.

3.2 INSTALLATION
A. Install plumbing fixtures in accordance with manufacturer's instructions, referenced standards, and code requirements.
B. Mount fixtures, trim, flush valves, faucets, controls, mirrors, accessories, and related components at heights indicated on the Drawings and in accordance with applicable ADA and ICC A117.1 requirements. Coordinate children's mounting heights where indicated. Do not rough-in or install fixtures where indicated mounting heights, clearances, or reach ranges conflict with the fixture manufacturer's requirements or wall construction; notify Architect/Engineer before proceeding.
C. Seal fixture joints watertight with sealant recommended by manufacturer.
D. Provide stop valves at each fixture.
E. Do not use plumbing fixtures for construction purposes.
F. Install carriers for wall-hung fixtures securely anchored to structure.
G. Install caulking, bolts, and seals for water-tight joints at floors and walls.
H. Set fixtures level, plumb, and securely anchored.

3.3 FIELD QUALITY CONTROL

A. Operate each fixture to verify proper function, flow rate, flush volume, drainage, trap seal, watertightness, hot/cold orientation, temperature limiting device operation where provided, sensor operation where provided, and accessibility of stops, strainers, cleanouts, filters, and serviceable components.

B. Replace defective fixtures, trim, or accessories.

C. Clean fixtures thoroughly before turnover to Owner.

D. Protect fixtures from damage until final acceptance.

END OF SECTION

SECTION 23 05 00 – COMMON WORK RESULTS FOR HVAC

PART 1 – GENERAL

1.1 SCOPE
A. The scope of this Division includes all labor, materials, equipment, and services necessary to provide a complete and operational HVAC system as described in the Contract Documents. Work includes coordination with other trades and compliance with all applicable codes and standards.

1.2 RELATED DOCUMENTS
A. Requirements of Divisions 0 and 1 apply to this Division.
B. Drawings and specifications are complementary; what is required by one shall be binding as if required by all.

1.3 CODES AND STANDARDS
A. All work shall be performed in accordance with the latest applicable edition of the respective code, including but not limited to:
1. International Mechanical Code (IMC) – as adopted by Louisiana.
2. International Plumbing Code (IPC) – as adopted by Louisiana.
3. International Energy Conservation Code (IECC) 2021 with Louisiana amendments.
4. NFPA 90A – Installation of Air Conditioning and Ventilating Systems.
5. National Electrical Code (NEC 2020).
6. OSHA 29 CFR 1926 – Safety and Health Regulations for Construction.

1.4 FEES, PERMITS, AND TAXES
A. Contractor shall obtain and pay for all required permits, inspections, and connection fees.
B. Contractor shall pay all applicable taxes related to labor and materials under this Division.

1.5 SUBMITTALS
A. Submit product data, shop drawings, and coordination drawings as required by each specification section.
B. Submittals shall include:
1. Manufacturer’s name and model number.
2. Performance ratings, compliance with codes/standards, and third-party listing where applicable.
3. Dimensions, weights, clearances, and utility requirements.
4. Installation instructions and maintenance data.
5. Identification of all deviations from the Contract Documents.
6. Side-by-side comparison to basis-of-design product for any proposed substitution.
C. Incomplete submittals will be returned without review.
D. Submittals shall be provided as soon as practicable and within thirty (30) days of contract award and prior to ordering equipment.
E. Contractor shall certify that submittals have been reviewed for accuracy, completeness, and coordination with other trades.

F. Approval of submittals is for general conformance only and shall not relieve the Contractor of responsibility for compliance with Contract Documents, codes, dimensions, coordination, or performance.
G. Resubmittals due to incompleteness or errors shall be at no cost to the Owner.
H. The size of mechanical equipment shown on the drawings is based on the dimensions of a specific manufacturer. Alternative manufacturers may be considered, but the Contractor shall confirm that selected equipment will fit within the designated space and maintain required service clearances. Provide shop drawings, when requested by the Architect/Engineer or Owner, to demonstrate a suitable arrangement.

1.6 PRIOR APPROVALS
A. Requests for substitution (“or equal”) shall be submitted via email to the Architect/Engineer no later than ten (10) calendar days before bid date.
B. Requests shall include manufacturer’s published data, performance comparisons, and side-by-side documentation showing equivalency to the specified basis-of-design product.
C. Incomplete substitution requests will not be considered.
D. Proof of equality rests solely with the Contractor.
E. Where the Contract Documents reference a specific manufacturer or product, such reference is intended to establish a standard of quality, performance, configuration, and appearance. It shall not be construed as limiting competition. Products of other manufacturers will be considered provided they meet or exceed the specified standard and are approved in writing by the Architect/Engineer.
F. Decisions of the Architect/Engineer regarding substitutions are final.

1.7 OPERATING AND MAINTENANCE DATA
A. Provide PDF format plus one (1) hard copy of operating and maintenance manuals.
B. Include manufacturer’s instructions, service manuals, parts lists, and warranty information.
C. Provide training to Owner’s staff on system operation and maintenance.
D. Identify components not to be adjusted except by manufacturer’s representatives.

1.8 COMMISSIONING
A. Coordinate with Owner’s Commissioning Authority where applicable.
B. Provide startup, testing, documentation, functional performance testing support, deficiency correction, and Owner training required by the Contract Documents and applicable commissioning requirements.
C. Provide documentation and system performance testing required by IECC 2021 Section C408 and applicable project commissioning requirements.
D. Participate in functional performance testing for HVAC equipment, temperature controls, dedicated outside air systems, exhaust systems, air distribution systems, and related interfaces. Provide personnel, tools, software, manufacturer support, access credentials, and documentation required to demonstrate system operation.
E. Correct deficiencies identified during commissioning and retest at no additional cost to Owner.

1.9 WARRANTY

A. The Contractor shall warrant all workmanship, materials, equipment, and systems for one (1) year following substantial completion. Defects shall be corrected at no cost to the Owner. Manufacturer warranties do not relieve the Contractor of obligations.

B. Warranty shall include repair or replacement of defective items at no cost to Owner.

C. Where individual Division 23 sections, equipment schedules, or manufacturer's standard warranties require a warranty period longer than one (1) year, the longer warranty period shall govern.

1.10 DEFINITIONS

A. "Provide": Furnish and install, complete and ready for operation.

B. "As Required": Furnish and install per manufacturer's instructions, code, and industry practice.

C. "Or Equal": Substitution permitted only if approved in writing by Architect/Engineer.

1.11 CLOSEOUT SUBMITTALS

A. Provide record drawings, warranties, spare parts lists, test reports, and O&M manuals organized by specification section in PDF format plus one (1) hard copy.

B. Submit prior to final payment.

1.12 QUALIFICATIONS

A. Contractor shall be licensed in the State of Louisiana for the respective trade.

B. Manufacturers shall have at least five (5) consecutive years producing specified products.

C. Installers shall be factory-trained where required.

1.13 ATTIC STOCK

A. Furnish attic stock to the Owner at substantial completion as a part of the base bid.

B. See "Attic Stock" requirements throughout the rest of Division 23 for detailed quantities and products.

1.14 QUALITY ASSURANCE

A. Provide products manufactured and listed for the intended use.

B. Perform work with certified/licensed tradesmen.

C. Follow all third-party listing agency requirements (UL, FM, etc.).

1.15 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle equipment in accordance with Division 01 and manufacturer's recommendations.

B. Protect from weather, dirt, and damage.

C. Do not store directly on grade.

D. Maintain packaging until installation.

PART 2 – PRODUCTS

2.1 GENERAL REQUIREMENTS
A. All materials shall be new, free from defects, and meet the requirements of these specifications.

2.2 IDENTIFICATION
A. Provide identification in accordance with codes and ANSI/ASME A13.1 or NEC/NEMA standards, as applicable.
B. Provide engraved phenolic nameplates for equipment and valves as required.
C. Provide labeling at maximum 10-foot spacing (for piping).

2.3 FIRESTOPPING
A. Provide UL-listed firestop assemblies tested per ASTM E814 / UL 1479 at all penetrations through fire-rated construction.
B. Restore fire-resistance rating of assemblies penetrated.

2.4 ACCESS AND SERVICEABILITY
A. Provide access panels as required for service, adjustment, and maintenance.
B. Locate equipment to allow safe and convenient maintenance and replacement.

PART 3 – EXECUTION

3.1 WORKMANSHIP
A. Install work in a neat, professional, and workmanlike manner.
B. Unacceptable or incomplete work shall be replaced at no additional cost.

3.2 CONFLICTS, INTERFERENCES AND COORDINATION BETWEEN TRADES
A. The Contract Drawings are diagrammatic in nature and are not to be construed as shop drawings. They establish design intent, required capacities, and approximate routing. The Mechanical Contractor shall prepare coordinated shop drawings indicating actual dimensions, offsets, elevations, and field conditions, and shall be responsible for coordination with structural members, ceilings, lighting, ductwork, plumbing, electrical, and other building systems. Where interferences occur, promptly notify the Architect/Engineer and obtain written direction before proceeding. Structural members shall not be cut or modified without written approval. Maintain clearances required for access to valves, drains, test connections, and other components.

B. Each trade shall coordinate its work with that of other trades so that the installation may be completed in a direct, workmanlike manner without delaying or obstructing others. Piping, ductwork, equipment, and conduit interferences shall be resolved by giving precedence to systems that require a specific grade, slope, elevation, access clearance, or routing condition for proper operation. Where space conflicts remain, the following routing and coordination precedence shall apply:

1. Building lines
2. Structural members
3. Soil and drain piping

4. Vent piping
5. Refrigerant piping
6. Condensate piping
7. Supply ductwork
8. Exhaust ductwork
9. Return ductwork
10. Domestic water
11. Electrical conduit
12. Natural gas piping
13. Automatic sprinkler piping
14. Compressed air piping

C. Where conflicts between specifications and drawings arise, drawings shall take precedence over specifications except in matters pertaining to quality, applications, and coordination between trades, which shall be governed by specifications.

D. The Contract Documents (drawings, specifications, addenda, and written directives) are complementary; what is required by one is as binding as if required by all. Provide all work that is reasonably inferable from the documents or necessary to deliver a complete, code-compliant system consistent with the design intent, even if every component is not explicitly called out. Minor omissions or discrepancies do not relieve the Contractor of this responsibility.

E. Where the Contract Documents conflict with applicable codes and standards, as interpreted by the Authority Having Jurisdiction (AHJ), the codes shall govern. When differing requirements exist, provide the more stringent requirement as determined by the AHJ and notify the Architect/Engineer before proceeding.

F. Where the drawings/specifications differ from a manufacturer's published installation instructions, listings/approvals, or warranty conditions, install in accordance with the manufacturer's instructions necessary to maintain the UL/FM listing and warranty and to comply with NFPA and code. Advise the Architect/Engineer of the conflict and obtain direction prior to fabrication or installation.

G. When a discrepancy or need for interpretation is discovered, submit a written request for information and do not proceed with the affected work until clarification is issued. If the Contractor proceeds without written direction, the Contractor shall furnish the work to meet the more stringent interpretation at no additional cost to the Owner and shall be responsible for all corrections.

3.3 INTERFACE WITH OTHER WORK

A. Coordinate with Electrical Contractor for power requirements, disconnects, and control wiring for HVAC equipment.

B. Coordinate with Plumbing Contractor for condensate drainage, hydronic piping, and piping interfaces.

C. Coordinate with Temperature Controls Contractor and HVAC equipment suppliers for thermostats, controllers, sensors, control wiring, factory controller settings, communication interface cards/modules, and future BAS-capable provisions where indicated. Active BAS

integration, BAS network wiring, BAS front end, graphics, alarming, trending, and BAS point-to-point checkout are not required unless specifically indicated.
D. Coordinate with Testing, Adjusting, and Balancing Contractor so equipment startup, control settings, fan speeds, damper positions, airflow setpoints, occupied/unoccupied modes, and special operating modes are ready for TAB and commissioning.
E. Coordinate with Structural and Architectural trades for equipment supports, openings, and access clearances.
F. Verify all dimensions, elevations, and conditions prior to installation. Drawings are diagrammatic and require coordination with other trades.

3.4 PROTECTION
A. Protect equipment and materials from damage during storage and installation.
B. Keep systems sealed until final connections are made.

3.5 CUTTING AND PATCHING
A. Contractor shall perform all required cutting for this Division; General Contractor shall perform patching.
B. Do not cut structural elements without Architect/Engineer approval.

3.6 PAINTING
A. Contractor shall not perform finish painting, except touch-up of equipment finishes with manufacturer’s paint.

3.7 TESTING AND STARTUP
A. Perform tests, startup, and operational checks required by Contract Documents, manufacturer’s instructions, and applicable codes.
B. Provide notice to Architect/Engineer and Commissioning Authority, where applicable, at least four (4) days prior to testing, startup, and functional performance testing.
C. Do not conceal work until required tests are completed and accepted where observation or acceptance is required.
D. Startup shall be complete before TAB and functional performance testing. Equipment shall be clean, filters installed, controls operational, safeties verified, and systems capable of operating in required modes.
E. Provide manufacturer startup services where required by equipment sections, equipment schedules, or manufacturer’s warranty requirements.
F. Submit startup reports, test reports, manufacturer checklists, final control settings, and other documentation required by individual Division 23 sections.
G. Correct deficiencies and retest until systems operate in accordance with Contract Documents.

3.8 AS-BUILTS
A. Provide record drawings in PDF format showing actual installation.
B. Include equipment schedules, locations, and diagrams.

3.9 FINAL CLEANING AND TURNOVER

A. Clean all systems, equipment, and exposed work prior to final acceptance.

B. Flush systems as applicable to remove debris.

C. Turn over keys, manuals, and warranties to Owner.

END OF SECTION

SECTION 23 05 03 – HVAC PIPING

PART 1 – GENERAL

1.1 SCOPE
A. Provide all labor, materials, equipment, and services necessary for the complete installation of HVAC piping systems, including refrigerant piping, hydronic supply/return, condensate drain, valves, fittings, specialties, instruments, hangers, supports, sleeves, identification, and accessories as indicated on the Drawings and described herein.

1.2 RELATED DOCUMENTS
A. Requirements of Divisions 00 and 01 apply to this Division.
B. Section 23 05 00 – Common Work Results for HVAC

1.3 CODES AND STANDARDS
A. All work shall conform to the latest applicable edition of the following codes and standards:
1. International Mechanical Code (IMC).
2. International Plumbing Code (IPC).
3. International Energy Conservation Code (IECC) with Louisiana amendments.
4. ASME B31.9 – Building Services Piping.
5. ASTM and ANSI standards for piping, valves, and fittings.
6. AWWA standards for water distribution piping (where applicable).
7. MSS SP standards for valves, fittings, and supports.
8. CISPI standards for cast iron piping.
9. NFPA 90A.
10. OSHA 29 CFR 1926.
11. ASHRAE 15 – Safety Standard for Refrigeration Systems.
12. EPA 608 refrigerant handling requirements.
13. ASTM B280 – Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.
14. AWS A5.8 – Specification for Filler Metals for Brazing and Braze Welding.

1.4 SUBMITTALS
A. Submit complete product data for all piping, valves, fittings, hangers, supports, sleeves, and specialties.
B. Submittals shall include manufacturer, model number, materials, pressure/temperature rating, and compliance with referenced standards.
C. Identify all deviations from Contract Documents.
D. Provide side-by-side comparison to basis-of-design for any proposed substitution.
E. Incomplete submittals will be returned without review.
F. Approval of submittals is for general conformance only and does not relieve Contractor responsibility for code compliance, dimensions, or performance.

G. Submit refrigerant piping materials, fittings, brazing materials, insulation, pressure test procedure, evacuation procedure, refrigerant charge documentation, and manufacturer's maximum line length/elevation requirements for each refrigerant system.

1.5 CLOSEOUT SUBMITTALS
A. Provide record drawings in PDF format showing as-installed routing, pipe sizes, valves, test ports, instruments, and accessories.
B. Submit final O&M manuals including valve charts, test results, and warranties.

1.6 QUALIFICATIONS
A. Contractor shall be licensed in the State of Louisiana for HVAC or mechanical piping.
B. Installers shall be trained and experienced in brazing, soldering, grooved, and welded piping systems.

1.7 WARRANTY
A. Provide a three (3) year warranty covering piping, valves, fittings, specialties, and workmanship.

PART 2 – PRODUCTS

2.1 GENERAL REQUIREMENTS
A. All materials shall be new, free from defects, and suitable for the intended service.
B. All materials shall be listed and labeled as required by applicable codes.

2.2 DRAIN AND RELIEF PIPING
A. Condensate drain piping, auxiliary drain piping, equipment drains, and appliance drain piping shall be Type "L" hard drawn copper with cast and/or wrought copper fittings per ASTM B88; 95/5 solder. Provide supports at specified intervals with only copper-plated, copper or brass in contact with copper piping.
B. Install all drain piping with a minimum fall of 1/8 inch per foot unless noted otherwise.
C. Provide threaded cleanout caps at changes in direction and at the upstream end of main condensate lines.
D. Minimum condensate pipe sizes where not shown on Drawings (use coil nominal tonnage):
- Up to 2 tons: 3/4 inch
- 2-1/2 to 5 tons: 1 inch
- 6 to 14 tons: 1-1/4 inch
- 15 to 30 tons: 1-1/2 inch

E. Provide all drain piping required for or related to HVAC equipment whether or not specifically indicated; coordinate termination points with Division 22.

2.3 REFRIGERANT PIPING
A. Refrigerant piping shall be Type ACR hard-drawn copper tubing conforming to ASTM B280, cleaned, dehydrated, sealed, and suitable for refrigeration service. Soft annealed ACR copper tubing may be used only where permitted by the equipment manufacturer and where protected from damage.
B. Fittings shall be wrought copper, solder-joint/brazed type, suitable for refrigerant service.

C. Brazing filler metal shall be silver-bearing brazing alloy suitable for refrigeration service. Soft solder shall not be used for refrigerant piping.
D. Refrigerant piping sizes shall be as indicated on the Drawings or as required by the equipment manufacturer based on actual installed line lengths, vertical separation, refrigerant type, and equipment capacity. Where manufacturer's requirements differ from the Drawings, notify Architect/Engineer before installation.
E. Provide refrigerant piping accessories required by the equipment manufacturer, including filter driers, sight glasses, solenoid valves, isolation/service valves, oil traps, mufflers, accumulators, and charging ports where required for the installed configuration.

2.4 VALVES
A. Provide valves with minimum 200 psig working pressure and materials compatible with piping service. Provide stem extensions for insulated valves equal to Nibco's Nib-Seal extended handle. Brass valves/components shall contain less than 15% zinc (dezincification resistance). Valves shall conform to MSSP-80.
B. Types and service:
1. Ball Valves – Full-port, quarter-turn, two-piece; chrome-plated ball; reinforced TFE seats; solder or threaded ends as appropriate; 600 psig WOG for 2-1/2 inches and smaller— Equal to Nibco S-585-70 solder joint, or Nibco T-585 screwed joint.
2. Butterfly Valves – Lug type with ductile iron body and molded-in liner at flange seals; EPDM seat; stainless steel stem and disc; rated 200 psig dead-end service; gear operators for 8 inches and larger. Provide flanged spools both sides where used. Acceptable manufacturers: Demco, Nibco, Milwaukee or equal.
3. Check Valves – Bronze, MSS SP-80 swing-type, threaded Nibco T-413-Y or Milwaukee 510-T, solder-end Milwaukee 1510-T, or equivalent.
4. Strainers – Y-type with blow-off; use basket type where complete accessibility is not possible.
5. Balancing Valves – Manual or automatic flow-control type; provide metal identification tag with unit ID, model number, and rated flow.
6. Gate Valves – Equal to Nibco T-113 screwed and Nibco S-113 or Milwaukee 115 solder joint.

2.5 PIPING ACCESSORIES
A. Flanges: Slip-on or butt-welding standard weight 1/16 inch raised face type with gaskets.
B. Unions: Bronze for copper systems; malleable iron with ground joint for steel; provide dielectric unions for dissimilar metals.
C. Escutcheons: Single piece, set-screw type, chrome plated covering opening and sleeve.
D. Flexible Connectors: Neoprene double-arch type, 150 psig minimum, flanged with backup rings and control units (or stainless braided type where shown).
E. Air Vents: Automatic float type at all system high points with isolation stop cocks.
F. Drains: Tee with 3/4-inch ball valve and short threaded nipple with cap at system low points and elsewhere as required.

2.6 HANGERS AND SUPPORTS
A. Conform to MSS SP-58. Support to maintain grade/pitch, prevent vibration, and allow for expansion/contraction.

B. Horizontal support spacing (maximum):
- Ferrous piping: 1/2 inch – 5'-0"; 3/4 inch – 6'-0"; 1 inch – 7'-0"; 1-1/2 inch – 8'-0".
- Copper piping/tubing: up to 1-1/4 inch – 6'-0"; 1-1/2 inch and larger – 8'-0".

C. Vertical support spacing (maximum):
- Ferrous piping: at base and at each story level, not exceeding 30'-0" intervals.
- Copper piping/tubing: up to 1-1/4 inch – 4'-0"; 1-1/2 inch and larger – at base and each story, not exceeding 15'-0" intervals.

D. Hanger types: Split ring for 2 inches and smaller; adjustable clevis for larger than 2 inches. Minimum hanger rod size 3/8 inch; rods shall have machine threads.
E. Use copper-plated hangers for copper piping. Install hangers within 2'-0" of each change in direction and on each side of valves and strainers.
F. Multiple small horizontal pipes may be supported on trapeze hangers sized for load; spacing per smallest pipe.
G. On cold, vapor-sealed insulation, oversize hangers and provide MSS SP-58 Type 40 galvanized steel shields, 16-gauge, not less than 14 inches long, 180° arc.
H. Provide strut-type metallic cushion clamps with thermoplastic liner where piping is supported on walls/floors.

PART 3 – EXECUTION

3.1 INSTALLATION
A. Install piping straight, plumb, and true to alignment. Cut pipe accurately and work into place without springing or forcing.
B. Provide expansion/offsets as required and solder/braze joints only when systems are not under strain.
C. Conceal piping in finished areas; run exposed only where shown or in mechanical/unfinished spaces.
D. Provide clearance for insulation and for access to valves, vents, drains, and unions.
E. Slope piping as required; provide automatic air vents at system high points; extend 1/4-inch soft copper from vents to a suitable drain where inaccessible.
F. Provide 1/2-inch thick foam plastic sleeve protectors on copper and plastic piping penetrations at slab-on-grade prior to concrete placement.
G. Locate/suspend piping to minimize transmission of vibration and noise.
H. Provide sleeves and firestopping at all penetrations; restore fire-resistance ratings.
I. Provide flanges or unions at all equipment connections whether shown or not to allow removal.
J. Provide continuous tracer wire for each nonmetallic underground pipe run: solid #12 AWG copper with 30-mil HDPE insulation; attach at top of pipe.

3.2 PIPING JOINTS
A. Threaded joints: Full-cut threads; apply approved compound to male threads only; minimum three threads exposed after assembly.
B. Mechanical coupling joints: Assemble strictly per manufacturer’s recommendations; use bolts/fasteners/gaskets/lubricants per manufacturer.
C. Soldered/Brazed joints: Square-cut using pipe cutter; ream to full size. Clean pipe and fittings thoroughly. Use non-corrosive flux; nitrogen purge required during brazing.

3.3 REFRIGERANT PIPING INSTALLATION

A. Install refrigerant piping in accordance with equipment manufacturer's instructions, ASHRAE 15, applicable code requirements, and EPA 608 requirements.

B. For systems using A2L refrigerants, install refrigerant piping in accordance with equipment listing, manufacturer's instructions, ASHRAE 15, ASHRAE 15.2 where applicable, UL 60335-2-40, IMC, charge limitations, labeling, leak detection, ventilation, and mitigation requirements applicable to the installed equipment.

C. Route refrigerant piping neatly and directly. Install piping to allow for expansion and contraction, avoid oil traps except where required by manufacturer, and prevent vibration, noise transmission, and physical damage.

D. Purge piping with dry nitrogen while brazing. Keep tubing capped or sealed until assembly. Clean and deburr tubing before joining.

E. Support refrigerant piping at intervals recommended by the equipment manufacturer and as required to prevent sagging, vibration, and strain on equipment connections. Provide isolation at supports to prevent abrasion and galvanic corrosion.

F. Pressure test refrigerant piping with dry nitrogen in accordance with equipment manufacturer's requirements. Do not use oxygen, compressed air, or flammable gases for pressure testing. Repair leaks and retest until tight.

G. Evacuate refrigerant piping and equipment to the vacuum level required by the equipment manufacturer. Hold vacuum for the manufacturer's required duration before charging.

H. Charge system with refrigerant type and quantity required by the equipment manufacturer. Record final charge quantity, line lengths, test pressures, evacuation level, and startup data.

I. Refrigerant piping insulation is specified in Section 23 07 00. Insulate suction piping and other refrigerant piping as required by the equipment manufacturer and as indicated on the Drawings.

3.4 VALVES

A. Locate valves to allow bonnet removal and maintenance access. Mount horizontal flanged valves with stems inclined approximately 30 degrees above horizontal.

B. Provide full-port isolation ball valves at each piece of equipment to permit isolation from accessible locations. Coordinate access doors with General Contractor.

3.5 ACCESSORIES

A. Provide unions/flanges at equipment; flexible connectors at pumps and vibration-producing equipment.

B. Provide drains at low points and vents at high points per this Section.

3.6 INTERFACE WITH OTHER WORK

A. Coordinate with Electrical for power to pumps, controls, and accessories.

B. Coordinate with HVAC equipment suppliers for coil, pump, and chiller connections including required PT ports both sides of pumps and coils.

C. Coordinate with Plumbing for condensate discharge and water supply tie-ins.

D. Coordinate with Structural/Architectural for sleeves, openings, and supports.

E. Verify dimensions and conditions; Drawings are diagrammatic.

3.7 TESTING

A. Test hydronic piping to 1.5 times operating pressure, minimum 125 psig, unless noted otherwise.

B. Test condensate drainage for proper slope and flow.

C. Refer also to Section 23 05 90 for additional testing requirements.

3.8 CLEANING AND FLUSHING

A. Provide hydronic system chemical cleaner; flush systems until water is clear and free of debris.

B. Clean strainers after flushing and provide spare screens.

3.9 AS-BUILTS

A. Record final piping sizes, routing, valves, test plugs, and accessories; submit PDF as-built drawings at closeout.

3.10 FINAL CLEANING AND TURNOVER

A. Clean exposed piping, remove temporary labels, and touch up finishes. Deliver valve charts, instruments, and manuals to Owner.

END OF SECTION

SECTION 23 05 53 – MECHANICAL IDENTIFICATION

PART 1 – GENERAL

1.1 SCOPE
A. Provide identification for piping, ductwork, equipment, valves, and controls as described herein and indicated on the Drawings. Identification shall include nameplates, tags, stencils, labels, pipe markers, ceiling tacks, and underground marker tape.

1.2 RELATED DOCUMENTS
A. Requirements of Divisions 00 and 01 apply to this Section.
B. Section 23 05 00 – Common Work Results for HVAC applies to this Section.

1.3 REFERENCES
A. ASME A13.1 – Scheme for the Identification of Piping Systems.
B. ANSI Z535 – Safety Color Code.
C. NFPA 90A – Installation of Air Conditioning and Ventilating Systems.
D. OSHA 29 CFR 1926 – Safety and Health Regulations for Construction.

1.4 SUBMITTALS
A. Submit product data for nameplates, tags, labels, pipe markers, ceiling tacks, and underground marker tape.
B. Submit valve charts in anodized aluminum frames showing tag numbers, service, and location.
C. Identify deviations from Contract Documents. Provide side-by-side comparisons for substitutions.
D. Submit proposed identification scheme for review and approval by Owner’s maintenance supervisor prior to application.

1.5 QUALITY ASSURANCE
A. All identification products shall be manufactured specifically for mechanical identification applications.
B. Provide consistent identification system across all piping, equipment, and accessories.
C. Identification scheme shall be reviewed with and approved by Owner’s maintenance staff prior to installation.

PART 2 – PRODUCTS

2.1 NAMEPLATES

A. Provide metal nameplates with engraved or stamped lettering, permanently attached with non-corrosive fasteners or adhesive.

B. Nameplates shall include at a minimum:

1. Equipment designation per Contract Documents.
2. Manufacturer's name, model number, and serial number.
3. Capacity (tons, MBH, CFM, GPM as applicable).
4. Electrical characteristics (voltage, phase, MCA/MOCP).
5. Horsepower where applicable.
6. Date of manufacture.
7. Room(s) served as designated by the Owner.
   C. Minimum size: 1″ x 4″ for small devices, 2″ x 6″ for major equipment.
   D. Laminated plastic may be used for secondary components (sensors, relays) but primary equipment (air handlers, condensing units, pumps, panels) shall use engraved metal.

2.2 TAGS

A. Provide brass or anodized aluminum tags with stamped or engraved lettering, minimum 1-½″ diameter for valves and dampers, ¾″ x 2″ for sensors, switches, and small devices.

B. Attach tags with stainless steel beaded chain or wire, no s-hooks permitted.

C. Tag lettering shall match valve and equipment schedules shown on Drawings (e.g., "CHWP-1," "EF-3").

D. Provide a tag chart listing all tags applied, with device name, designation, and location. Mount chart in anodized aluminum frame in main mechanical room.

E. Provide spare blank tags (5% of total installed) to Owner for future use.

2.3 PIPE MARKERS

A. Pipe markers shall conform to ASME A13.1.

B. Provide markers indicating fluid service and direction of flow.

C. Stencil letter sizes minimum:

- ½ inch for pipe less than 2 inches.
- 1 inch for 2 to 6 inch pipe.
- 1-¾ inch for pipe greater than 6 inches.

D. Provide markers at each valve, fitting, penetration, and at 20-foot intervals on straight runs.

E. Underground plastic pipe shall be identified with 6 inch wide, 4 mil thick plastic underground marker tape, color coded by service.

2.4 LABELS
A. Provide adhesive-backed aluminum labels with printed identification and clear lacquer overcoat.
B. Labels shall be permanent and resistant to moisture, heat, and cleaning agents.

2.5 CEILING TACKS
A. Provide colored ceiling tacks to identify equipment above concealed ceilings.
B. Tack colors:
- Yellow – HVAC.
- Red – Fire Dampers / Smoke Dampers.
- Green – Plumbing Valves.

2.6 CONTROLS IDENTIFICATION
A. Provide tags or labels for thermostats, controllers, sensors, relays, communication interface modules, and similar devices coordinated with Section 23 09 00 and approved controls submittals.
B. Tags shall be laminated plastic, engraved plastic, or metal, permanently attached.
C. Device identifiers shall match control schematics, final controls documentation, and Owner training materials.

2.7 STENCILS
A. Provide stencils with clean-cut symbols and letters, minimum sizes as follows:

1. Up to 2 inches OD of insulation or pipe: ½-inch high letters.
2. 2½ to 6 inches OD of insulation or pipe: 1-inch high letters.
3. Over 6 inches OD of insulation or pipe: 1¾-inch high letters.
4. Ductwork and equipment: 1¾-inch high letters.

B. Stencil paint shall be semi-gloss enamel, colors and lettering conforming to ASME A13.1, with contrasting background for visibility.
C. Apply stencils on clean, dry surfaces only, after painting or insulation is complete.

PART 3 – EXECUTION

3.1 APPLICATION
A. Install identification after painting or insulation is complete.
B. Secure tags and nameplates with non-corrosive fasteners.
C. Apply stencils and labels to clean, dry surfaces.
D. Provide pipe markers and tags as specified in Part 2.
E. Install ceiling tacks in suspended ceilings directly below concealed equipment or devices.
F. Identification scheme shall be consistent throughout the project.

END OF SECTION

SECTION 23 05 90 – CLEANING AND TESTING FOR HVAC

PART 1 – GENERAL

1.1 SCOPE
A. Provide all labor, materials, equipment, and services required for cleaning, flushing, leak testing, and operational testing of HVAC systems. Verify systems are free of leaks, dirt, oil, and debris, and are safe and ready for TAB under Section 23 05 93. The General Contractor shall be responsible for providing water and power for testing as required.

1.2 RELATED DOCUMENTS
A. Requirements of Divisions 00 and 01 apply to this Section.
B. Section 23 05 00 – Common Work Results for HVAC
C. Section 23 05 93 – Testing, Adjusting, and Balancing for HVAC
D. Section 23 09 00 – Temperature Controls

1.3 SUBMITTALS
A. Submit proposed testing plan and schedule for review.
B. Submit certified test reports documenting procedures, pressures, durations, deficiencies, and corrective actions.

PART 2 – PRODUCTS
Not used.

PART 3 – EXECUTION

3.1 CLEANING
A. Clean all ductwork and piping of construction debris prior to startup.
B. Protect cleaned systems from re-contamination until acceptance.

3.2 LEAK AND PRESSURE TESTS
A. Perform pressure and leak tests on all piping and ductwork prior to concealment or insulation.
B. Test hydronic and other liquid piping systems to not less than 1.5 times the system operating pressure, unless a different test pressure is required by code, manufacturer, or another Division 23 specification section.
C. Test ductwork for leakage in accordance with SMACNA HVAC Air Duct Leakage Test Manual, SMACNA HVAC Duct Construction Standards, and Section 23 31 00. Test pressure, leakage class, allowable leakage, and extent of testing shall be as specified in Section 23 31 00 or as indicated on the Drawings.
D. Repair leaks with new material and retest until satisfactory. Caulking of duct joints as a sole means of repair is not permitted.
E. No piping, ductwork, or equipment shall be concealed until required inspections and tests are complete and approved.

3.3 OPERATIONAL TESTS

A. Operate each system and component to demonstrate performance as intended by the Contract Documents.

B. Demonstrate that heating and cooling capacities can be met under design conditions.

C. Verify motors, controls, thermostats/controllers, safeties, and equipment operating sequences function properly. Coordinate with the temperature controls contractor or equipment manufacturer where required.

D. Verify systems are sufficiently complete, clean, operational, and ready for TAB, including clean filters, clean coils, operating fans, accessible balancing devices, operational dampers, operational controls, verified safeties, and corrected deficiencies. Upon completion of tests under this Section, turn systems over for TAB in accordance with Section 23 05 93.

END OF SECTION

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

PART 1 – GENERAL

1.1 SCOPE
A. The HVAC Contractor shall be responsible for providing testing, adjusting, and balancing (TAB) of all HVAC systems at no additional cost to the Owner. TAB work shall be performed by an independent firm certified by AABC or NEBB, hired and paid for by the HVAC Contractor.
B. The HVAC Contractor shall coordinate all testing activities, provide access to systems, furnish temporary duct or piping connections, and arrange for electrical power and water as needed; power and water shall be the responsibility of the General Contractor.
C. The TAB firm shall conduct all required tests in accordance with applicable codes, the Contract Documents, and accepted industry standards. All instruments and personnel shall be properly certified.
D. Deficiencies discovered during TAB, including inaccessible dampers, improperly operating controls, incorrect fan rotation, inadequate airflow, excessive pressure drop, improper damper operation, dirty filters/coils, missing balancing devices, or other conditions preventing proper balance, shall be reported to the HVAC Contractor and Architect/Engineer. HVAC Contractor shall correct deficiencies at no additional cost to the Owner. Retesting shall continue until systems perform in accordance with the Contract Documents.
E. No ductwork, piping, or equipment shall be covered or insulated until required inspections and tests are completed and approved. Work concealed before approval shall be uncovered and corrected at the Contractor’s expense.
F. Each system shall be operated long enough to demonstrate that fans, coils, controls, and other components perform as intended. All adjustments necessary to achieve design performance shall be completed to the satisfaction of the Architect.
G. All motor-driven equipment shall be demonstrated to operate properly, consistent with the manufacturer’s recommendations and these specifications.

1.2 RELATED DOCUMENTS
A. Requirements of Divisions 00 and 01 apply to this Section.
B. Section 23 05 00 – Common Work Results for HVAC
C. Section 23 05 90 – Cleaning and Testing for HVAC
D. Section 23 09 00 – Temperature Controls
E. Section 23 35 00 – Air Conditioning Equipment
F. Section 23 74 00 – Dedicated Outside Air Handling Units
G. Division 26 – Electrical, for power wiring, motor starters, disconnects, and electrical connections

1.3 REFERENCES
A. AABC – Associated Air Balance Council National Standards.
B. NEBB – National Environmental Balancing Bureau Procedural Standards.
C. ASHRAE Guideline 1.1 – HVAC&R Technical Requirements for Commissioning.

1.4 SUBMITTALS
A. Submit proposed TAB plan indicating procedures, equipment to be used, and schedule.
B. Submit final certified TAB report showing design values, actual readings, percent deviation, and corrective actions taken.
C. Submit test instrument calibration certificates, dated within the last 12 months.
D. Pre-TAB Readiness Report: Submit checklist confirming that systems are complete, clean, filters installed, coils clean, fans operating, dampers operational, controls sufficiently programmed for TAB, access doors installed, balancing dampers accessible, and equipment startup complete.
E. Commissioning Coordination: Submit list of TAB values, control settings, fan speeds, damper positions, and deficiencies that must be resolved before functional performance testing.

1.5 QUALIFICATIONS
A. TAB shall be performed by a firm certified by AABC or NEBB.
B. Field technicians shall be individually certified by AABC or NEBB.

1.6 WARRANTY
A. TAB Contractor shall return during warranty period at no additional cost to make adjustments required due to system changes or deficiencies identified by Owner.

PART 2 – PRODUCTS

2.1 INSTRUMENTS
A. Provide instruments properly maintained and calibrated to industry standards.
B. Instruments shall be appropriate for the range and accuracy of values being measured, including digital manometers, anemometers, flow hoods, and tachometers.

PART 3 – EXECUTION

3.1 PREPARATION
A. Verify systems are complete, clean, and ready for balancing.
B. Verify variable devices (VAV boxes, exhaust fans, return fans) are installed, operational, and under automatic control.
C. Verify all coils, fans, and filters are clean and operable prior to balancing.
D. TAB work shall not commence until cleaning, leak testing, and preliminary operational testing required under Section 23 05 90 has been completed and approved.

3.2 AIR SYSTEMS
A. Balance supply air, return air, outside air, relief air, exhaust air, air handlers, outside air handling units, terminal devices, diffusers, registers, and grilles to design airflow within plus or minus 10 percent unless more stringent tolerance is indicated.
B. Exhaust fans and restroom exhaust systems shall be balanced to design airflow within plus or minus 5 percent.
C. Dedicated outside air handling units shall be balanced to scheduled supply airflow, outside airflow, exhaust airflow, and relief airflow where applicable.

D. Adjust balancing dampers, fan speeds, sheaves/drives where applicable, control setpoints, and damper positions to achieve design airflow and pressure relationships.
E. Document final fan speeds, motor amperages, static pressures, filter pressure drops, coil pressure drops where applicable, damper positions, control settings, and measured airflows.
F. Verify building pressure relationships indicated on the Drawings. Where pressure relationships cannot be achieved, document measured values, likely cause, and recommended corrective action.

3.3 DX EQUIPMENT
A. Verify DX equipment (split systems, condensing units, RTUs) deliver required airflow and capacity.
B. Measure coil entering and leaving air temperatures; document sensible and total ΔT.
C. Confirm airflow per ton meets manufacturer's requirements.
D. Document condenser fan operation, compressor staging, and refrigerant circuit performance when observed during startup.
E. Coordinate with equipment manufacturer's startup technician for integrated performance verification.
F. For equipment with dehumidification and hot gas reheat, coordinate with equipment startup technician and Temperature Controls Contractor to verify cooling/dehumidification operation, reheat operation, leaving air temperature, and control response where operating conditions allow.

3.4 EXHAUST AND RELIEF SYSTEMS
A. Balance exhaust and relief fans to design airflow within plus or minus 5 percent.
B. Balance restroom exhaust systems associated with dedicated outside air handling units to scheduled airflow.
C. Coordinate exhaust, relief, and outside air quantities to maintain design building pressurization and air balance.
D. Verify exhaust fan operation, backdraft dampers, control dampers, and associated controls operate sufficiently for TAB. Report deficiencies preventing proper balance.

3.5 COORDINATION
A. Coordinate with Temperature Controls Contractor and HVAC equipment suppliers to operate equipment in required modes during TAB. Active BAS operation is not required unless specifically indicated.
B. Coordinate with Temperature Controls Contractor so final fan speed settings, damper positions, airflow setpoints, occupied/unoccupied modes, minimum outside air settings, exhaust/relief operation, humidity assist mode, and restroom occupancy override mode are consistent with final TAB results.
C. Coordinate with Electrical Contractor for motor rotation checks, starter settings, variable frequency drive settings where provided, and verification of motor amperage.
D. Coordinate with equipment manufacturer's startup technician where manufacturer support is required to adjust fan speeds, unit controller settings, compressor staging, dehumidification operation, energy recovery operation, or other factory controller parameters.

E. Where project commissioning is required, provide TAB support during functional performance testing as required to demonstrate airflow, pressure relationships, and system operating modes. Correct TAB-related deficiencies and retest as required.

3.6 REPORTS

A. Submit certified TAB report indicating design values, actual measured values, percent deviation, and corrective actions taken.

B. Include fan data, motor data, coil data, filter pressure drops, static pressure profiles, terminal airflows, outside airflows, exhaust airflows, relief airflows, diffuser/register/grille airflows, final fan speeds, final damper positions, and final control settings used for TAB.

C. For dedicated outside air handling units, include scheduled and measured supply airflow, outside airflow, exhaust airflow, relief airflow where applicable, fan speeds, motor amperages, static pressures, filter pressure drops, energy recovery operating status, and control settings used during TAB.

D. Provide recommendations for corrective action if systems cannot be balanced within specified tolerance or if design pressure relationships cannot be achieved.

E. Submit final TAB report before functional performance testing where project commissioning is required, unless otherwise accepted by Architect/Engineer.

3.7 OWNER TRAINING

A. Review TAB report with Owner’s representatives where requested.

B. Identify final balancing settings, control settings coordinated with TAB, and locations of balancing devices requiring future access.

C. Explain that balancing dampers, fan speeds, and airflow setpoints shall not be adjusted by Owner except through qualified service personnel.

END OF SECTION

SECTION 23 07 00 – HVAC INSULATION

PART 1 – GENERAL

1.1 SCOPE
A. Provide insulation for all HVAC piping, ductwork, and associated equipment as specified. Work shall include furnishing and installing insulation, jackets, adhesives, mastics, and accessories required for a complete system in accordance with the Contract Documents and applicable codes.

1.2 RELATED DOCUMENTS
A. Requirements of Divisions 00 and 01 apply to this Section.
B. Section 23 05 00 – Common Work Results for HVAC applies to this Section.

1.3 REFERENCES
A. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
B. ASTM C534 – Flexible Elastomeric Cellular Materials.
C. International Mechanical Code (IMC), latest applicable edition.
D. International Energy Conservation Code (IECC) 2021 with Louisiana amendments.
E. ASHRAE 90.1 – Energy Standard for Buildings Except Low-Rise Residential Buildings.

PART 2 – PRODUCTS

2.1 GENERAL REQUIREMENTS
A. All insulation materials, jackets, facings, and adhesives shall have composite surface burning characteristics with a maximum flame spread rating of 25 and smoke developed rating of 50 when tested in accordance with ASTM E84.
B. Insulation thickness shall be as required by the 2021 IECC and IMC, but not less than values indicated herein.

2.2 DUCTWORK INSULATION
A. Supply, return, and outside air ductwork shall be externally insulated with minimum 2-inch thick fiberglass blanket insulation with FRK or ASJ+ vapor barrier jacket, minimum R-8, except where specifically indicated to remain uninsulated or where factory-fabricated double-wall insulated ductwork is provided. Insulation shall be wrapped tightly on the ductwork with all circumferential joints butted and longitudinal joints overlapped a minimum of 2”. Adhere insulation to metal with 4” strips of insulation bonding adhesive at 8” on centers. On longitudinal joints, the overlap shall be secured using 9/16” flared door staples applied 6” on centers and taped with minimum 3” wide foil reinforced kraft tape. All pin penetrations or punctures in facing shall be taped. Tape all circumferential joints with 4” wide foil reinforced kraft tape. Refer to Section 23 30 00 for ductwork with internal lining.
B. Internally lined single-wall supply ductwork shall also be externally insulated. Internal duct liner in single-wall supply ductwork is provided for sound attenuation and shall not be considered a substitute for external duct insulation or vapor barrier.

C. Factory-fabricated double-wall insulated ductwork, including double-wall spiral ductwork with insulation between the inner and outer metal walls, shall not be externally wrapped unless specifically indicated on the Drawings or required for exterior exposure, weather protection, condensation control, or code compliance.
D. Internally lined return ductwork located within conditioned space is not required to be externally insulated unless indicated otherwise, exposed to unconditioned conditions, or required for condensation control or code compliance.
E. Coordinate internal duct liner and double-wall ductwork requirements with Section 23 30 00. Where ductwork is internally lined, duct dimensions shown on the Drawings are inside clear dimensions unless indicated otherwise. Increase sheet metal dimensions as required to maintain scheduled airflow area.

2.3 PIPING INSULATION
A. Refrigerant suction piping and other refrigerant piping requiring insulation shall be insulated with closed-cell flexible elastomeric insulation conforming to ASTM C534. Minimum insulation thickness shall be 3/4 inch for indoor piping and 1 inch for outdoor piping unless greater thickness is required by equipment manufacturer, code, condensation control, or Drawings. Apply UV-resistant coating or weatherproof jacket where exposed outdoors.
B. Condensate drain piping shall be insulated as follows:

1. Condensate drain piping from HVAC equipment that extends outside the fan housing shall be insulated with minimum 1 inch thick fiberglass with ASJ+ vapor retarder jacket and self-seal lap (SSL) closure system. Provide factory-manufactured rigid fitting covers.

2. All condensate drain piping above slab (including floor drain branches, deep-seal p-traps, hub drains, or other termination piping) shall be insulated with minimum 1 inch thick fiberglass with ASJ+ vapor retarder jacket and self-seal lap (SSL) closure system. Provide factory-manufactured rigid fitting covers.

2.4 JACKETS
A. Exposed indoor insulation: factory-applied ASJ+ vapor retarder jacket with SSL.
B. Outdoor insulation: 0.024 inch stucco embossed aluminum jacket, seams lapped and sealed watertight.

2.5 INSERTS AND SHIELDS
A. Provide galvanized steel shields at all pipe hangers and supports.
B. Shields shall be sized to protect insulation from compression and allow for continuous thermal barrier.

PART 3 – EXECUTION

3.1 INSTALLATION
A. Install insulation in accordance with manufacturer’s instructions, NAIMA and SMACNA standards.
B. Insulation shall be continuous, tight fitting, with all seams and penetrations sealed to maintain vapor barrier integrity.

C. Seal circumferential joints with 4 inch wide pressure-sensitive foil tape or approved mastic. Longitudinal seams shall be sealed with SSL closure system or 3 inch wide tape.
D. All pin penetrations or jacket tears shall be sealed.
E. Where ductwork or piping passes through walls, ceilings, or floors, continue insulation and vapor barrier without voids.
F. Engage qualified insulation subcontractor to perform installation.
G. All surfaces to be insulated shall be clean and dry before application of insulation. All sections of molded pipe covering shall be firmly butted together. No insulation shall be applied until the pipe, duct, etc. have been pressure tested and found tight. Piping flexible connections, flanges, and unions shall not be covered unless specifically noted. Flexible duct connections shall not be covered.
H. Unsightly work shall be just cause for rejection of installation.

3.2 EXTERIOR APPLICATIONS
A. Insulation exposed to weather shall be protected with aluminum jacket, seams (positioned on bottom) overlapped and sealed watertight.
B. Provide weather-resistant mastics, coatings, or sealants at terminations and penetrations.

END OF SECTION

SECTION 23 09 00 – TEMPERATURE CONTROLS

PART 1 – GENERAL

1.1 SCOPE
A. Provide all labor, materials, equipment, and services required for a complete temperature control system. Work includes thermostats, equipment controllers, sensors, safety devices, control wiring, programming/setup, and coordination with HVAC equipment manufacturers as required for complete and operable control of the HVAC systems indicated. Split system heat pumps and dedicated outside air systems shall include DDC-capable controls and communication provisions suitable for future connection to a building automation system where indicated. Ductless mini-splits, packaged terminal air conditioners, and electric unit heaters shall be controlled by manufacturer-furnished, integral, or scheduled thermostats/controllers unless otherwise indicated. No building automation system front end, graphics, workstation, BAS network, or active BAS integration is required under this project unless specifically indicated.

1.2 RELATED DOCUMENTS
A. Requirements of Divisions 00 and 01 apply to this Section.
B. Section 23 05 00 – Common Work Results for HVAC applies to this Section.

1.3 REFERENCES
A. International Mechanical Code (IMC), latest applicable edition
B. International Energy Conservation Code (IECC), 2021 edition
C. ASHRAE Standard 135 – BACnet, A Data Communication Protocol for Building Automation and Control Networks
D. UL Standards for control panels and devices

1.4 SUBMITTALS
A. Submit product data, wiring diagrams, thermostat/controller locations, control device locations, sequences of operation, and manufacturer controller/interface data for each HVAC system.
B. Submit product data for thermostats, sensors, equipment controllers, communication interface modules, safety devices, and accessories.
C. Submit O&M manuals including product data, wiring diagrams, programming instructions, and training materials.
D. For equipment specified to be future BAS-capable, submit documentation identifying available communication protocol, required communication module, available control points, and field wiring requirements for future BAS connection.
E. Startup and functional testing documentation: submit proposed startup checklist, functional test procedures, final setpoints, controller schedules, occupied/unoccupied settings, humidity/dehumidification settings, alarm/safety settings, and sample functional test forms for each HVAC system controlled under this Section.

1.5 QUALIFICATIONS

A. Temperature controls shall be provided by the HVAC equipment supplier, Mechanical Contractor, or qualified temperature controls subcontractor regularly engaged in installation, setup, programming, and testing of HVAC control systems, thermostats, and manufacturer-furnished equipment controllers. Entity responsible for this work is referred to in this Section as the Temperature Controls Contractor. Temperature Controls Contractor shall employ personnel qualified to install, wire, program, calibrate, test, and document the specified control devices and manufacturer-furnished equipment controllers.

1.6 WARRANTY

A. Provide a three (3) year warranty covering thermostats, controllers, sensors, control devices, control wiring, programming/setup, calibration, and workmanship furnished under this Section.

PART 2 – PRODUCTS

2.1 GENERAL REQUIREMENTS

A. All control products shall be new, listed, and labeled by recognized testing agencies.
B. Provide all ancillary equipment required for a complete and operable system.

2.2 THERMOSTATS AND SENSORS

A. Provide programmable wall-mounted thermostats or local controllers for split system heat pumps and dedicated outside air systems unless otherwise indicated. Thermostats/controllers shall be compatible with the associated equipment and shall provide heating/cooling automatic changeover, occupied/unoccupied scheduling, fan control, humidity/dehumidification control where applicable, and staging as required by the equipment sequence of operation.
B. Split system heat pumps and dedicated outside air systems shall include manufacturer-furnished DDC-capable controls and factory communication interface cards/modules required for future connection to a building automation system. Factory communication interface shall be installed and enabled as part of the equipment installation. Active connection to a building automation system, BAS network wiring, BAS front end, graphics, alarming, trending, and BAS point-to-point checkout are not required unless specifically indicated.
C. Thermostats/controllers for ductless mini-split systems and packaged terminal air conditioners shall be manufacturer-furnished or manufacturer-recommended devices furnished with the equipment unless otherwise indicated.
D. Electric unit heaters shall be controlled by integral thermostats or wall-mounted line-voltage thermostats as scheduled or indicated on the drawings.
E. Provide remote temperature, humidity, CO2, or other sensors only where indicated on the drawings or required by the equipment manufacturer for the specified sequence of operation.

2.3 SAFETY DEVICES

A. Fire-stats shall be provided on all air handling devices over 600 CFM, set to trip at 125°F to 200°F, adjustable.
B. Float switches shall be provided at auxiliary drain pans to shut down equipment in case of

water detection.
C. Duct smoke detectors shall be provided by the fire alarm contractor; mechanical contractor shall install and interface.

2.4 MISCELLANEOUS
A. Temperature Controls Contractor shall provide relays, switches, capacity relays, interface modules, communication cards, transformers, sensors, and auxiliary devices necessary to provide complete and properly operating control of HVAC equipment as specified, as indicated on the Drawings, and as required by the equipment manufacturer.
B. All electric switches and relays shall be UL listed and rated for the voltage and current requirements of the application.

2.5 SEQUENCES OF OPERATION
A. General: HVAC equipment shall operate in accordance with sequences indicated on the Drawings, manufacturer's requirements, and approved submittals. Where conflicts exist, notify Architect/Engineer before programming or installation.
B. Split System Heat Pumps: Provide occupied/unoccupied scheduling, heating/cooling automatic changeover, fan control, compressor staging or modulation where applicable, auxiliary heat control where applicable, and safety shutdowns. Thermostat/controller shall maintain space temperature setpoints indicated on the Drawings or established by Owner.
C. Dedicated Outside Air Systems: Sequence shall apply individually to each OAHU and associated restroom.
1. Occupied Mode: Enable/disable OAHU via time-of-day schedule with holiday scheduling capability. During scheduled occupied periods, run supply and exhaust fans, position outside air, supply air, and exhaust air dampers to occupied settings, operate energy recovery wheel per normal sequence, and enable cooling, dehumidification, and hot gas reheat as required.
2. Unoccupied Mode: During scheduled unoccupied periods, OAHU shall remain off unless Unoccupied Humidity Assist Mode or Restroom Occupancy Override Mode is active. Associated zone HVAC equipment shall maintain unoccupied space temperature and humidity setpoints.
3. Unoccupied Humidity Assist Mode: During scheduled unoccupied periods, enable OAHU when representative space dew point or relative humidity for the area served by that OAHU rises above adjustable setpoint. Operate OAHU at occupied mode airflow settings. Cool/dehumidify outside air and use hot gas reheat to temper supply air. Return to Unoccupied Mode when space humidity falls below setpoint, subject to minimum runtime and anti-short-cycle protection.
4. Restroom Occupancy Override Mode: During scheduled unoccupied periods, occupancy signal from restroom associated with OAHU shall start that OAHU in Occupied Mode. Unit shall run for 30 minutes after last occupancy signal, then return to Unoccupied Mode unless Unoccupied Humidity Assist Mode remains active.
5. Adjustable Setpoints and Proving: Provide adjustable dew point, relative humidity, temperature, airflow, and override timer setpoints required for the specified sequence. Provide exhaust fan status or exhaust flow proving where indicated or required by the equipment sequence.

D. Ductless Mini-Splits and PTACs: Units shall operate from manufacturer-furnished thermostats/controllers or remote controllers furnished with the equipment unless otherwise indicated.
E. Electric Unit Heaters: Unit heaters shall operate from integral thermostats or wall-mounted thermostats as scheduled or indicated on the Drawings.
F. Future BAS Capability: For equipment specified to be future BAS-capable, manufacturer-furnished communication interface cards/modules shall be installed and enabled. Active BAS integration, BAS network wiring, graphics, alarming, trending, and point-to-point checkout are not required unless specifically indicated.
G. Duct-Smoke-Detector Shutdown: Upon activation of a duct smoke detector, shut down the associated air-distribution system in accordance with the adopted code and approved fire-alarm interface schedule. Restore operation only after the initiating condition has cleared, the fire-alarm system has been reset, and the HVAC equipment has been reset or restarted as required by the approved sequence.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install thermostats, controllers, sensors, relays, interface modules, communication cards, transformers, control wiring, and auxiliary devices in accordance with manufacturer's written instructions, approved submittals, Contract Documents, and applicable code requirements.
B. Mechanical contractor shall provide low-voltage wiring (<50 VAC). Electrical contractor shall provide line-voltage wiring (≥50 VAC).
C. All temperature control wiring shall be in conduit unless otherwise approved; exterior and exposed in the building shall be in rigid metal conduit and all other shall be in EMT.

3.2 COORDINATION

A. Coordinate thermostat, controller, sensor, communication interface, and control wiring requirements with HVAC equipment suppliers, Electrical Contractor, Testing, Adjusting, and Balancing Contractor, and Commissioning Authority where applicable.
B. Coordinate with Electrical Contractor for power, control wiring, conduit routing, disconnects, interlocks, and equipment shutdown interfaces.
C. Division 28 shall furnish, install, wire, address, program, and test duct smoke detectors, remote test/reset stations, monitor modules, control modules, fire-alarm-side interposing relays, and fire-alarm wiring through the dry-contact interface. Division 23 shall provide accessible shutdown input terminals, HVAC controls, and equipment-side wiring from the dry-contact interface to starters, variable-frequency drives, packaged-equipment controllers, or other HVAC control equipment, and shall implement the required shutdown and reset sequence. Coordinate detector location, permanent access, contact ratings, normal contact state, shutdown action, reset action, and final testing before installation.

D. Coordinate with Testing, Adjusting, and Balancing Contractor so final control settings, fan speeds, damper positions, airflow setpoints, occupied/unoccupied modes, and special operating modes are consistent with final TAB results.
E. Where project commissioning is required, provide personnel, tools, software, access credentials, manufacturer support, and documentation required to demonstrate HVAC control sequences and correct deficiencies.

3.3 TESTING AND COMMISSIONING
A. Test, calibrate, and verify proper operation of thermostats, local controllers, factory equipment controllers, sensors, relays, safeties, interlocks, communication cards, and control devices.
B. Verify thermostats/controllers, schedules, setpoints, staging, safeties, fan operation, heating operation, cooling operation, dehumidification operation, economizer operation where applicable, equipment shutdown functions, and alarms/status indications where provided.
C. For dedicated outside air systems and associated restroom exhaust systems, demonstrate each required operating mode, including occupied mode, unoccupied mode, humidity assist mode, restroom occupancy override mode, exhaust fan operation, supply fan operation, damper operation, energy recovery wheel operation, cooling/dehumidification operation, hot gas reheat operation, heating operation where applicable, and return to normal operation after override or humidity demand is satisfied.
D. Verify humidity sensors, dewpoint or relative humidity setpoints, occupied/unoccupied schedules, holiday schedule capability, minimum runtime/anti-short-cycle settings, override timers, and adjustable setpoints required for the specified sequences of operation.
E. For equipment specified to be future BAS-capable, verify installation and enablement of required communication cards, gateways, or interface modules. Active BAS point-to-point testing, graphics, alarming, trending, and BAS network checkout are not required unless specifically indicated.
F. Where project commissioning is required, support functional performance testing by demonstrating control sequences to the Commissioning Authority and Engineer where requested. Temperature Controls Contractor remains responsible for programming, calibration, correction of deficiencies, retesting, and final documentation.
G. Correct deficiencies at no additional cost to the Owner and retest until operation complies with the Contract Documents.
H. Coordinate each duct-smoke-detector and HVAC-shutdown test with Division 28. Demonstrate detector activation, required annunciation and transmission, shutdown of each affected air-distribution system, required reset or restart, and restoration to normal operation.

3.4 TRAINING
A. Provide one training session for Owner’s personnel covering operation, scheduling, occupied/unoccupied modes, holiday schedules, setpoint adjustment, humidity/dehumidification settings, restroom override operation, alarm/status review where provided, basic troubleshooting, and routine operation of thermostats, local controllers, and manufacturer-furnished equipment controllers.

B. Provide training materials, controller instructions, final setpoint schedule, final operating schedules, and handouts to Owner.

3.5 SERVICE AND WARRANTY

A. The control system shall be free from defects in workmanship and materials under normal use and service for a period of three (3) years from the date of Owner acceptance.
B. Upon completion of the work, Temperature Controls Contractor shall thoroughly check, adjust, calibrate, program, and place into full operation all thermostats, controllers, sensors, safeties, interlocks, communication cards, and control devices furnished under this Section.
C. Provide the Owner with complete instruction manuals covering the function and operation of all control system components.
D. Provide a qualified technician for a minimum of two (2) site visits during the warranty period to assist the Owner in system operation, adjustment, and troubleshooting, in addition to training requirements specified herein.

3.6 CLOSEOUT DOCUMENTATION

A. Submit final controls documentation including final setpoint schedule, final operating schedules, occupied/unoccupied settings, holiday schedule instructions, humidity/dehumidification settings, override timer settings, alarm/safety settings, controller access information, communication interface documentation, functional test results, and training records.

END OF SECTION

SECTION 23 11 23 – GAS PIPING

PART 1 – GENERAL

1.1 SUMMARY
A. Provide a complete natural gas piping system to all gas-burning appliances and connectors, including underground and aboveground piping, valves, regulators, meters, specialties, and accessories.
B. Coordinate with the gas utility, Architect, and Owner for service entry, meter set, and pressures.
C. Submit shop drawings to Owner/Engineer and the serving gas utility for review and approval prior to installation.

1.2 RELATED REQUIREMENTS
A. Section 22 05 03 – Plumbing Piping (coordination for penetrations, identification, hangers/supports, tracer wire).
B. Section 23 05 03 – Common Work Results for HVAC.
C. Section 23 05 53 – Identification for HVAC Piping and Equipment.
D. Division 01 – Administrative and procedural requirements.

1.3 REFERENCES
A. NFPA 54 – National Fuel Gas Code.
B. ASME B31.9 – Building Services Piping.
C. ASME Section IX – Welding Qualifications.
D. ASTM A53 – Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
E. ASTM D2513 – Polyethylene (PE) Gas Pressure Pipe, Tubing, and Fittings.

1.4 SUBMITTALS
A. Product Data: Pipe and fittings; valves; regulators; relief valves; coating systems; anodeless risers; tracer wire; warning tape.
B. Qualifications: Welder qualifications per ASME Section IX; PE fusion technician certifications for heat-fusion joining.
C. Test Reports: Pressure/leak tests for underground and aboveground piping.
D. Record Documents: As-built routing; valve and regulator locations; materials; operating pressures.

1.5 QUALITY ASSURANCE
A. Perform fuel-gas work in accordance with NFPA 54 and ASME B31.9.
B. Welding: Procedures and welders qualified per ASME Section IX for the materials and positions used.
C. PE fusion joining shall be performed by manufacturer-trained and certified technicians; maintain fusion logs for submittal.

1.6 DELIVERY, STORAGE, AND HANDLING
A. Protect pipe and fittings from dirt and moisture; cap ends during storage and installation.
B. Deliver valves in original cartons with identification and ratings intact.

1.7 ENVIRONMENTAL CONDITIONS

A. Do not install underground piping when bedding is wet or frozen.

1.8 EXTRA MATERIALS
A. Furnish two packing kits for each type and size of valve.

PART 2 – PRODUCTS

2.1 NATURAL GAS PIPING – BELOW GRADE
A. Medium-Density Polyethylene (MDPE) Gas Pipe: ASTM D2513, PE 2708 or PE 4710, yellow; SDR 11 for pressures up to 125 psig unless otherwise required by utility; heat-fusion fittings and transitions; listed for natural gas distribution.
B. Joints: Butt fusion, socket fusion, or electrofusion per pipe manufacturer; mechanical compression fittings only where specifically approved for buried gas service.
C. Transitions/Risers: Anodeless risers listed for gas service to transition from PE to steel at building entrances and meter sets; factory assembled.
D. Tracer Wire and Warning Tape: 12 AWG copper tracer wire with corrosion-resistant insulation, installed continuously over nonmetallic pipe; plastic warning tape, 6-inch wide, printed “CAUTION – GAS LINE BELOW.”
E. Underground Steel (where required): ASTM A53 Schedule 40 black steel with welded joints; factory or field coating per utility requirements; dielectric isolation at building entries.
F. Cathodic Protection (for buried steel only; not required for MDPE):
1. Provide 17-lb magnesium anodes with No. 12 AWG HMWPE lead wire, factory mastic-coated; bury in augered hole a minimum of 5 feet from pipe and below frost line.
2. Make lead connections to steel by exothermic weld; coat with mastic/patch wrap.
3. Provide test stations at each anode and at building entry/meter set, in accessible grade box with labeled terminals.
4. Insulating devices: Provide dielectric unions/flanges to electrically isolate Owner’s buried steel from utility system and building interior steel.
5. Materials and application: Per NACE SP0169 (or latest), NFPA 54, and utility requirements.

2.2 NATURAL GAS PIPING – ABOVE GRADE
A. Steel Pipe: ASTM A53 Schedule 40 black steel.
B. Fittings: Malleable iron threaded (through 2 inches) conforming to ASME B16.3, or forged steel welding type per ASTM A234.
C. Joints: Threaded through 2 inches; welded above 2 inches unless noted otherwise; thread compound listed for gas service.
D. Dielectric Connections: Provide where joining dissimilar metals.

2.3 VALVES
A. Ball Valves: UL listed for fuel-gas service; bronze or steel body; full port to 1 inch; lever handle; blow-out-proof stem.
B. Plug Valves (where indicated): 150 psi WOG lubricated plug type.
C. Provide manual shutoff valve and union ahead of each appliance, with drip leg (sediment trap) not less than 12 inches in length and of the same nominal diameter as the inlet.
2.4 STRAINERS (WHERE INDICATED)
A. Y-pattern with stainless steel screen; 175 psig working pressure; threaded or flanged to match connecting pipe.

2.5 PRESSURE REGULATORS AND RELIEF VALVES
A. Service Regulators: Spring-loaded, self-operated, with internal relief diaphragm; body materials suitable for temperature –20°F to 150°F; inlet pressure rating not less than 150 psig; vent connection full-size to outdoors when installed indoors.
B. Relief Valves: Spring-loaded type; outlet/vent same size as inlet; materials compatible with natural gas.

2.6 COATINGS AND JACKETS (UNDERGROUND STEEL)
A. Polyethylene encasement per AWWA C105 or double-layer polyethylene tape; field wrap fittings and welds after testing where applicable.

PART 3 – EXECUTION

3.1 EXAMINATION AND PREPARATION
A. Verify trench grades are correct, dry, and not over-excavated; provide sand bedding as required by utility and pipe manufacturer.
B. Ream pipe ends; remove burrs; clean inside and outside prior to assembly.

3.2 INSTALLATION – BURIED PIPING
A. Install MDPE gas piping in accordance with NFPA 54, ASTM D2513, and manufacturer's instructions. Maintain required separations from other utilities.
B. Provide continuous tracer wire and warning tape directly above nonmetallic pipe; bring tracer wire to accessible test stations at risers and meter sets.
C. Provide anodeless risers at building entries and meter sets; transition to aboveground steel piping before entering the building.
D. Prohibit direct-buried steel penetrations into buildings; provide dielectric isolation at entries.
E. Perform pressure test prior to backfill.
F. Cathodic Protection Installation:
1. Install anodes, test leads, insulating devices, and test stations as shown and per utility/CP designer.
2. Where MDPE is used, provide CP only for buried steel components (e.g., steel service nipples, meter headers), if present.
G. Provide seismic bracing and vibration isolation for aboveground gas piping in accordance with NFPA 54.

3.3 INSTALLATION – ABOVEGROUND PIPING
A. Install aboveground piping in accordance with NFPA 54. Provide rigid appliance connections unless noted otherwise.
B. Provide accessible manual shutoff valve within 3 feet of each appliance; locate to allow service without removing the valve.
C. Vent regulator reliefs full size to exterior through roof or wall with weatherproof termination and birdscreen; do not manifold dissimilar reliefs unless listed for such use.
D. Exposed Ferrous Piping Finish: After testing and acceptance, prepare and paint exposed, uninsulated ferrous gas piping, fittings, and field-fabricated ferrous supports. Remove oil, dirt, rust, mill scale, and loose coatings. Apply a compatible corrosion-inhibitive primer and two finish coats of rust-inhibitive coating suitable for the installed environment. Color shall be as selected by the Architect. Repair damaged galvanized and factory-applied coatings using materials

compatible with the substrate. Do not paint pipe markers, nameplates, valve stems or handles, regulator vents, flexible connectors, or other operating components.
E. Exposed Ferrous Piping Finish: After testing and acceptance, prepare and paint exposed, uninsulated ferrous gas piping, fittings, and field-fabricated ferrous supports. Remove oil, dirt, rust, mill scale, and loose coatings. Apply a compatible corrosion-inhibitive primer and two finish coats of rust-inhibitive coating suitable for the installed environment. Color shall be as selected by the Architect. Repair damaged galvanized and factory-applied coatings using materials compatible with the substrate. Do not paint pipe markers, nameplates, valve stems or handles, regulator vents, flexible connectors, or other operating components.

3.4 TESTING
A. Pressure-test new fuel-gas piping after installation and before concealment, backfilling, connection to the gas supply, or placement into service. Perform testing in accordance with the adopted fuel-gas code, NFPA 54, and the authority having jurisdiction.
B. Use air, nitrogen, carbon dioxide, or an inert gas as the test medium. Do not use oxygen, fuel gas, or water.
C. Test pressure shall be not less than 1-1/2 times the proposed maximum working pressure and not less than 3 psig. Test duration shall be not less than 1/2 hour for each 500 cubic feet of piping volume or fraction thereof. For a system having a volume less than 10 cubic feet, test for not less than 10 minutes. Test duration need not exceed 24 hours.
D. Disconnect or isolate appliances, regulators, meters, valves, and other components not rated for the test pressure. The piping system shall withstand the required test without pressure loss or evidence of leakage or other defects. Repair defective work and repeat the complete test.
E. Submit a signed test report identifying the piping tested, test medium, test pressure, test duration, measuring instrument, results, date, and witnesses.
F. Where the serving utility establishes separate testing requirements for piping under its jurisdiction, comply with those requirements for that piping.

3.5 IDENTIFICATION
A. Identify gas piping in accordance with Section 23 05 53 and ASME A13.1. Provide “GAS” pipe markers at maximum 10-foot intervals and at branches, penetrations, changes in direction, and other locations required for ready identification. Label risers and regulator stations. Apply identification after finish painting is complete. Finish color selected by the Architect shall not replace the required pipe markers.

3.6 HANGERS AND SUPPORTS FOR FUEL GAS PIPING
A. Provide hangers, supports, anchors, guides, rods, inserts, clamps, rooftop pipe supports, and accessories required to support fuel gas piping. Supports shall comply with applicable code requirements, MSS SP-58 where applicable, and manufacturer’s requirements.
B. Support piping to maintain alignment, prevent sagging, allow for expansion and contraction, and prevent transmission of vibration. Support spacing shall not exceed code-required maximum intervals. Provide additional supports at changes in direction, at valves, at equipment connections, and as required to prevent stress on equipment, regulators, meters, and appliances.
C. Fuel gas piping installed on roofs shall be supported on manufactured rooftop pipe supports or engineered supports compatible with the roof system. Do not rest piping directly on roofing membrane. Coordinate support type, spacing, bearing surface, and installation with roofing manufacturer and roofing contractor to maintain roof warranty. Supports shall allow for thermal movement and shall not damage roofing, insulation, or membrane.

D. Exterior and rooftop supports, rods, clamps, strut, and hardware shall be galvanized, stainless steel, or otherwise corrosion-resistant and suitable for exterior exposure. Isolate dissimilar metals to prevent galvanic corrosion.

3.7 CLOSEOUT

A. Submit as-built plans indicating materials, sizes, burial depths, tracer wire routes, test results, and operating pressures.

B. Turn over fusion logs and welder qualification certificates.

C. Electrical Isolation & Cathodic Protection Testing:

1. Verify electrical isolation across insulating unions/flanges by DC potential; a minimum of 0.2 V measured across the union is required. Repair or replace unions until achieved.
2. Perform pipe-to-soil potential survey at test stations using $Cu/CuSO_4$ reference cell. Acceptable criterion: –0.85 V or more protective (“instant-off” reading) in accordance with NACE SP0169, or as required by utility/AHJ. Submit results.

END OF SECTION

SECTION 23 30 00 – HVAC AIR DISTRIBUTION

PART 1 – GENERAL

1.1 SUMMARY
A. Provide complete air distribution systems, including supply, return, outside air, relief, and exhaust ductwork; fittings; plenums; accessories; air distribution devices; dampers; access doors; sealants; supports and hangers; flexible connectors; test ports; and roof and wall hoods.

1.2 RELATED DOCUMENTS
A. Requirements of Divisions 00 and 01 apply to this Section.
B. Section 23 05 00 – Common Work Results for HVAC.
C. Section 23 05 53 – Mechanical Identification.
D. Section 23 07 00 – HVAC Insulation.
E. Section 23 09 00 – Temperature Controls.
F. Section 23 05 93 – Testing, Adjusting, and Balancing for HVAC.

1.3 REFERENCES

A. ANSI/SMACNA 006 – HVAC Duct Construction Standards—Metal and Flexible, 4th Edition.
B. ANSI/SMACNA 016 – HVAC Air Duct Leakage Test Manual, 2nd Edition.
C. SMACNA – HVAC Systems Duct Design, current edition.
D. NFPA 90A – Standard for the Installation of Air-Conditioning and Ventilating Systems, latest adopted edition.
E. UL 181 – Factory-Made Air Ducts and Air Connectors.
F. UL 555 – Fire Dampers.
G. UL 555S – Smoke Dampers.
H. ASTM A653/A924 – Galvanized Steel Sheet, G90 coating.
I. ASTM B209 – Aluminum Sheet.
J. ASTM C1071 – Thermal and Sound Absorbing Materials for Duct and Plenum Liner.
K. ASTM E84 – Test Method for Surface Burning Characteristics of Building Materials.

1.4 SUBMITTALS
A. Shop Drawings: Duct layout coordinated with ceilings and structure; hanger and support details; fire/smoke damper locations; access doors; flex duct lengths and supports.
B. Product Data: Sealants, gaskets, access doors, dampers, flexible duct, connectors, air devices, and roof hoods.
C. Quality: Duct leakage test plan per ANSI/SMACNA 016; sample report forms.
D. Coordination: Record of site measurements and conflicts resolved.

1.5 QUALITY ASSURANCE
A. Fabrication and installation shall conform to referenced standards. Perform work by qualified sheet-metal contractor with minimum five years' experience on similar projects.
B. Apply SMACNA Seal Class A to all ducts and fittings regardless of pressure classification.

1.6 DELIVERY, STORAGE, AND HANDLING
A. Protect materials from damage. Cap duct ends to keep clean and dry during storage and transport. Store off the ground, under cover, and free of standing water or contaminants.

1.7 COORDINATION
A. Do not fabricate until field dimensions and reflected ceiling plans are verified and approved for coordination of devices, lights, and ceiling patterns.

PART 2 – PRODUCTS

2.1 MATERIALS
A. All sheet metal duct, plenum, and casing construction shall be fabricated from new, prime-grade, lock-forming quality galvanized steel sheets, conforming to ASTM A653/A653M and ASTM A924/A924M. Minimum coating weight shall be G90 (1.25 oz/ft² total both sides).
B. Material thickness and construction details shall comply with ANSI/SMACNA 006, *HVAC Duct Construction Standards—Metal and Flexible*, 4th Edition, for the pressure class indicated. Where not indicated, provide construction suitable for 2-inch w.g. minimum pressure class.
C. Fabrication and installation shall be in strict accordance with SMACNA standards and NFPA 90A. Where drawings or specifications do not indicate details, the most stringent requirements of SMACNA or NFPA shall govern.
D. Provide factory-applied paint-grip galvanized steel in all locations where field painting of exposed ductwork is required.
E. Sealants and Tapes: Water-based duct mastic and pressure-sensitive tapes listed/labeled under UL 181A for rigid metal ducts; UL 181B for flexible ducts. Solvent-based mastics not permitted inside the building.
F. Gaskets: Closed-cell elastomeric, low-permeance, compatible with metal and duct sealants.

2.2 LABELING AND GAUGE
A. Each sheet shall be stenciled with the manufacturer's name and the gauge of the ductwork. Coil steel, if used, shall be stenciled throughout, on ten foot (10') centers with the same.
B. Sheet metal shall conform to the tolerances listed in ANSI/SMACNA 006, *HVAC Duct Construction Standards—Metal and Flexible*, 4th Edition. All ducts penetrating 1 hour fire walls shall be of minimum 24 gauge construction.

2.3 LOW PRESSURE DUCTWORK CONSTRUCTION

A. GENERAL REQUIREMENTS

1. Construct low pressure ductwork to comply with NFPA 90A & 90B (latest adopted editions) and ANSI/SMACNA 006, *HVAC Duct Construction Standards—Metal and Flexible*, 4th Edition.
2. All ductwork shall conform to applicable state, local, and federal codes.
3. Minimum construction shall be suitable for 2-inch water gauge pressure class unless noted otherwise.

B. RECTANGULAR DUCTS

1. Fabricate rectangular low pressure ducts per SMACNA for 2-inch w.g. construction.
2. Longitudinal seams shall be Pittsburgh lock, sealed with mastic sealant. Snaplock seams are not permitted.
3. Elbows shall be mitered with double-thickness turning vanes or fabricated as smooth-radius long-sweep elbows.
4. Combination elbows (outside smooth radius with inside miter) are not acceptable.

C. ROUND DUCTS

1. Fabricate round low pressure ducts per ANSI/SMACNA 006, 4th Edition, Tables for 2-inch w.g. pressure class.
2. Transverse joints shall comply with SMACNA Figure 3-2 and 3-3, “Round Duct Gauge Selection” and “Transverse Joints—Round Duct.”
3. Elbows shall be smooth-radius type, with:

    1. Five-piece construction for 90° elbows.
    2. Three-piece construction for 45° elbows.
    3. Minimum centerline radius 1.5 times the duct diameter.

D. EXPOSED LOW PRESSURE DUCTWORK

1. All exposed low-pressure ductwork shall be factory-fabricated double-wall spiral round or rectangular duct, where specifically indicated on drawings. Outer duct wall shall be paint-grip galvanized steel (ASTM A653/A924, G90), suitable for field painting unless otherwise noted. nner duct wall shall be perforated galvanized steel liner, lined with 2-inch thick internal acoustic duct liner meeting ASTM C1071. Factory construction shall comply with SMACNA HVAC Duct Construction Standards, 4th Edition.

2.4 JOINT SEALING

A. Joint sealing shall conform to ANSI/SMACNA HVAC Duct Construction Standards—Metal and Flexible, 4th Edition.

B. Sealants:

1. Provide elastomeric duct sealant, brush- or gun-grade, rated maximum flame spread 25 and smoke developed 50 (dry state), compounded specifically for ductwork sealing as recommended by the manufacturer.
2. For low-clearance slip joints, apply liquid sealant (with or without compatible tape).

3. For large clearances, apply permanently elastic mastic sealant.
4. Oil-based caulking or glazing compounds are not permitted.

C. Tape:

1. Use only pressure-sensitive tape specifically designated by the sealant manufacturer and listed to UL 181A (rigid ducts) or UL 181B (flexible ducts).
2. Apply only over wet sealant.
3. Do not use tape alone on bare metal or on dry sealant.

D. Gaskets:

1. At flanged joints, provide soft neoprene gaskets sized to maintain an airtight seal.

E. Factory Joints:

1. Factory-made sealed joints may be used where listed and approved for the duct pressure class.

D. As an option, transverse duct joints may be fabricated using the Ductmate System or approved equal. Approved equal systems shall only be employed after Contractor personnel have received proper instruction from the manufacturer's representative in the application and installation of the system.Duct gauges shall conform strictly to the requirements of the selected joint system manufacturer.

2.5 FLEXIBLE DUCT

A. Factory-made flexible air duct, UL 181 Class 1, with inner core, polyethylene fabric mechanically locked to the duct helix without the use of adhesives, fiberglass insulation, and reinforced metalized vapor-barrier, sealed at both ends, maximum flame spread rating of 25 and smoke developed rating of 50 when tested in accordance with ASTM E84. Use for terminal runouts only; do not use as main trunk. Rated to 1-1/2" w.g. working pressure.

B. Maximum installed length of a single flexible-duct run shall be 6 feet unless otherwise indicated. Install flexible duct fully extended and in the shortest practical length. Minimum centerline bend radius shall be one duct diameter. Do not kink, bunch, or compress flexible duct or use it in place of rigid elbows or fittings. Support at maximum 4-foot intervals.

C. Flexible Duct Clamps

Provide clamps specifically manufactured for flexible duct connections. Acceptable types include:

1. 100% nylon straps with minimum 175-pound loop tensile strength, or
2. Stainless steel straps with cadmium-plated worm gear tightening device.

Apply clamps with UL 181–listed sealant. Installation shall comply with UL 181 Class I requirements.

2.6 FLEXIBLE CONNECTORS

A. Where ducts connect to mechanical equipment with fans, including roof exhausters, provide flexible connections using fabric specifically manufactured for HVAC applications. Fabric shall be fire-resistant, waterproof, mildew-resistant, and airtight, with a weight of approximately 30 ounces per square yard (e.g., "Ventglas" or approved equal).

Install flexible connections with a minimum of 1/2 inch slack and a minimum separation of 2-1/2 inches between the edges of the duct ends. Provide additional slack at a rate of 1 inch for each inch of static pressure on the fan system.
B. For exterior applications exposed to sunlight or weather, provide hypalon-coated fabric in lieu of neoprene.
C. Flexible connector materials shall conform to NFPA 90A flame spread and smoke requirements.
D. Attach to round ducts with stainless steel or zinc-coated iron draw bands with worm-gear fasteners.
E. For rectangular ducts, crimp fabric to sheet metal and fasten to ducts with sheet-metal screws spaced not more than 2 inches on center.
F. Fabric shall not be stressed other than by air pressure. Provide minimum 1-inch slack to prevent vibration transmission.

2.7 ACCESS DOORS
A. Hinged access doors per SMACNA, insulated where ducts are insulated. Provide metal nosings at liner edges.
B. Minimum sizes: 8×8 inches for ducts ≤14 inches; 12×12 inches for larger ducts.

2.8 DAMPERS
A. Volume Dampers: Low-leakage opposed-blade dampers for rectangular ducts; butterfly type for round ducts. Provide locking quadrant and position indicator.
B. Smoke Dampers: UL 555S listed, Class I leakage rating, with actuators coordinated with the fire alarm contractor.

2.9 AIR DISTRIBUTION DEVICES
A. Grilles, registers, and ceiling outlets shall be as scheduled on the drawings and provided with sponge rubber or soft felt gaskets.
B. If a manufacturer other than the one scheduled is proposed, the Contractor shall verify that sizes shown on the drawings provide equivalent performance, including noise level, face velocity, throw, and pressure drop, prior to submittal.
C. Device selections shall meet the manufacturer’s published performance data. The terminal velocity at the end of the throw, measured 5 feet above the floor in occupied zones, shall be between 25 FPM and 50 FPM.
D. Substituted devices must demonstrate compliance with all noise and performance requirements, subject to Architect/Engineer review.
E. All devices shall be tested in accordance with the Air Diffusion Council standards and shall bear appropriate labels.
F. Specialty devices, including high-volume drum louvers, shall be provided where scheduled. Substitutions will not be accepted.
G. Locations of devices shown on drawings are approximate. Final locations shall be coordinated with other trades to achieve symmetrical ceiling patterns consistent with lighting layouts or reflected ceiling plans.

H. Where indicated on schedules, grilles, registers, and outlets shall be furnished with integral deflectors and manual balancing dampers.
I. Devices shall be the standard product of the scheduled manufacturer or approved equal, subject to Architect/Engineer review.
J. Ceiling devices shall be furnished with trim or frames compatible with the type of ceiling system in which they are installed.

Acceptable manufacturers: Titus, Krueger, Price, Metalaire, or approved equal.

2.10 ROOF AND WALL HOODS
A. Aluminum hoods with bird screens and matching curbs as indicated. Design to shed water and prevent condensation.
B. Height above roof: 12 inches minimum. Curbs insulated to match adjacent construction.3.4

2.11 DUCT LINER
A. GENERAL
1. Provide duct liner in supply, return, and outside air ductwork where indicated on drawings, and in all ductwork exposed in mechanical rooms.
2. Liner shall comply with ANSI/SMACNA HVAC Duct Construction Standards—Metal and Flexible, 4th Edition, and NFPA 90A (latest adopted edition).
3. Liner shall be fiberglass blanket, 1 to 1-1/2 lb/ft³ density, minimum 1 inch thick.
4. Internal duct liner in single-wall supply ductwork is for sound attenuation and shall not replace external duct insulation required by Section 23 07 00. Factory-fabricated double-wall insulated ductwork shall be considered insulated ductwork and shall not receive external duct wrap unless specifically indicated.
B. DIMENSIONS
1. Duct dimensions shown on the drawings are inside clear dimensions. Increase sheet metal sizes as required to accommodate the specified liner thickness.
C. MATERIALS
1. Duct liner shall be equal to Johns Manville “Linacoustic RC” or approved equal, complying with ASTM C1071.
2. Adhesive shall be UL-listed, water-resistant, and applied to 100% of liner contact surface.
3. Fasteners shall be galvanized steel pins, welded or mechanically fastened, with metal washers.
4. Coat all cut edges, transverse joints, and penetrations with UL-listed mastic.
D. ROUND DUCT LINER
1. Where indicated, provide rigid round duct liner equal to Johns Manville “Spiracoustic Plus” or approved equal, complying with ASTM C423.

2.12 SUPPORTS
A. All horizontal and vertical ducts shall be supported per SMACNA standards.
B. Flexible ducts shall be free of sags and kinks and shall be supported on minimum of 48” centers.

2.13 INSTRUMENT PORTS
Provide instrument ports with the following characteristics:
A. Base: 2-5/8 inch diameter, with mounting screws.
B. Neck: 2 inch deep, fitted with neoprene gasket.
C. Cover: Threaded/screwed type, removable with No. 024 spanner wrench.
D. Equivalent to Young Model 1101 or approved equal.

2.14 FIRE DAMPERS
A. Provide UL 555-listed fire dampers where indicated on the Drawings and where required by NFPA 90A, the International Mechanical Code, and the Authority Having Jurisdiction. Fire dampers shall have fire-resistance rating, dynamic/static classification, mounting orientation, sleeve, retaining angles, breakaway connections, and accessories required for the rated assembly and application.
B. Fire dampers shall be 1-1/2 hour rated minimum unless a higher rating is required by the fire-resistance-rated assembly, code, or Authority Having Jurisdiction. Provide dynamic-type fire dampers where installed in duct systems that may continue to operate during fire alarm or smoke control conditions, or where otherwise required by code or the damper listing.
C. Fire dampers shall be installed in strict accordance with the manufacturer's UL listing, approved installation instructions, NFPA 90A, and applicable code requirements.
D. Fire dampers shall be provided with frame styles suitable for round, oval, or rectangular duct applications. Where fire dampers are installed in a horizontal position, provide stainless-steel closure springs and cam-type blade locks or other listed closing devices required for the damper orientation and listing.
E. Where fire dampers are installed at grilles, registers, or diffusers, air distribution devices shall be compatible with the listed fire damper assembly. Aluminum devices shall not be used where prohibited by the fire damper listing.
F. Acceptable manufacturers: Ruskin, Greenheck, Pottorff, Nailor, Air Balance, Airstream Products, or approved equal.

PART 3 – EXECUTION

3.1 INSTALLATION
A. Install ductwork per SMACNA 4th Edition and NFPA 90A. Construct and erect in a first-class manner. Provide dampers in all branches, splits, and taps whether shown or not for proper balancing.

1. Contract documents show the general layout of ductwork and accessories but do not show all required fittings and offsets that may be necessary to connect ducts to equipment, boxes, diffusers, grilles, etc., and to coordinate with other trades. Fabricate ductwork based on field measurements. Provide all necessary fittings and offsets at no additional cost to the Owner. Coordinate with other trades for space availability and relative location of HVAC equipment and accessories on ceiling grids. Duct sizes shown on the contract documents are inside dimensions; the Contractor shall adjust to other

dimensions with the same air handling characteristics where necessary to avoid interferences and clearance difficulties.

2. Provide duct transitions, offsets, and connections to dampers, coils, and other equipment in accordance with SMACNA Standards. Provide streamlined fittings where obstructions cannot be avoided and must be taken in by a duct. Repair galvanized areas with galvanizing repair compound after modification.
3. Provide bolted construction and tie-rod reinforcement in accordance with SMACNA Standards.
4. Construct casings, eliminators, and pipe penetrations in accordance with SMACNA Standards. Design casing access doors to swing against air pressure so that pressure helps to maintain a tight seal.

B. Coordinate routing with ceiling layouts, structure, lights, and other MEP systems.
C. Provide access doors for dampers, actuators, cleaning, and duct-smoke-detector sampling components where required by the equipment listing or manufacturer. Coordinate duct-smoke-detector mounting surfaces, straight-duct requirements, and permanent service access with Division 28. Insulate access doors where ducts are insulated.
D. Install duct hangers and supports in accordance with ANSI/SMACNA 006, the flexible-duct manufacturer's instructions, and applicable code requirements. Support horizontal flexible duct at the manufacturer's recommended intervals, but not exceeding 4 feet. Maximum sag shall not exceed 1/2 inch per foot of spacing between supports. Stabilize vertical runs at intervals not exceeding 6 feet. Hanger or saddle material contacting flexible duct shall be at least 1-1/2 inches wide and sufficiently wide to prevent constriction of the inner core, excessive compression of insulation, or damage to the vapor barrier. Provide additional supports at bends as necessary. Connections to rigid duct or equipment may be considered support points. Do not support ductwork from suspended ceilings.
E. Install fire dampers and smoke dampers in accordance with manufacturer's approved installation instructions, UL listings, NFPA 90A, and applicable code requirements. Install fire dampers and smoke dampers at locations indicated on the Drawings and where required by rated assemblies, shafts, smoke barriers, smoke partitions, the International Mechanical Code, NFPA 90A, and the Authority Having Jurisdiction. Install with required sleeves, retaining angles, breakaway duct connections, access doors, actuators, springs, bearings, bushings, hinges, and accessories required for the listed installation. Demonstrate resetting of fire dampers and operation of smoke dampers to the Architect/Engineer and Authority Having Jurisdiction where required.
F. Seal openings around duct penetrations of floors and fire rated partitions with fire stop material as required by NFPA 90A.
G. Where diffusers, registers and grilles cannot be installed to avoid seeing inside the duct, paint the inside of the duct with flat black paint to reduce visibility.
H. Control Damper Installation:

1. Provide necessary blank-off plates required to install dampers that are smaller than duct size. Provide necessary transitions required to install dampers larger than duct size.

2. Assemble multiple sections dampers with required interconnecting linkage and extend required number of shafts through duct for external mounting of damper motors.
3. Provide necessary sheet metal baffle plates to eliminate stratification and provide air volumes specified. Locate baffles by experimentation, and affix and seal permanently in place, only after stratification problem has been eliminated.
4. Install all damper control/adjustment devices on stand-offs to allow complete coverage of insulation.

3.2 SEALING
A. Seal all duct joints, seams, and penetrations with UL 181 listed mastic or tape. Apply Seal Class A throughout.

3.3 LEAKAGE TESTING
A. Perform leakage testing per ANSI/SMACNA 016. Supply duct leakage ≤1 percent of design airflow. Return and exhaust duct leakage ≤2 percent. Seal all visible leaks and retest until compliant.

3.4 CLEANING AND PROTECTION
A. Keep duct interiors clean and capped until connection. Remove construction debris prior to turnover.
B. Black out interior of visible branch drops behind grilles and diffusers where visible.

3.5 TAB PREPARATION
A. Provide test ports, access, and balancing dampers as required for Testing, Adjusting, and Balancing per Section 23 05 93.

END OF SECTION

SECTION 23 35 00 – AIR CONDITIONING EQUIPMENT

PART 1 – GENERAL

1.1 SUMMARY
A. Provide all labor, materials, equipment, and services required for installation of air conditioning equipment, including filters, exhaust fans, ductless split systems, unit heaters, split system heat pump units, packaged terminal air conditioners (PTACs), and accessories necessary for a complete and operable system.

1.2 RELATED DOCUMENTS
A. Requirements of Divisions 00 and 01 apply to this Section.
B. Section 23 05 00 – Common Work Results for HVAC.
C. Section 23 05 93 – Testing, Adjusting, and Balancing for HVAC.
D. Section 23 07 00 – HVAC Insulation.
E. Section 23 09 00 – Temperature Controls.
F. Section 26 05 00 – Common Work Results for Electrical.

1.3 REFERENCES
A. NFPA 90A – Installation of Air-Conditioning and Ventilating Systems, latest adopted edition.
B. IMC – International Mechanical Code, latest adopted edition.
C. IECC 2021 – International Energy Conservation Code with Louisiana amendments.
D. ASHRAE 90.1 – Energy Standard for Buildings Except Low-Rise Residential Buildings.
E. ASHRAE Handbooks – Fundamentals and Systems volumes.
F. UL 1995 – Heating and Cooling Equipment.
G. AMCA 210/300 – Laboratory methods of testing fans.
H. AHRI 210/240, 340/360 – Performance rating standards for air conditioners and heat pumps.
I. ANSI/SMACNA 006 – HVAC Duct Construction Standards, 4th Edition.
J. ASHRAE 15 – Safety Standard for Refrigeration Systems.
K. ASHRAE 15.2 – Safety Standard for Refrigeration Systems in Residential Applications, where applicable.
L. UL 60335-2-40 – Safety Requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers.

1.4 SUBMITTALS
A. Product Data: Manufacturer’s catalog data, performance ratings, dimensional drawings, wiring diagrams, and installation instructions for all equipment.
B. Shop Drawings: Equipment layouts, control diagrams, duct and piping connections, curb details.
C. O&M Manuals: Complete operation and maintenance manuals including startup procedures, service data, replacement parts lists, and recommended maintenance schedules.
D. Commissioning Documentation: Startup reports and factory technician checklists.

1.5 QUALITY ASSURANCE
A. Provide products of manufacturers regularly engaged in the production of air conditioning equipment.
B. Equipment shall bear label from UL, ETL, or other recognized testing agency.
C. Equipment shall meet or exceed minimum efficiencies required by IECC 2021 and ASHRAE 90.1.

1.6 WARRANTY
A. Comply with warranty requirements of Division 01.
B. Extended warranties: Ten (10) years for compressors and heat exchangers.

PART 2 – PRODUCTS

2.1 FILTERS
A. Provide temporary construction filters in all equipment during construction.
B. Provide permanent filters at completion for all air-moving equipment: 2-inch-thick pleated throwaway filters, MERV 8 minimum, unless a higher MERV rating is scheduled or required by equipment manufacturer, code, or other Specification Section. Filter rating shall not exceed equipment manufacturer's allowable pressure drop or conflict with scheduled airflow.

2.2 EXHAUST FANS

2.2.1 CEILING EXHAUST FANS
A. Ceiling-mounted exhaust fans shall be equal to Greenheck Model CSP/SP or approved equal, as scheduled on drawings.
B. Fan housing shall be constructed of heavy-gauge galvanized steel and acoustically lined with minimum 1/2-inch insulation.
C. Motors shall be mounted on resilient elastic grommets. Fans shall have forward-curved centrifugal wheels.
D. All fans shall bear the AMCA seal for air and sound performance and shall be UL 702 listed and labeled.
E. Provide integral grille and wall/roof caps with birdscreen, molded of high-strength material suitable for the application.
F. Acceptable manufacturers: Greenheck, Loren Cook, Twin City Fan, PennBarry, or approved equal.

2.2.2 ROOF EXHAUSTERS
A. Roof-mounted exhausters shall be direct- or belt-driven centrifugal type, equal to Greenheck Models G or approved equal, with capacities as scheduled on the drawings.
B. Fans shall be complete with weatherproof housings, centrifugal wheels, automatic shutters, non-fused disconnect switches, birdscreens, and suitable motor and belt guards.
C. Where scheduled, provide electronically commutated (EC) motors with integral potentiometer speed adjustment.
D. Fans shall be supplied with factory-fabricated insulated roof curbs for sloped roofs, except

where noted otherwise.
E. All fans shall bear the AMCA seal for air and sound performance and shall be UL 705 listed and labeled.
F. Acceptable manufacturers: Greenheck, Loren Cook, Twin City Fan, PennBarry, or approved equal.

2.3 DUCTLESS MINI-SPLIT SYSTEMS

2.3.1 General
A. Provide factory-assembled, matched indoor and outdoor ductless heat pump equipment consisting of an indoor wall-mounted unit and an outdoor heat pump condensing unit.
B. Units shall be AHRI certified and ETL listed, suitable for 208/230V, 1-phase, 60 Hz power supply.
C. System shall utilize R-32 refrigerant with electronic expansion valve (EEV). Units using R-32 or other A2L refrigerant shall be listed and installed in accordance with the equipment listing, manufacturer's instructions, ASHRAE 15, ASHRAE 15.2 where applicable, UL 60335-2-40, IMC, and applicable code requirements. Provide factory-required refrigerant detection, mitigation controls, charge limitations, airflow safeguards, labeling, and installation clearances required for the installed equipment and refrigerant charge.

2.3.2 Performance Requirements
A. Performance and efficiency shall be as scheduled.
B. Equipment shall meet or exceed minimum efficiency requirements of IECC 2021, ASHRAE 90.1 where applicable, and applicable federal energy conservation standards. Where scheduled performance requirements exceed minimum code requirements, scheduled requirements shall govern.

2.3.3 Construction Features
A. Indoor Unit:

1. Wall-mounted, slim-line design with factory-applied finish.
2. Cross-flow fan with multiple speed settings.
3. Washable air filter, easily removable.
4. Built-in Wi-Fi control via LG ThinQ™ app.

B. Outdoor Unit:

5. Inverter-driven variable-speed compressor.
6. Propeller fan with brushless DC motor.
7. GoldFin™ coil coating for corrosion protection.
8. Weatherproof galvanized steel housing.

2.3.4 Controls and Features
A. System shall include microprocessor-based controls with the following features:

1. 24-hour on/off timer.

2. Auto restart following power outage.
3. Auto changeover (heat/cool).
4. Jet Cool/Jet Heat, Sleep Mode, Smart Diagnosis, Smart Care.
5. Two-way (up/down) auto swing.

B. Wireless remote controller, dry contacts, and BMS integration modules.

2.3.5 Installation Requirements

A. Refrigerant piping sizes, maximum lengths, elevation limits, oil traps, additional refrigerant charge, insulation, and accessories shall comply with manufacturer's instructions for the submitted equipment and Section 23 05 03 – HVAC Piping. Notify Architect/Engineer where manufacturer's requirements conflict with routing or sizes indicated on the Drawings.
B. Provide vibration isolation pads under outdoor unit.
C. Field-supplied power and communication wiring per manufacturer's instructions; minimum 14 AWG stranded cable.
D. Provide condensate piping as indicated.

2.3.6 Warranty

A. General warranty: Three (3) years parts and labor.
B. Compressor warranty: Ten (10) years.

2.4 ELECTRIC UNIT HEATERS

A. Provide electric unit heaters as scheduled, Marley, QMark, Berko, or approved equal.
B. Units shall be UL-listed, factory wired, with integral thermostat, ON-OFF-AUTO switch, and pilot light.

2.5 SPLIT SYSTEM HEAT PUMP UNITS

2.5.1 General

A. Provide factory-assembled, matched indoor and outdoor split system heat pump equipment consisting of indoor air handling unit and outdoor heat pump condensing unit.
B. Units shall be listed and labeled by UL or ETL, and AHRI certified.
C. System shall operate with refrigerant scheduled or approved for the submitted equipment. Units using R-32 or other A2L refrigerant shall be listed and installed in accordance with the equipment listing, manufacturer's instructions, ASHRAE 15, ASHRAE 15.2 where applicable, UL 60335-2-40, IMC, and applicable code requirements. Provide factory-required refrigerant detection, mitigation controls, charge limitations, airflow safeguards, labeling, and installation clearances required for the installed equipment and refrigerant charge.
D. System performance and efficiency shall be as scheduled. Equipment shall meet or exceed minimum efficiency requirements of IECC 2021, ASHRAE 90.1 where applicable, and applicable federal energy conservation standards. Where scheduled performance requirements exceed minimum code requirements, scheduled requirements shall govern.

2.5.2 Construction Features

A. Indoor Unit:

1. Multi-position AHU (vertical upflow/downflow, horizontal left/right) with insulated cabinet and GoldFin™ coil coating.
2. Brushless DC fan motor with constant flow control.
3. Access panel for field-supplied air filter (16x20x2).
4. Drain pans for all orientations.
   B. Outdoor Unit:
5. Inverter-driven variable-speed compressor with base pan heater for low ambient heating.
6. Propeller fan with brushless DC motor.
7. Factory charge of R-32 refrigerant.
8. Galvanized steel weatherproof housing with baked enamel finish.

2.5.3 Controls

A. System shall include microprocessor-based controls with the following features:

1. Auto changeover (heating/cooling).
2. Hot start, soft dry, and sleep mode.
3. Built-in self-diagnostic functions.
4. Wi-Fi module and BACnet™/LonWorks® gateways for BMS integration.
5. 7-day programmable thermostat with intuitive touchscreen
   B. Provide field wiring per manufacturer's instructions, with stranded and shielded communication wiring between indoor and outdoor units.

2.5.4 Accessories

A. Factory accessories shall include:

1. Auxiliary electric heater kit.
2. Downflow conversion kit (for vertical downflow applications).
3. Shutoff valves as scheduled.
4. Factory-approved roof curbs where required.

2.5.5 Installation Requirements

A. Install equipment in accordance with manufacturer's instructions, NEC, and IMC.

B. Provide refrigerant piping, condensate piping, and electrical work as specified elsewhere.

C. Maximum refrigerant line length: 164 ft, maximum elevation difference: 30 ft.

D. Provide vibration isolation pads under outdoor unit.

E. Provide test ports and service clearances as recommended by manufacturer.

2.5.6 Warranty

A. General warranty: Three (3) years from date of Owner acceptance.

B. Compressor warranty: Ten (10) years.

2.6 ROOFTOP UNITS – GAS HEAT

A. Provide and install factory-assembled unitary rooftop gas heat/electric cooling equipment, including all options and accessories necessary for a complete installation, as scheduled on the

drawings. Units shall be designed for constant volume duty unless otherwise indicated. TempMaster, Carrier, Trane, Lennox, York, or approved equal.
B. Units shall be certified in accordance with AHRI Standard 210/240 or 340/360 (as applicable to unit size).
C. Gas heat sections shall be tested and certified in accordance with ANSI Z21.47 / CSA 2.3 and carry the AGA/CGA seal of approval. Heat exchanger shall be constructed of minimum 20 gauge stainless steel; 10-year non-prorated limited warranty.
D. Units shall be suitable for outdoor rooftop installation, with weatherproof enclosures and all necessary components including:

1. Compressors (scroll or rotary, as scheduled), fully hermetic or semi-hermetic with unloading and shall have suitable vibration isolators and crankcase heaters. 5-year warranty covering compressor and compressor motor. Capable of operation down to 0 degrees Farenheit outdoor air temperature. Refrigeration system shall utilize R-454B refrigerant. Compressors shall have the following minimum protections:
    i. Overcurrent
    ii. Over-temperature
    iii. Short cycle (minimum 5 minutes before start)
    iv. Refrigerant low pressure and high pressure safety
    v. Phase monitoring including loss, imbalance, and reversal
2. Condensers and evaporator coils.
3. Condenser and evaporator fans.
4. Refrigeration and temperature controls.
5. Minimum 2-inch filters.
6. Outdoor air damper for ventilation air as scheduled; outdoor air damper shall be automatic motorized damper.
7. Factory-mounted safety devices including high/low pressure cutouts, freezestats, and overload protection.
8. Factory roof curb approved by National Roof Contractor Association for horizontal or down discharge units; include insulated panel under compressor section to prevent condensation; seal strip and wood nailer for flashing; top of curb minimum of 8” above roof or slab; coordinate with roof construction and insulation depth; install per manufacturer’s installation instructions.

E. Units shall be available in either down-discharge or horizontal-discharge configurations as scheduled on the drawings.
F. Cabinet: G90 galvanized steel with enamel finish; double-wall insulated access doors.
G. Fans: direct-drive, variable-speed where scheduled; belt-driven over 5 tons nominal capacity. Multi-speed fan control shall adjust fan speed to 67% of full airflow based off of compressor stages.
H. Coils: copper tubes, aluminum fins; epoxy-coated where indicated.
I. Drain pans: stainless steel, double-sloped.
J. Accessories: economizer (where scheduled), hail guards, hinged filter access doors, factory

controls, full perimeter isolation rail (units greater than 5 tons), through the base electrical connection, hinged access doors to filter compartment, communication interface to Facility Management Control System, Wi-Fi enabled intuitive touchscreen thermostat, 7-day programmable.
K. Warranty: 5 years compressor, 10 years heat exchanger.

PART 3 – EXECUTION

3.1 INSTALLATION
A. Install equipment in accordance with manufacturer's instructions, IMC, and NFPA 90A.
B. Provide vibration isolation and flexible connections at duct and piping connections.
C. Coordinate roof curb installation with roofing contractor; flash and seal to maintain watertight integrity.
D. Provide service clearances as required by IMC and manufacturer.

3.2 START-UP AND COMMISSIONING
A. Manufacturer's factory-authorized service technician shall perform startup where required by manufacturer, scheduled, or specified. For equipment not requiring factory startup, startup shall be performed by qualified HVAC technician in accordance with manufacturer's written instructions.
B. Verify correct installation, voltage, phase, rotation, amperage, airflow, refrigerant charge, condensate drainage, controls, safeties, compressor operation, fan operation, heating operation, cooling operation, defrost operation where applicable, and alarm/status functions where provided.
C. For split systems and ductless mini-splits, submit refrigerant piping pressure test documentation, evacuation/dehydration documentation, final refrigerant charge documentation, line length/elevation verification, condensate test documentation, and manufacturer startup checklist.
D. For PTACs, verify sleeve installation, exterior grille installation, condensate disposal, controls, heating operation, cooling operation, supplemental electric heat where provided, and filter access.
E. Where project commissioning is required, provide personnel, tools, manufacturer support, controller access, and documentation required to demonstrate equipment operation and correct deficiencies. Coordinate with Sections 23 09 00 and 23 05 93.
F. Submit completed startup reports and commissioning support documentation.

3.3 FIELD QUALITY CONTROL
A. Test each unit for correct operation, voltage, current draw, airflow, refrigerant charge, condensate drainage, controls, safeties, heating operation, cooling operation, and accessories.
B. Coordinate airflow verification with Section 23 05 93.
C. Coordinate controls verification with Section 23 09 00.
D. Replace or correct defective equipment and retest at no additional cost to Owner.

3.4 TRAINING
A. Provide Owner training covering operation, thermostat/controller use, occupied/unoccupied operation where applicable, filter replacement, condensate maintenance, alarm/status review

where provided, seasonal changeover considerations, and basic troubleshooting.
B. Deliver written training materials, manufacturer operation manuals, startup reports, warranty documentation, and O&M manuals to Owner.

3.5 WARRANTY SERVICE
A. Provide return visits during warranty period to address deficiencies and confirm operation.
B. Provide one complete spare set of filters for each piece of air-moving equipment unless otherwise indicated.

END OF SECTION

SECTION 26 05 00 – COMMON WORK RESULTS FOR ELECTRICAL

PART 1 – GENERAL

1.1 GENERAL REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, apply to this Division. Refer to these articles in the specifications for additional information.

B. Provide all materials, equipment, labor, and transportation required to install a complete and working electrical system. It is the intent of the drawings and specifications to provide complete installations even though each and every item necessary is not specifically mentioned or shown.

C. Bidders shall determine the contents of a complete set of drawings and specifications and be aware that they may be bidding from a partial set of drawings applicable only to separate contracts or trades as may be issued for bidding purposes. Submission of bids shall be deemed evidence of the review of existing conditions on site and of all drawings, specifications, and addenda; no allowances will be made because of unfamiliarity with any portion of the documents or site conditions.

D. Perform all Division 26 work in strict accordance with the latest adopted version of all federal, state, and local codes, ordinances, and standards (NFPA, NEC, IECC, etc.) except when requirements are modified by the Authority Having Jurisdiction (AHJ).

E. Where local codes or practices exceed or conflict with the NEC, perform the work in accordance with the local code prevailing and local interpretations thereof by the AHJ. This Contractor shall bear all costs for correcting any deficiencies due to non-compliance.

1.2 COORDINATION

A. Coordinate with Division 01 Administrative Requirements. Attend coordination meetings and designate a single point of contact for this Division.

B. Maintain electrical service to occupied areas not directly affected by the Work. Provide temporary power and lighting as required. Give a minimum seventy-two (72) hours' written notice for outages; implement lockout/tagout and phase work to maintain safe operations.

C. Submit coordinated shop drawings reflecting actual dimensions, elevations, supports, and clearances. Include pull boxes, expansion fittings, firestopping details, and equipment working spaces. Field-verify conditions prior to fabrication.

D. Provide sleeves, inserts, anchors, and supports in time for placement of concrete, masonry, and roofing. Coordinate penetrations with structural and architectural trades. Do not cut structural members without written approval.

E. Coordinate rough-ins, boxes, raceways, disconnects, and power for equipment furnished by other divisions or by the Owner; provide assistance necessary to deliver complete, operable systems.

F. Maintain code-required working clearances about electrical equipment and keep shafts, corridors, and egress paths free of obstructions. Protect installed work until final acceptance.

G. Provide look-ahead schedules and cutover plans for meter sets, utility releases, energization, and major equipment start-up. Coordinate with the serving utility and the AHJ.

1.3 TEMPORARY ELECTRICAL SERVICE AND COSTS

A. Provide, meter, and maintain temporary electrical service necessary for construction, including GFCI protection for temporary receptacles and OSHA-compliant wiring methods. Provide egress and task lighting sufficient for safe construction activities.

B. All utility charges, service fees, deposits, and metering costs for temporary service shall be paid by the Contractor. Remove temporary wiring, devices, and equipment at completion; restore affected surfaces. Remove temporary meters and coordinate final billing/closeout with the utility.

C. Coordinate utility release/meter set and temporary service removal with the utility and AHJ.

1.4 DRAWINGS – DIAGRAMMATIC NATURE

A. Drawings indicate general extent, location, and arrangement of conduit systems and equipment and are diagrammatic; do not scale for exact size.

B. Prepare coordinated shop drawings reflecting actual dimensions, offsets, elevations, and field conditions. Coordinate with other trades.

1.5 INTERFERENCES AND PRECEDENCE (GENERAL)

A. Piping or equipment requiring a fixed slope or elevation shall take precedence over systems that do not.

B. Where space conflicts remain, resolve in accordance with the order of precedence listed in 3.6.B.

1.6 COMPLEMENTARY CONTRACT DOCUMENTS

A. The Drawings, Specifications, Addenda, and written directives are complementary; what is required by one is as binding as if required by all.

B. Provide all work reasonably inferable from the documents to deliver a complete, code-compliant system consistent with the design intent.

1.7 MANUFACTURER’S INSTRUCTIONS – PRECEDENCE

A. Where Drawings/Specifications differ from a manufacturer’s published installation instructions, listings/approvals, or warranty conditions, install in accordance with the manufacturer to maintain the listing and warranty and to comply with applicable codes. Provide firestopping per Division 07 84 00 to maintain tested assemblies and ratings.

B. Notify the Architect/Engineer of the variance and obtain direction prior to fabrication or installation.

1.8 REQUESTS FOR INFORMATION AND INTERPRETATIONS

A. When a discrepancy or need for interpretation is discovered, submit a written Request for Information and do not proceed with the affected Work until clarification is issued.

B. If the Contractor proceeds without written direction, furnish the Work to meet the more stringent interpretation at no additional cost to the Owner and be responsible for all corrections.

1.9 SUBMITTALS

A. Submit shop drawings, product data, and equipment layouts in PDF format. Include dimensional layouts of all equipment rooms showing required clearances and access. Identify any deviations from the Contract Documents.

B. Provide coordinated shop drawings when field conditions, interferences, or substitutions require changes from the Contract Drawings.

C. Submittals shall be carefully reviewed by the Contractor prior to submission and certified as correct for dimensions, space, and compliance with the specifications.

1.10 CLOSEOUT SUBMITTALS

A. Record Drawings (As-Builts): Provide updated one-lines, plans, and diagrams showing final conductor sizes, raceway sizes, routing/elevations, pull/push points, junction/pull boxes, homeruns, spares/spaces used, and device IDs.

B. Panel Directories: Provide typed directories inside each panelboard and distribution panel; match circuit numbers and descriptions to the as-built drawings. See Section 26 05 53 – Identification for Electrical Systems for formatting and nomenclature.

C. Test Reports: Submit results for insulation resistance (megger), continuity and bonding, grounding electrode resistance, emergency lighting 90-minute test, and GFCI/AFCI functional tests where required.

D. Equipment Ratings, Studies, and Settings Documentation: Submit utility available-fault-current data, equipment SCCR/interrupting-rating verification, and final field settings for adjustable protective devices furnished. Provide system-wide short-circuit, protective-device coordination, and arc-flash studies and related documentation and labeling in accordance with Section 26 05 73.

E. Certifications/Approvals: Submit utility release/green-tag (if applicable) and any NRTL field-evaluation reports and labels for modified/assembled equipment.

F. O&M Deliverables: Provide searchable PDF O&M manuals with parts lists, recommended maintenance, wiring diagrams, and start-up/commissioning checklists; include native configuration/back-up files for lighting controls or PLCs where applicable. Include wireless lighting control as-programmed documentation, configuration exports, backup files, device schedules, zone/group schedules, scenes, time schedules, and Owner access information where applicable.

G. Training Materials: Provide agenda, sign-in sheets, and summary of training; include screenshots/exports of control sequences and setpoints turned over to Owner.

H. Spare Parts and Tools: Provide spare fuses, lamps/drivers, special keys, and tools as indicated on the drawings/specs; list quantities delivered.

I. Identification: Submit final labeling schedules (equipment nameplates, feeder labels, conductor/wire markers) confirming field installation matches schedules.
J. Room Postings: Provide laminated one-line diagram(s) and panel schedule summary posted in each main electrical room.
K. Digital Delivery: Deliver all closeout submittals electronically; file names to include project name, section number, and date (e.g., “Project_DIV26_Closeout_YYYY-MM-DD”). Include native files for shop drawings/coordination models (PDF + DWG/RVT where available).
L. Timing: Submit closeout materials prior to requesting final observation; acceptance is a condition of final payment.

1.11 PRIOR APPROVAL
Where substitutions are requested under an “or equal” clause, submit written requests to the Architect no fewer than seven (7) working days prior to bid opening with sufficient data demonstrating equality. Approvals will only be issued by addendum.

1.12 OPERATING AND MAINTENANCE MANUALS AND INSTRUCTIONS
A. Provide operating and maintenance manuals for electrical equipment as required. Manuals shall include manufacturer instructions, parts lists, recommended maintenance, and diagrams. Provide four (4) copies unless noted otherwise.
B. Instruct Owner’s personnel in operation of electrical equipment and systems, including panel schedules, shut-offs, and safety considerations. Turn over keys or tools required for access or adjustment.

1.13 WARRANTY
Contractor shall warrant all workmanship, materials, and equipment for one (1) year after substantial completion unless otherwise noted. Correct defects at no cost to the Owner. This warranty is in addition to other warranties required by the Contract Documents.

1.14 DEFINITIONS
A. Provide: Furnish and install all material and labor required for a complete installation ready for operation.
B. As required: Perform work in accordance with manufacturer’s instructions, applicable codes, and good practice.
C. Or equal: Substitute equipment by another manufacturer when, in the Architect’s judgment, salient features are equal.
D. Contractor: The Contractor engaged to execute the work under this Division of the specifications only.

1.15 INSPECTION OF THE SITE
Visit the site prior to submitting a proposal and verify locations, capacities, and conditions that may affect the Work. Notify the Architect of discrepancies that may impair proper operation of the Work.

1.16 CONSTRUCTION REQUIREMENTS

A. Lay out work to conform to structural conditions, avoid obstructions, maintain grades where required, and coordinate with other trades. Provide sleeves, inserts, and supports in proper sequence with construction.

B. Install exposed work parallel/perpendicular to building lines unless noted otherwise. Keep openings closed during construction.

C. Determine exact locations of devices and equipment by reference to architectural and structural drawings and field measurements. Make minor relocations as required without additional cost where directed.

1.17 ISOLATION

Transmission of perceptible vibration, structure-borne noise, or objectionable airborne noise to occupied areas from equipment installed under this Division will not be permitted.

1.18 CONSTRUCTION SAFETY

The Contractor is responsible for construction safety of personnel and operations related to this Division. Refer to General and Supplementary Conditions for additional safety requirements.

1.19 DAMAGE

A. Contractor shall be responsible for damage to the project caused by failure to recognize hazards or by negligent work. Repair damage at no expense to the Owner.

B. Protect concealed piping, wiring, and equipment to remain. Repair damage caused by negligence at no cost to the Owner.

1.20 SAFETY GUARDS

Provide guards and covers required for safety. Enclose projecting shafts and other rotating parts as required.

1.21 STORAGE OF MATERIALS

Provide suitable ground-level storage for materials and equipment. Storage within the building is permitted only upon approval of the Architect.

1.22 DELIVERY, STORAGE, AND HANDLING

Follow manufacturers' published directions for delivery, storage, protection, and handling. Report conflicts with the Contract Documents to the Architect and obtain direction before proceeding.

1.23 FIRE-PUMP ELECTRICAL WORK

A. Section 21 30 13 furnishes the listed fire pump, motor, fire-pump controller, controller-mounted surge protective device, jockey-pump package and controller, required monitoring contacts or outputs, and factory wiring.

B. Division 26 shall provide the dedicated fire-pump source and all field-installed electrical work indicated on the Drawings and required by NEC Article 695, including source-to-controller conductors and raceways, controller-to-motor conductors and raceways, jockey-pump branch-circuit conductors and raceways, grounding and bonding, terminations, connections, and identification.

C. Conductor and raceway quantities, sizes, and routing shown on the Drawings, where indicated, establish the minimum design and pricing basis. Where controller-to-motor conductors or raceways are not indicated, Division 26 shall provide all quantities and sizes required for the final approved fire-pump controller, motor, starting method, motor-lead configuration, terminal limitations, manufacturer's installation instructions, and NEC Articles 430 and 695. Include all required conductors, raceways, grounding and bonding, terminations, fittings, supports, seals, and accessories in the Base Bid. Do not reduce, consolidate, reroute, or otherwise revise requirements indicated on the Drawings without written Engineer approval. Report conflicts before procurement.

D. Section 21 30 13 shall provide final motor, controller, starting-method, terminal, lead-arrangement, and jockey-pump electrical data. Division 26 shall perform the equipment-specific verification, including starting voltage at the fire-pump controller line terminals, running voltage at the motor terminals, and available fault current at the controller. Coordinate with Sections 21 30 13, 26 05 19, 26 05 26, 26 05 33, and 26 05 73.

E. Division 28 shall provide fire-alarm monitor modules, signal wiring, point programming, supervising-station transmission, and end-to-end testing in accordance with Section 28 31 00. Division 26 shall provide fire-alarm monitoring raceways only where indicated.

PART 2 – PRODUCTS

2.1 MATERIALS

A. All materials shall be new, of current manufacture, free of defects, and suitable for the intended environment and use.

B. Provide listed and labeled equipment and components bearing the mark of a Nationally Recognized Testing Laboratory (NRTL) and identified for the specific application and location. Install in accordance with the product listing, labeling, and the manufacturer's written instructions.

C. Acceptable NRTLs include: UL, ETL (Intertek), CSA, TÜV, or other OSHA-recognized NRTLs.

D. Provide factory-assembled equipment as complete listed assemblies to the applicable standards, including but not limited to: panelboards (UL 67), molded-case circuit breakers (UL 489), enclosed switches (UL 98), switchboards (UL 891), transfer switches (UL 1008), motor-control centers (UL 845), industrial control panels (UL 508A), transformers (UL 1561/UL 506 as applicable), luminaires (UL 1598), and enclosures (UL 50/50E) or equivalent standards as applicable.

E. Where field modifications, combinations, or substitutions affect the product's listing, short-circuit current rating, or enclosure rating, obtain a field evaluation and label from an NRTL. Include the evaluation report in the closeout documents.
F. Short-Circuit Current Ratings (SCCR): Assemblies shall be marked with SCCR and have SCCR not less than available fault current at the installation point. Series-combination ratings are permitted only where code-compliant and shall be plainly marked with the specific upstream device.
G. Enclosure Ratings: Provide NEMA enclosure types as indicated on the drawings (minimum NEMA 1 indoors, NEMA 3R outdoors unless noted otherwise). Maintain enclosure ratings after installation using rated hubs, gaskets, and fittings.
H. Identification: Provide permanent factory-applied nameplates/labels and directories as applicable (equipment name, voltage, phase, FLA or kVA, SCCR, and wiring diagrams where provided inside the door).
I. Conductor and device terminations shall be compatible (AL/CU as applicable) with the listed lugs/terminals; provide suitable adapters where required to maintain listing.
J. Provide fittings, hubs, and sealing washers that maintain enclosure ratings at penetrations.

2.2 MANUFACTURERS
Manufacturers shall have at least five years of continuous experience producing the type of equipment specified.

2.3 SUBSTITUTIONS
Submit complete technical documentation and justification of equivalency. Substitutions after award will only be considered for code changes, product unavailability, or manufacturer refusal to warranty. Make all resulting revisions at no additional cost.

PART 3 – EXECUTION

3.1 WORKMANSHIP
Work shall be performed by skilled tradespeople. Deficient work shall be corrected at no cost to the Owner.

3.2 PROTECTION OF EQUIPMENT
Protect electrical equipment, panels, and conduit with covers. Do not use for scaffolding supports. Clean all equipment and devices at completion of work.

3.3 PROTECTION OF STRUCTURE
Protect building finishes and structure during construction. Cover finished floors and stairs.

3.4 LARGE EQUIPMENT
Deliver and install large equipment such as switchboards, motor control centers, and transformers that cannot pass through standard openings before the building is closed in.

3.5 FOUNDATIONS

A. Provide reinforced concrete equipment bases as indicated. Align, level, and grout bases. Concrete foundations required by electrical equipment shall be constructed by this Contractor. See Division 03 – Concrete.

B. Set equipment on bases, align and level using shims, connect conduit, and grout in place in that order. After grouting, remove forms and finish foundation surfaces smooth. Concrete work shall comply with Division 03 – Concrete.

3.6 CONFLICTS, INTERFERENCES AND COORDINATION BETWEEN TRADES

A. The Contract Drawings are diagrammatic in nature and are not to be construed as shop drawings. They establish design intent, required capacities, and approximate routing. The Electrical Contractor shall prepare coordinated shop drawings indicating actual dimensions, offsets, elevations, and field conditions, and shall be responsible for coordination with structural members, ceilings, lighting, ductwork, plumbing, fire protection, and other building systems. Where interferences occur, promptly notify the Architect/Engineer and obtain written direction before proceeding. Structural members shall not be cut or modified without written approval. Maintain clearances required for access to panels, disconnects, junction boxes, and other components.

B. Each trade shall coordinate its work with that of other trades so that the installation may be completed in a direct, workmanlike manner without delaying or obstructing others. Piping and equipment interferences shall be resolved by giving precedence to systems that require a specific grade or elevation for proper operation. Where space conflicts remain, the following order of precedence shall apply:

1. Building lines
2. Structural members
3. Soil and drain piping
4. Vent piping
5. Refrigerant piping
6. Condensate piping
7. Supply ductwork
8. Exhaust ductwork
9. Return ductwork
10. Domestic water piping
11. Electrical conduit and raceways
12. Natural gas piping
13. Automatic sprinkler piping
14. Compressed air piping

C. Where conflicts between specifications and drawings arise, drawings shall take precedence over specifications except in matters pertaining to quality, applications, and coordination between trades, which shall be governed by specifications.

D. The Contract Documents (drawings, specifications, addenda, and written directives) are complementary; what is required by one is as binding as if required by all. Provide all work that is reasonably inferable from the documents or necessary to deliver a complete, code-compliant system consistent with the design intent, even if every component is not explicitly called out. Minor omissions or discrepancies do not relieve the Contractor of this responsibility.
E. Where the Contract Documents conflict with applicable codes and standards, as interpreted by the AHJ, the codes shall govern. When differing requirements exist, provide the more stringent requirement and notify the Architect/Engineer before proceeding.
F. Where the drawings/specifications differ from a manufacturer's published installation instructions, listings/approvals, or warranty conditions, install in accordance with the manufacturer's instructions necessary to maintain the listing and warranty and to comply with NFPA and code. Advise the Architect/Engineer of the conflict and obtain direction prior to fabrication or installation.
G. When a discrepancy or need for interpretation is discovered, submit a written request for information and do not proceed with the affected work until clarification is issued. If the Contractor proceeds without written direction, furnish the work to meet the more stringent interpretation at no additional cost to the Owner and be responsible for all corrections. Document precedence is set forth in the order-of-precedence that follows.

3.7 CUTTING AND PATCHING
A. This Contractor shall perform all cutting required; patching shall be performed by the General Contractor. Do not cut structural members or finished work without approval from the Architect.
B. This Contractor shall cut and patch all paving as required by the installation of buried conduit, including utilities.

3.8 PAINTING
Leave exposed conduit and equipment clean, primed, and painted per Division 09. Touch up damaged finishes of equipment with matching color touch-up paint from the equipment's manufacturer.

3.9 TRENCHING AND BACKFILL
A. Provide all excavation and backfill required for installation of electrical raceways and ductbanks under this Division. Work shall include removal of materials encountered, placement of bedding, shoring, compaction, and restoration of surfaces. Each trade is responsible for trenching and backfilling required for its own work.
B. Excavate trenches to the required depth and width with banks as near vertical as practical. Where required, provide sheeting, bracing, or shoring to prevent cave-ins. Trenches shall be a minimum of 12 inches wider than the outside width of the raceway/ductbank. The trench bottom shall be uniformly graded and tamped to provide proper slope or grade. Provide bell holes at joints where required. Excavate 6 inches below the raceway/ductbank and backfill to grade with compacted sand or pea gravel. Where trenches are cut in fill, extend excavation to undisturbed load-bearing soil and support raceways accordingly. Do not backfill until work has been

inspected and accepted. Provide tracer wire for non-metallic raceways and buried-utility warning tape 12 inches below finished grade.
C. Within six feet (6'-0") of building foundations, provide a minimum of six inches of bedding above the crown of the uppermost raceway using pea gravel or approved sand. Subsequent layers of backfill may consist of excavated earth, loam, sand, or gravel free of debris, organic matter, or stones larger than 1-1/2 inches. Place backfill in layers not exceeding 6 inches, compacting and moistening each layer before placing the next. Furnish all additional material required for backfilling and remove excess materials and debris from the site. Provide special backfill where shown on drawings or required by the specifications.
D. Perform all excavation and backfilling in a manner that does not endanger adjacent structures, utilities, or work. Provide shoring and bracing as required for safety and stability.

3.10 ELECTRICAL WORK
The Electrical Contractor shall provide power wiring, disconnects, starters, final power connections, and raceways for equipment under this and other Divisions where indicated. Control wiring furnished with equipment, factory control wiring, and low-voltage control wiring shall be provided by the trade furnishing the controlled equipment or control system unless indicated otherwise. Coordinate exact scope, voltage, raceway, control interface, and termination requirements with related trades before bidding and installation.

3.11 EQUIPMENT CONNECTIONS
Bring required electrical services to equipment, make final connections, and ensure ready for operation. Verify phase rotation, control locations, and accessibility prior to energization.

3.12 EQUIPMENT ARRANGEMENTS
Install equipment to permit access for service and maintenance. Provide required working space and clearances per NEC.

3.13 EXECUTION OF WORK
Schedule and execute work to avoid interference with other trades. Coordinate with general construction progress.

3.14 FLASHING AND WATERPROOFING
Provide flashing and waterproof seals at all penetrations through exterior walls and roofs. Provide link-seals at below grade conduit penetrations greater than 2 inches. Coordinate all roof and wall penetrations with the roofing/waterproofing installer to preserve manufacturer warranties. Provide UL-listed roof penetration assemblies where required by the roofing system.

3.15 TESTS
Perform all tests required by code and the Contract Documents and repeat until accepted by the Architect/Engineer. Provide a minimum four (4) days’ written notice prior to testing and do not conceal work until testing is complete. Verify termination torque per NEC 110.14 and manufacturer instructions and maintain a torque log for closeout. Perform insulation-resistance (megger) tests on feeders prior to energization and document test voltages, durations, and results

(test at 1 kV per 1 kV class unless manufacturer instructions specify otherwise). Function-test GFCI/AFCI devices where provided. Conduct a 90-minute emergency egress lighting test and record device IDs, locations, and results. Submit written test reports with any corrective actions noted.

3.16 CLEAN-UP

Maintain a clean work area daily. Clean panels, luminaires, and exposed surfaces at project completion.

3.17 FINAL OBSERVATIONS

A. At the completion of the installation of the electrical systems and prior to final acceptance, this Contractor shall carefully inspect the entire project to assure that the project is ready for final acceptance. This inspection shall occur prior to requesting final observations from the Architect/Engineer.

B. Deliver all test certificates, as-built drawings, operation and maintenance manuals, warranty information, and other closeout documents at or before the final observation.

C. Acceptance will not be granted until all required documentation and corrective work have been completed.

END OF SECTION

SECTION 26 05 19 – LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 – GENERAL

1.1 SUMMARY
A. Provide low-voltage (600 V class) building wire and cable, terminations, and connectors for power circuits.
B. Related work is specified elsewhere and includes raceways, supports, grounding and bonding, identification, and electrical studies.
C. Conductors and cables for fire alarm, communications, data, security, access control, audiovisual, temperature controls, and Class 2/Class 3 control circuits are specified in their respective sections and are not covered by this Section unless specifically indicated.

1.2 RELATED REQUIREMENTS
A. Division 01 – Administrative Requirements.
B. Section 26 05 00 – Common Work Results for Electrical.
C. Section 26 05 26 – Grounding and Bonding for Electrical Systems.
D. Section 26 05 33 – Raceways and Boxes for Electrical Systems.
E. Section 26 05 53 – Identification for Electrical Systems.

F. Section 21 30 13 – Electric-Driven Fire Pumps.

1.3 REFERENCES AND STANDARDS
A. NFPA 70 – National Electrical Code (NEC).
B. NECA 1 – Standard Practices for Good Workmanship in Electrical Construction.
C. UL 83 – Thermoplastic-Insulated Wires and Cables (THHN/THWN-2).
D. UL 44 – Thermoset-Insulated Wires and Cables (XHHW-2).
E. UL 1569 – Metal-Clad Cables (MC/MCI-A).
F. ICEA S-95-658/NEMA WC 70 – Power Cables Rated 2000 V or Less for the Distribution of Electrical Energy.
G. ICEA S-61-402 – Thermoplastic-Insulated Wire and Cable.
H. ASTM B3/B8 – Soft or Annealed Copper Wire; Concentric-Lay-Stranded Copper.

1.4 SUBMITTALS
A. Product Data: Conductor types and insulation, MC cable construction (where allowed), terminations, lugs, splices, and compounds.
B. Shop Drawings (as needed): Conductor schedules where sizes differ from drawings due to voltage-drop/derating; proposed color coding if deviating from this Section.
C. Certificates: Manufacturer certifications of NRTL listing/labeling and country of origin where required by the Contract Documents.

1.5 CLOSEOUT SUBMITTALS

A. Submit test reports and logs required by 3.4 FIELD QUALITY CONTROL and Section 26 05 00.
B. Provide updated panel directories correlated with as-built drawings (Section 26 05 53).
C. Provide final conductor color-coding schedule where existing conditions required deviations.

1.6 QUALITY ASSURANCE

A. Workmanship: Install in accordance with NECA 1.
B. Listing and Labeling: Provide products listed and labeled by a Nationally Recognized Testing Laboratory (NRTL) for the intended application and environment.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver wire on reels with factory-sealed ends. Store in clean, dry, elevated indoor locations; protect from moisture and physical damage. Keep ends capped/sealed until pulling.
B. Handle reels to avoid kinking or crushing conductors; roll in the direction indicated by the manufacturer.

1.8 FIRE-PUMP CONDUCTORS

A. Fire-pump source-to-controller and controller-to-motor conductors shall comply with NEC Article 695 and the Drawings. Route and protect fire-pump source conductors as required by NEC 695.6. Keep fire-pump circuits independent of other wiring and do not apply ordinary feeder overcurrent-protection rules where NEC Article 695 provides specific fire-pump requirements.

B. Using final approved motor, controller, starting-method, utility transformer, and conductor data, Division 26 shall submit equipment-specific voltage-drop calculations demonstrating that voltage at the fire-pump controller line terminals during starting does not drop more than 15 percent below controller-rated voltage and that voltage at the motor terminals while the motor operates at 115 percent of full-load current does not drop more than 5 percent below motor-rated voltage, in accordance with NEC 695.7.

C. Coordinate conductor ampacity, insulation, quantity, motor-lead configuration, terminal size range, locked-rotor current, starting method, and circuit length with the approved fire-pump/controller submittal. Conductor quantities and sizes shown on the Drawings, where indicated, establish the minimum design and pricing basis. Where controller-to-motor conductor quantities or sizes are not indicated, Division 26 shall provide the quantities and sizes required for the final approved controller, motor, starting method, motor-lead configuration, terminal limitations, manufacturer’s installation instructions, NEC Articles 430 and 695, and the voltage-drop calculations required by Paragraph 1.8.B. Include all required conductors and terminations in the Base Bid. Do not reduce or revise conductor quantities or sizes indicated on the Drawings without written Engineer approval. Report conflicts before procurement.

D. Verify available fault current at the fire-pump controller and confirm the controller SCCR and conductor suitability. Coordinate with Sections 21 30 13 and 26 05 73.

PART 2 – PRODUCTS

2.1 CONDUCTORS

A. Copper: Provide soft-drawn annealed copper conductors for feeders and branch circuits unless noted otherwise on the drawings.

B. Aluminum Feeders: Permitted only where specifically indicated. Aluminum shall be AA-8xxx series compact stranded; terminations shall be listed AL/CU; apply antioxidant per manufacturer instructions.

C. Insulation: 600 V, 90°C rated. Use THHN/THWN-2 or XHHW-2 as applicable to the location (wet/dry).

D. Minimum Size: #12 AWG for branch circuits unless noted otherwise. Conductors #8 AWG and larger shall be stranded. Conductors #10 and #12 may be solid or stranded; when stranded conductors are terminated on devices, provide listed crimp terminals or pigtails suited to the device.

E. Neutral Conductors: Provide a dedicated neutral for each branch circuit unless noted otherwise. Shared neutrals for multi-wire branch circuits are not permitted unless specifically shown and provided with common trip. Where branch circuits serve nonlinear loads, electronic power supplies, computer equipment, lighting drivers, or receptacle loads, neutrals shall not be reduced unless specifically indicated and permitted by NEC.

F. Equipment Grounding Conductors: Provide a copper equipment-grounding conductor in each raceway, sized in accordance with NEC 250.122 and adjusted where required by NEC 250.122(B).

G. Jacket/Color: #6 AWG and smaller shall have factory-colored insulation; larger conductors shall be identified with field-applied tape bands at terminations.

2.2 METAL-CLAD CABLE (MC/MCI-A)

A. Use of MC cable is limited to final connections to luminaires, short fixture whips above accessible ceilings, or where specifically indicated. Maximum length shall be 6 feet unless noted otherwise. MC cable shall not be used for general branch circuit wiring, homeruns, exposed work, outdoor work, wet locations, embedded work, or work subject to physical damage unless specifically indicated and listed for the application.

B. Construction: THHN conductors with polypropylene covering; interlocked galvanized steel armor complying with UL 1569; provide full-size equipment grounding conductor. Where isolated ground is indicated, provide dedicated insulated IG conductor.

C. Fittings: Listed and identified for MCI-A where an armor equipment ground is provided; steel or malleable iron connectors with saddle clamp; provide anti-short bushings.

2.3 TERMINATIONS, SPLICES, AND CONNECTORS

A. Provide listed mechanical or compression lugs and splicing devices sized for the conductors and duty. Terminations for stranded conductors shall be pressure-type or compression.

B. Insulation-piercing connectors and push-in spring backwire device terminations are not permitted for power conductors unless specifically indicated. Lever-type splicing connectors shall

be listed for conductor type, conductor size, voltage, and application, and shall be used only where specifically approved by Architect/Engineer.
C. Compression Systems: Provide dies and tools matched to the manufacturer; finished crimps shall show die index and manufacturer mark for inspection.
D. Oxide Inhibitor: Apply antioxidant on aluminum terminations and as recommended by the connector manufacturer.

2.4 COLOR CODING
A. Provide the following color coding unless existing conditions require matching an established scheme (document deviations in record drawings):
B. 208/120 V, 3-Phase: Phase A – Black; Phase B – Red; Phase C – Blue; Neutral – White; Ground – Green; Isolated Ground – Green with Yellow tracer.
C. 240/120 V, 1-Phase: Line 1 – Black; Line 2 – Red; Neutral – White; Ground – Green.
D. 480/277 V, 3-Phase: Phase A – Brown; Phase B – Orange; Phase C – Yellow; Neutral – Gray; Ground – Green; Isolated Ground – Green with Yellow tracer.

2.5 IDENTIFICATION
A. Identify all conductors within panelboards and equipment enclosures by tags or tape showing circuit designation. Coordinate with Section 26 05 53.

PART 3 – EXECUTION

3.1 EXAMINATION
A. Do not install conductors until raceways and boxes are complete, clean, and dry.
B. Verify conductor sizes and overcurrent protective devices provide required ampacity after adjustments for ambient temperature and number of current-carrying conductors.
C. Verify that conductor terminations and connected equipment interrupting/SCCR ratings are suitable for the available fault current based on serving-utility data and the ratings indicated on the Drawings.

3.2 INSTALLATION
A. Pull all conductors in a raceway together. Use listed pulling lubricants where required; do not exceed manufacturer pulling tensions or minimum bend radii. Do not install conductors in raceways until raceway installation is complete, bushings are installed, raceways are cleaned, and pull strings or pulling means are provided.
B. Do not place more than one conductor under a terminal unless the terminal is specifically listed for multiple conductors.
C. Number of Current-Carrying Conductors (CCCs): Minimize the number of CCCs per raceway to limit derating. Where more than three CCCs are installed in a raceway, apply NEC ampacity adjustment; as a design goal, limit to a maximum of six CCCs for #12 and nine CCCs for #10 unless specifically engineered otherwise.

D. Voltage Drop: Except for fire-pump circuits governed by Article 1.8, size conductors such that branch-circuit voltage drop does not exceed 3% and total feeder plus branch-circuit voltage drop does not exceed 5% under design load. For 120-volt branch circuits, use the following planning limits unless conductors are upsized or voltage-drop calculations demonstrate compliance with the above: #12 AWG – 90 ft; #10 AWG – 120 ft; #8 AWG – 150 ft. Circuits that exceed these planning lengths shall be upsized or supported by a calculation showing compliance with the voltage-drop criteria.
E. Neutral Conductors: Provide separate neutrals as specified in 2.1.E; neutrals shall be the same size as associated phase conductors unless noted otherwise.
F. Splicing: Keep splices to a minimum. Make splices and taps only in boxes or enclosures; provide suitable covers and insulation equal to the conductor.
G. Terminations: Make up terminations neatly; do not support conductors solely by devices or lugs. Match conductor metal to lug rating (CU, AL/CU). Torque all connections to manufacturer values and record in torque log (see Section 26 05 00).
H. Existing Conduits: When installing conductors in existing raceways, clean and inspect interior and repair/replace damaged sections before pulling new conductors.

3.3 MC CABLE INSTALLATION (WHERE PERMITTED)
A. Support MC cable with dedicated J-hooks, cable tray, split-ring hangers, or hanger rods; spacing per NEC/Manufacturer.
B. Prepare cable ends using a rotary cutting tool; ensure flush seating in the fitting; provide anti-short bushings; torque fitting screws per manufacturer.
C. Arrange conductors neatly in enclosures; bundle with nylon ties where appropriate.

3.4 FIELD QUALITY CONTROL
A. Perform tests with calibrated instruments and submit written reports:
1. Insulation Resistance: Test new service and feeder conductors prior to energization and prior to connection to sensitive electronic equipment. Test branch circuit homeruns where required by Contract Documents, Architect/Engineer, or where installation conditions warrant. Use test voltage and duration recommended by NETA, conductor manufacturer, and equipment manufacturer for the installed voltage class. Do not perform insulation-resistance testing on connected electronic equipment, lighting controls, surge protective devices, UPS equipment, VFDs, dimming modules, or other sensitive equipment unless specifically permitted by manufacturer.
2. Continuity/Polarity: Verify conductor continuity and correct polarity for each branch circuit.
3. Torque Verification: Verify and document terminal torque values per NEC 110.14 and manufacturer instructions.
4. Functional Tests: Verify operation of GFCI/AFCI devices where provided.
B. Correct deficiencies and retest until results comply with this Section and the Contract Documents.

3.5 CLEANING

A. Remove pulling compounds and debris from enclosures; leave conductors neatly dressed and identified.

3.6 PROTECTION

A. Protect installed conductors and terminations from damage until final acceptance.

END OF SECTION

SECTION 26 05 26 – GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 SUMMARY
A. Provide a continuous grounding and bonding system for the entire electrical installation, including an effective ground-fault current path and grounding electrode system. Work includes grounding electrodes, grounding electrode conductors, system bonding jumpers, equipment grounding conductors, bonding jumpers, ground busbars, connectors, exothermic materials, and accessories.
B. Coordinate grounding for separately derived systems, telecommunications, CATV, lightning protection (if provided), gas piping, and other systems requiring bonding to the building grounding electrode system.

1.2 RELATED REQUIREMENTS
A. Division 01 – Administrative Requirements.
B. Section 26 05 00 – Common Work Results for Electrical.
C. Section 26 05 19 – Low-Voltage Electrical Power Conductors and Cables.
D. Section 26 05 33 – Raceways and Boxes for Electrical Systems.
E. Section 26 05 53 – Identification for Electrical Systems.
F. Section 21 30 13 – Electric-Driven Fire Pumps.

G. Division 27 – Communications (telecommunications grounding/bonding).
H. Division 07 84 00 – Firestopping.

1.3 REFERENCES AND STANDARDS
A. NFPA 70 – National Electrical Code (NEC), Article 250.
B. IEEE 142 – Recommended Practice for Grounding of Industrial and Commercial Power Systems (Green Book).
C. IEEE 1100 – Recommended Practice for Powering and Grounding Electronic Equipment (Emerald Book).
D. UL 467 – Grounding and Bonding Equipment.
E. UL 486A-486B – Wire Connectors.
F. CSA/UL standards applicable to listed products furnished under this Section.

1.4 SUBMITTALS
A. Product Data: Grounding electrodes, busbars, mechanical/irreversible compression connectors, exothermic materials and molds, grounding bushings, bonding jumpers, test wells, and accessories.
B. Shop Drawings (as applicable): Grounding riser/one-line showing electrode system, bonding, conductor sizes, and connections for separately derived systems and telecom bonding backbones.
C. Field Quality Control Plan: Test procedures, instruments, and acceptance criteria.
D. Qualifications: Installer experience where required; NRTL listings for products.

1.5 CLOSEOUT SUBMITTALS
A. Test Reports: Ground resistance, continuity/neutral isolation, and corrective actions per 3.5.
B. Record Drawings: Final grounding riser/one-line and routing of grounding electrode conductors, ground rings, rods, and busbars.
C. Certifications: NRTL field-evaluation labels and reports (if any).

1.6 QUALITY ASSURANCE
A. Products shall be listed and labeled by a Nationally Recognized Testing Laboratory (NRTL) for the intended application and environment.
B. Workmanship shall comply with NECA 1 and IEEE 142.
C. Pre-Installation Meeting: When a ground ring is specified, hold a coordination meeting prior to footing pours to confirm bonding of reinforcing steel and electrode routing.

1.7 COORDINATION
A. Coordinate with structural and civil trades for grounding electrode concrete encasement, ground ring routing, and test wells.
B. Coordinate with the serving utility and Authority Having Jurisdiction (AHJ) for service grounding/bonding requirements and inspections.

PART 2 – PRODUCTS

2.1 CONDUCTORS
A. Grounding Electrode Conductors (GEC), Ground Rings, and Bonding Jumpers: Bare copper, solid or stranded, sized per NEC. Aluminum is not permitted for GECs or grounding conductors in contact with earth or concrete.
B. Equipment Grounding Conductors (EGC): Copper; insulated green in feeders and branch circuits unless noted otherwise. Isolated grounding (IG) conductors where indicated shall be insulated, continuous, and identified green with yellow tracer.
C. In corrosive environments, provide tinned copper or additional protection as recommended by the manufacturer.

2.2 GROUNDING ELECTRODES
A. Use electrodes as required by NEC and as indicated on the Drawings, including concrete-encased electrode, metal building frame, metal underground water pipe, ground ring where specified, and made electrodes where required.
B. Ground Rods: Copper-clad steel, 5/8 inch diameter minimum, 10 feet length minimum, listed to UL 467.
C. Test Wells: Polymer or cast-iron traffic-rated lids as indicated; with mechanical connector to permit isolation of rod for testing.

2.3 CONNECTORS AND HARDWARE

A. Below Grade/Concealed in Concrete: Exothermic welds for conductor-to-conductor and conductor-to-rod/rebar connections.
B. Above Grade/Accessible: UL 467 listed mechanical or irreversible compression connectors of copper alloy (bronze/brass) sized for conductors and application. Provide compatible dies and tools; finished crimps shall show die index and manufacturer mark.
C. Grounding Bushings and Bonding Jumpers: Provide listed bushings with lay-in lugs and bonding jumpers where required to bond around concentric/eccentric knockouts and at service equipment per NEC 250.92/250.97.
D. Ground Busbars: Copper busbar with pre-drilled hole pattern, insulators/standoff brackets, and tinned surface where required for telecom.
E. Hardware: Silicon-bronze or stainless steel for outdoor/corrosive locations.

2.4 IDENTIFICATION
A. Identify grounding conductors, busbars, and electrodes per Section 26 05 53. Tag test wells with the associated panel/room identification.

PART 3 – EXECUTION

3.1 GENERAL INSTALLATION
A. Install grounding and bonding in accordance with NEC Article 250, IEEE 142, and manufacturer instructions to provide a permanent, low-impedance path for ground-fault current.
B. Route grounding conductors as straight and short as practical; avoid sharp bends. Protect from physical damage; conceal where possible.

3.2 SERVICE AND SYSTEM GROUNDING
A. At the service disconnecting means, install the main bonding jumper and bond the grounded (neutral) service conductor to the grounding electrode conductor and to the grounding electrode system. Isolate neutrals downstream.
B. Separately Derived Systems (e.g., transformers): Provide system bonding jumper and grounding electrode conductor per NEC 250.30. Bond metal enclosures; isolate neutrals on the load side.
C. Bond metal water piping systems, building steel, and other metal piping systems to the grounding electrode system within the distances required by NEC.

3.3 GROUNDING ELECTRODE SYSTEM
A. Bond all grounding electrodes together to form the grounding electrode system, including metal underground water pipe, metal building frame, concrete-encased electrode, ground ring (if provided), and made electrodes.
B. Where a metal underground water pipe is used as an electrode, provide a supplemental made electrode. Bond around insulating joints, meters, or non-metallic sections to maintain continuity.
C. Ground Rings (where specified): Provide a continuous bare copper conductor sized per drawings/NEC, buried not less than 30 inches below grade and encircling the structure outside the

foundation. Provide exothermic connections to driven rods and to the building grounding electrode system.
D. Separate Buildings and Structures: Provide a complete grounding-electrode system at each separate building or structure in accordance with NEC Article 250. Connect the grounding-electrode system to the service disconnecting means, building disconnecting means, or equipment-grounding terminal applicable to the approved supply arrangement. For buildings supplied by feeders, install an equipment-grounding conductor with the supply conductors and isolate the grounded conductor from equipment grounding and the building grounding-electrode system. Coordinate grounding and bonding with the approved one-line diagram and equipment listings.

3.4 EQUIPMENT GROUNDING AND BONDING
A. Provide an equipment grounding conductor in all feeders and branch circuits; size per NEC 250.122.
B. Bond raceways, cable trays, pull boxes, junction boxes, enclosures, and equipment to the EGC system. Provide bonding bushings, bonding locknuts, bonding jumpers, or other listed bonding fittings where required at service raceways, feeder raceways, concentric/eccentric knockouts, expansion fittings, nonmetallic raceway transitions, and other locations required by NEC 250.92 and 250.97.
C. Gas Piping: Bond above-ground metallic gas piping to the building grounding electrode system per NFPA 54; gas piping shall not be used as a grounding electrode.
D. Outdoor Lighting Poles: Bond pole and equipment to the circuit EGC; provide a ground rod at each metallic pole base where indicated and bond to pole ground.
E. Telecommunications Bonding: Provide bonding conductors from telecom grounding bars to the building grounding electrode system per Division 27 and IEEE 1100.
F. Remote Fire-Pump Building: Bond the fire-pump controller and disconnecting-means enclosures, fire-pump motor, jockey-pump controller and motor, metallic raceways, building structural metal, and metallic water and fire-protection piping to the building grounding and bonding system. Provide copper equipment-grounding conductors with each load-side circuit. Do not use metallic piping as the equipment-grounding conductor or ground-fault return path.

3.5 FIELD QUALITY CONTROL
A. Perform tests with calibrated instruments and submit written reports:
1. Ground Resistance: Measure resistance of the grounding electrode system using the fall-of-potential method or clamp-on ammeter method where permitted. Target resistance is the resistance required by the NEC for the installed electrode arrangement or less, or as required by the AHJ or utility. If results exceed the target value, install additional electrodes and retest until acceptable.
2. Continuity/Neutral Isolation: Verify continuity of grounding/bonding conductors and verify isolation of neutrals from ground at all downstream panels and equipment.
3. Telecommunications Bonding: Verify continuity of bonding backbone where provided.

B. Correct deficiencies and retest until results comply with this Section and the Contract Documents.

3.6 TEST WELLS

A. Install test wells where indicated. Set tops flush with finished grade. Provide a mechanical connector inside the well so that the ground rod can be isolated from the system for testing.

END OF SECTION

SECTION 26 05 33 – RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 SUMMARY
A. Provide raceways, outlet boxes, pull and junction boxes, floor and poke-thru boxes, wireways, gutters, handholes, and associated fittings as indicated and as required for feeders, branch circuits, splices, taps, equipment connections, and code compliance. Locations shown are approximate unless dimensioned; provide raceway to complete the wiring system.

1.2 RELATED REQUIREMENTS
A. Division 01 – Administrative Requirements.
B. Section 26 05 00 – Common Work Results for Electrical.
C. Section 26 05 19 – Low-Voltage Electrical Power Conductors and Cables.
D. Section 26 05 26 – Grounding and Bonding for Electrical Systems.
E. Section 26 05 53 – Identification for Electrical Systems.
F. Section 21 30 13 – Electric-Driven Fire Pumps.

G. Divisions 25, 27, and 28 – Controls, Communications, and Security.

1.3 REFERENCES AND STANDARDS
A. NEC (NFPA 70); NECA 1.
B. ANSI C80.1 – Rigid Steel Conduit; ANSI C80.3 – Electrical Metallic Tubing; ANSI C80.5 – Aluminum Rigid Conduit.
C. NEMA 250 – Enclosures; NEMA FB 1 – Fittings and Conduit Bodies; NEMA OS 1/OS 2 – Outlet Boxes; NEMA RN 1 – PVC-Coated RMC/IMC; NEMA TC 2/TC 3 – PVC Conduit and Fittings; NEMA TC 14 – RTRC.
D. UL 1 – FMC; UL 5 – Surface Raceways; UL 6 – RMC; UL 360 – LFMC; UL 514 – Boxes and Fittings; UL 651 – RNC; UL 797 – EMT; UL 870 – Wireways.
E. ICC-ES – Evaluation Reports for anchors/adhesives applicable to substrate.
F. ACI 318 — Building Code Requirements for Structural Concrete (anchor design).

1.4 DESIGN REQUIREMENTS
A. Products shall be listed and labeled for the intended application and environment. Install per NEC, NECA workmanship standards, and manufacturer instructions.
B. Boxes and fittings shall be the same material as the associated raceway unless noted otherwise.

1.5 SUBMITTALS
A. Product Data: Raceways, fittings, wireways, surface raceways, pull/push boxes, handholes, roof supports, and accessories.
B. Shop Drawings (as applicable): Roof support layouts; large pull box details; underground handhole schedules.
C. Certificates: NRTL listing/labeling where applicable.

1.6 CLOSEOUT SUBMITTALS
A. Record routing of conduits 3/4 inch and larger where routing differs from drawings or is critical to future work (major feeders, ductbanks, roof runs).
B. Provide labels and directories per Section 26 05 53.

1.7 DELIVERY, STORAGE, AND HANDLING
A. Store raceways above grade, protected from debris and moisture. Protect PVC from sunlight. Keep ends capped until installation.

1.8 COORDINATION
A. Coordinate mounting heights, orientation, and locations of boxes at counters, backsplashes, casework, and equipment. Verify with architectural elevations and equipment submittals.
B. Do not conceal raceway until required inspections are complete and acceptance by the Authority Having Jurisdiction (AHJ) is obtained.

1.9 FIRE-PUMP RACEWAYS

A. Fire-pump source-to-controller and controller-to-motor raceways and routing shall comply with NEC Article 695 and the Drawings. Keep fire-pump circuits independent of other building wiring and provide the routing, separation, and protection against physical damage required by NEC Article 695.

B. Provide dedicated raceways for source-to-controller conductors and controller-to-motor conductors as required by NEC Article 695 and the final approved fire-pump package. Provide raceways for jockey-pump branch-circuit conductors as required for a complete installation. Provide fire-alarm monitoring raceways only where indicated. Coordinate underground entries, seals, drainage, conductor pulling, and terminations with the fire-pump equipment and listed controllers. Pressure-sensing lines are provided under Section 21 30 13 and shall not be installed in electrical raceways. Fire-alarm monitoring conductors and modules are provided under Section 28 31 00.

C. Raceway quantities, sizes, and routing shown on the Drawings, where indicated, establish the minimum design and pricing basis. Where controller-to-motor raceway quantities or sizes are not indicated, Division 26 shall provide the number and size of raceways required for the final approved controller, motor, starting method, motor-lead configuration, conductors, terminal arrangement, manufacturer’s installation instructions, and NEC Articles 430 and 695. Include all required raceways, fittings, pull and junction boxes, supports, seals, and accessories in the Base Bid. Do not reduce, consolidate, or reroute raceways indicated on the Drawings without written Engineer approval. Report conflicts before procurement.

PART 2 – PRODUCTS

2.1 GENERAL PERFORMANCE

A. Minimum raceway size: 3/4 inch except 1/2 inch permitted for in-wall drops to a single device (receptacles/switch legs).
B. Fittings: Threaded or compression type. Set-screw fittings are not permitted. Provide insulated throat at terminations.
C. Accessories and hardware: corrosion-resistant; maintain enclosure ratings at penetrations.
D. Where metal raceways contain 4 AWG or larger insulated conductors and enter a cabinet, box, enclosure, or raceway, provide a listed insulating fitting that gives a smooth, rounded insulating surface (e.g., insulating bushing or connector with an insulated throat listed for this use). Install insulating protection prior to conductor installation.
E. Communications/low-voltage sleeves and stub-outs: Provide insulating bushings on all metallic raceway ends and end bells on PVC/RTRC where raceways terminate without a box (e.g., stubbed through walls, above ceilings, into telecom spaces). Bushings/end bells shall be listed for the raceway type/size and provide a smooth, rounded surface to protect cabling.
F. Empty comms raceways: Cap and tag; provide a 200-lb min, non-waxed, continuous pull string and leave 3 ft slack at each end.
G. Telecom room bonding: Bond metallic communications raceways entering telecom spaces to the telecommunications grounding busbar (TGB) per Division 27 (TIA-607). Provide a #6 AWG green insulated copper bonding conductor unless noted otherwise.

2.2 RIGID METAL CONDUIT (RMC) AND INTERMEDIATE METAL CONDUIT (IMC)
A. Hot-dipped galvanized steel with zinc-coated threads.
B. Fittings: Steel or malleable iron to NEMA FB 1. Provide expansion/deflection couplings with bonding jumpers where required.

2.3 PVC-COATED RMC
A. Galvanized steel with 40-mil PVC exterior coating; fittings to match, factory-coated. Use only listed systems with compatible accessories.

2.4 ELECTRICAL METALLIC TUBING (EMT)
A. Galvanized steel EMT; aluminum EMT only where indicated.
B. Fittings: Steel compression type. Provide aluminum fittings where aluminum EMT is indicated.
C. Aluminum EMT shall not be in direct contact with concrete or masonry.

2.5 RIGID NONMETALLIC CONDUIT (RNC)
A. PVC Schedule 40 per NEMA TC 2; RTRC fiberglass per NEMA TC 14 where indicated.
B. Fittings: Solvent-weld PVC or RTRC fittings to match conduit.
C. Do not use PVC elbows 1-1/2 inch and larger; provide steel or fiberglass elbows.
D. Where PVC is exposed to view or subject to physical damage, provide Schedule 80. Schedule 40 permitted underground and concealed unless noted otherwise.
E. Provide PVC expansion fittings where thermal movement may stress the raceway (long exterior runs, sun-exposed walls, building expansion joints). Install per manufacturer tables for maximum temperature differential; maintain EGC continuity across fittings.

2.6 FLEXIBLE CONDUIT
A. FMC: Use only for final connections to equipment and luminaires, for vibration/isolation, or where required to accommodate movement; not permitted in concealed walls or as a substitute for fixed raceway runs.
B. LFMC: Same use limits as FMC; required in wet/damp/outdoor/washdown locations.
C. LFNC: Only where specifically indicated and in corrosive environments; not permitted in concealed walls or plenums.
D. Maximum lengths unless noted: 72 in above ceilings and to equipment; 48 in exposed below ceilings. Do not daisy-chain fixtures or devices using flexible conduit.

2.7 WIREWAYS AND GUTTERS
A. Sheet steel, oil-tight/dust-tight/raintight with gasketed covers; size per NEC but not less than 4 inches by 4 inches where used.

2.8 SURFACE RACEWAYS
A. Manufacturer’s standard single- and multi-channel systems with fittings and accessories; color as selected by Owner.

2.9 BOXES AND HANDHOLES
A. Outlet and device boxes: NEMA OS 1/OS 2. Interior depth 2-1/8 inch minimum unless conditions require otherwise; exterior boxes 3-1/2 inch deep, NEMA 3R or better.
B. Cast boxes: Malleable iron or aluminum, FS/FD with gasketed covers and threaded hubs.
C. Masonry boxes: Provide gang capacity and extension rings to suit devices.

D. Floor boxes/poke-thru: As indicated; gasketed and adjustable; provide accessories for power/data per drawings. Fire-rated poke-thru devices shall maintain floor fire/smoke ratings when installed per the listing; coordinate fire-caulk accessories as required.
E. Pull/splice boxes: Size to NEC; provide hinged covers for large boxes. Outdoor/ingrade boxes rated for location; provide traffic ratings where required.
F. Barriers: Where voltage between adjacent devices exceeds 150 V to ground, provide listed barriers in multi-gang boxes.
G. Exterior handholes: Polymer-concrete or reinforced concrete with removable cover, load rating as indicated (Tier/traffic class), pulling irons, and sump where groundwater is present.
H. Provide stainless steel hardware and bonding lugs as required; label covers with system identification.

2.10 ROOFTOP CONDUIT SUPPORTS
A. Pre-manufactured adjustable supports with UV-stable bases and hot-dip galvanized or stainless steel hardware.

2.11 ANCHORS AND FASTENERS

A. Concrete: Wedge-type expansion anchors, screw anchors, or adhesive anchors with ICC-ES evaluation for the application (including cracked concrete where required); install per the ESR and manufacturer's instructions.
B. Masonry: Expansion or adhesive anchors with ICC-ES evaluation for the substrate.
C. Steel: Beam clamps or through-bolts; welding only when detailed and approved by the Structural Engineer of Record (SER).
D. Hollow assemblies: Toggle or hollow-wall anchors rated for the load and substrate.
E. Powder-actuated fasteners: Not permitted unless specifically approved in writing by the Architect/Engineer and the SER.

PART 3 – EXECUTION

3.1 PREPARATION
A. Provide sleeves in walls and slabs for passage of conduits. Set sleeves prior to concrete placement. Cap ends before pours. Seal penetrations in exterior walls and floors.

3.2 GENERAL INSTALLATION
A. Ground and bond all raceways and boxes per Section 26 05 26. Identify per Section 26 05 53.
B. Install complete raceway systems before pulling conductors; clean interiors prior to pulls.
C. Keep raceway routing neat and parallel/perpendicular to structure; maximize headroom.
C.1. Limit total bends between pull points to 270 degrees (e.g., three 90s). Provide pull/junction boxes where additional bends would be required.
D. Provide expansion/deflection fittings where raceway crosses structural expansion joints; bond around fittings in metal systems.
E. Provide listed bonding bushings and bonding jumpers where required, including at services and separately derived systems, locations with concentric/eccentric knockouts, nonmetallic enclosures, and across expansion/deflection fittings. Size bonding jumpers per NEC and connect to the equipment grounding/bonding conductor.

F. Seal underground raceways and penetrations at building entries to prevent water, soil gas, and air transfer; slope conduits away from the building, and pack entries with non-hardening duct seal or a listed sealing device compatible with the raceway.
G. Cap open raceway ends; close unused wireway openings.
H. RNC joints: solvent-weld; provide equipment grounding conductor in all PVC raceways.

3.3 CONDUIT AND RACEWAY APPLICATION
A. Underground exterior: PVC Schedule 40 with steel or fiberglass elbows, or RMC where indicated. Provide Schedule 80 PVC where subject to physical damage. Provide traffic-rated boxes/handholes where required. Provide continuous tracer wire and buried warning tape above nonmetallic underground raceways. Where nonmetallic raceways emerge from grade, slab, or paving, transition to RMC, IMC, or Schedule 80 PVC before emergence and extend protection to the first enclosure or to a point not subject to physical damage.

B. Under or in Slab on Grade: Branch circuits not permitted unless shown. Where permitted, use Schedule 40 PVC; maximum size 3/4 inch unless noted. Provide steel risers to above grade.
C. Embedded in or Passing Through Concrete: RMC only unless utility requirements dictate otherwise. Verify with Structural Engineer prior to placement.
D. Crawlspaces: PVC with fittings to match; boxes to match material.
E. Wet and Damp Locations: RMC with fittings rated for the space; EMT is not permitted in wet/damp locations unless specifically noted with corrosion protection; use RMC/LFMC as specified.
F. Concealed/Exposed Dry Locations Indoors: EMT with steel compression fittings; sheet-metal boxes. Do not use aluminum in cinder-fill walls.
G. Existing Finished Walls: Concealed work shall be EMT with steel compression fittings. Where concealment is not feasible, provide listed surface raceway. Do not use FMC/LFMC/LFNC in concealed walls.
H. Indoor Equipment Connections: Provide short FMC/LFMC whips for connections to equipment and luminaires only, within length limits in 2.6.D. Do not use flexible conduit for branch-circuit routing through walls or as a fixed raceway substitute.
I. Outdoor Above Grade: RMC with weatherproof cast boxes; roof runs only where indicated and supported per 3.7.
J. Outdoor Equipment Connections: LFMC; maximum length 72 inches.
K. Corrosive Environments: PVC or LFNC as indicated; fittings/boxes rated for environment.
L. Hazardous Locations: RMC; fittings/boxes rated for location.
M. Fire-Resistive Assemblies: EMT or RMC; provide listed firestopping materials.

3.4 INSTALLATION – SUPPORTS AND SPACING
A. Support raceways with coated steel or malleable-iron straps, clevis/split-ring hangers, or conduit racks. Provide dedicated supports; do not support from other trades' work (piping, ductwork, cable tray, sprinkler, or ceiling grid wires). Do not use tie wire, drywall screws, or wire/perforated straps. Do not fasten to metal roof/decking or roofing assemblies. Powder-actuated fasteners are not permitted unless specifically approved in writing by the Architect/Engineer and the Structural Engineer of Record. Install anchors per the applicable ICC-ES Evaluation Report (ESR) and manufacturer instructions, observing the specified base-material condition (cracked or uncracked concrete) and the project's seismic design-category limitations.

B. Support spacing: Provide two-hole straps or listed hangers; support within 12 inches of boxes and bends for flexible raceways and within 3 feet for rigid/EMT. Space supports at intervals not exceeding the following (or the more restrictive NEC/manufacturer requirement):

1. RMC / IMC / EMT: 10 feet max; secure within 3 feet of terminations.
2. FMC / LFMC: 4-1/2 feet max; secure within 12 inches of terminations.
3. LFNC: 3 feet max; secure within 12 inches of terminations.

4. RNC (PVC/RTRC): Per NEC 352.30/355.30 and manufacturer; provide extra supports at boxes, bends, and grade transitions.

5. Wireways/Gutters: Per manufacturer, 10 feet max, and at each end.

6. Group related raceways on trapeze racks sized for 25 percent future capacity.

C. Anchors and fasteners — by substrate:

1. Concrete (structural/toppings): Use preinstalled inserts where practicable. Otherwise provide wedge, screw, or adhesive anchors with a current ICC-ES ESR for the base material and condition; install per the ESR and manufacturer instructions. Avoid post-tensioned zones; confirm with the Structural Engineer of Record (SER).

2. Steel structural elements: Use beam clamps or through-bolts. Welding only when detailed and approved by the SER. Do not side-load clamps beyond manufacturer limits.

3. Hollow masonry/plaster/gypsum board: Provide toggle or hollow-wall anchors rated for the load and substrate.

4. Solid masonry: Provide expansion or adhesive anchors with an ICC-ES ESR for the substrate.

5. Sheet metal (light-gauge framing, support channels): Self-drilling sheet-metal screws permitted only for light attachments (e.g., device/ring supports); not for primary support of raceways, trapezes, pull boxes, or equipment.

6. Wood: Provide lag screws or through-bolts sized to the load.

7. Power-actuated fasteners: Not permitted unless specifically approved in writing by the Architect/Engineer and the SER.

D. Inserts:

1. Install inserts before concrete placement where possible; coordinate locations with structure and other trades.

2. For suspended hangers from reinforced concrete slabs/beam sides, use cast-in inserts or ICC-ES evaluated anchors sized for the load.

3. Where inserts are omitted, core drill and through-bolt with a recessed square plate and nut above; grout flush with slab.

4. Set slab-ceiling inserts flush with the finished surface.

5. Do not cut or bend reinforcing; coordinate with SER when reinforcement engagement is required.

E. Maintain 12 inches clearance from surfaces above 104°F (40°C) except where noted (e.g., roof).

3.5 WIREWAYS AND SURFACE RACEWAYS
A. Install where noted or required. Serve surface raceways from flush boxes where practicable. Field-coat cut edges to prevent corrosion.

3.6 COMMUNICATIONS AND LOW-VOLTAGE COORDINATION
A. Provide raceways for communications and low-voltage systems (Divisions 25/27/28) as shown and as required. Coordinate sizes and quantities with the respective contractors.
B. Where low-voltage rough-ins are indicated in rooms with walls extending to structure, provide minimum 1-inch stub conduit from device box or accessible wall location to accessible ceiling space or corridor ceiling unless shown otherwise. Provide additional stubs where indicated or required for complete low-voltage pathway.
C. Ream/deburr all communications raceway ends before installing bushings/end bells; install bushings flush with the finished surface where stubbed through walls/ceilings.
D. Maintain fire/smoke ratings: provide listed firestopping at rated penetrations for communications sleeves/stub-outs per Division 07 84 00.
E. Identification: Label each communications raceway at both ends with destination/room per Section 26 05 53 and Division 27 naming standards.

3.7 ROOFTOP CONDUIT INSTALLATION
A. Securely fasten RMC to rooftop supports at not more than 10-foot intervals and within 3 feet of terminations. LFMC shall be secured within 12 inches of terminations and at intervals not exceeding 4-1/2 feet; do not lay flexible conduit directly on roof.
B. Route only those conduits serving rooftop equipment and rise as close to equipment as practical.
C. Do not penetrate roofing membrane for conduit supports unless specifically detailed and approved by roofing manufacturer and Architect. Coordinate support type, spacing, walkway pads where required, and routing with roofing warranty requirements.

3.8 BOXES – APPLICATION AND INSTALLATION
A. Do not install boxes back-to-back. Maintain required separations; provide barriers where required.
B. Standard mounting heights unless noted otherwise: switches 44 inches AFF to centerline of device box; receptacles 18 inches AFF to bottom of box; boxes for above-counter receptacles shall be mounted 6 inches above counter to bottom of box unless indicated otherwise. Verify door swings and mount switches on latch side of door where practical. Coordinate device heights with architectural elevations, casework, equipment, appliance rough-ins, accessibility requirements, and manufacturer requirements.
C. Align adjacent boxes and match elevations for grouped devices; use gang boxes and multigang plates where feasible.

D. Provide heavy-duty dual bar hangers for ceiling-mounted receptacles and luminaires; support independently of raceway. Do not fasten to ceiling support wires or other systems.

E. Provide boxes at intervals to facilitate pulls; generally not more than 100 feet between boxes unless otherwise engineered.
F. Install boxes above accessible ceilings and in unfinished areas where possible; provide access doors for boxes above hard ceilings.
G. Mount flush boxes to finish surfaces within 1/4 inch; provide extension rings where required. Do not enter/exit through extension rings—enter boxes only.
H. Keep boxes clean; protect from plaster and debris; provide blank covers where devices are not installed.

3.9 FLOOR BOXES AND POKE-THRU DEVICES
A. Provide complete assemblies with covers, gaskets, adjustment rings, and partitions. Do not daisy-chain between floor boxes unless shown. Coordinate power and low-voltage compartments and conduits to nearest wall/accessible ceiling as indicated.

3.10 INTERFACE WITH OTHER WORK
A. Provide listed firestopping at rated assemblies (Division 07 84 00).
B. Coordinate roof penetrations with roofing/waterproofing to preserve warranties; use manufacturer-approved boots/jacks.
C. Locate boxes to suit luminaire locations and architectural details.

3.11 ADJUSTING AND CLEANING
A. Adjust flush outlets to finished surfaces; install knockout closures in unused openings. Clean interiors and exposed surfaces; restore finishes.

3.12 EXISTING WORK
A. In renovations, reuse existing raceways where size and condition are adequate; repair/replace damaged sections and clean raceways before pulling new conductors.

END OF SECTION

SECTION 26 05 53 – IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 SUMMARY
A. Provide electrical identification for equipment, raceways, cables/conductors, junction/pull boxes, underground systems, and safety/operational signage as required by the Contract Documents and codes.
B. Section includes: equipment nameplates; safety/operational signs; panelboard/directories; conduit/raceway and back-box identification; wire and cable markers; underground warning tape; and arc-flash/fault-current labels.

1.2 RELATED REQUIREMENTS
A. Division 01 – Administrative Requirements.
B. Section 26 05 00 – Common Work Results for Electrical.
C. Section 26 05 19 – Low-Voltage Electrical Power Conductors and Cables.
D. Section 26 05 26 – Grounding and Bonding for Electrical Systems.
E. Section 26 05 33 – Raceways and Boxes for Electrical Systems.
F. Section 26 05 73 – Power System Studies.
G. Divisions 25, 27, and 28 – Controls, Communications, and Security.

1.3 REFERENCES AND STANDARDS
A. NFPA 70 – National Electrical Code (NEC) (e.g., 110.21, 110.24, 225.37/230.2(E), 408.4).
B. NECA 1 – Standard Practices for Good Workmanship in Electrical Construction.
C. ANSI Z535.4 – Product Safety Signs and Labels.
D. Federal Specification L-P-387 – Plastic sheet, engraving (colors/requirements).
E. UL 969 – Marking and Labeling Systems.
F. NEMA standards applicable to products furnished.

1.4 SUBMITTALS
A. Product Data: Nameplate/safety sign materials, underground warning tape, marker labels/sleeves, wire markers, arc-flash/fault-current labels, and mechanical fasteners/adhesives.
B. Samples: One sample of each label/sign type showing color, thickness, letter height, and fastening method.
C. Identification Schedule: Proposed wording, symbols, letter sizes, color scheme, tag numbers, locations, and function. Coordinate with Drawings and Division 27/28 where applicable.
D. Arc-flash label samples: Show proposed layout, required fields, and material for study-based incident-energy labels. Coordinate label content with the final approved arc-flash report required by Section 26 05 73.
E. Service fault-current label sample: show wording and date format.
F. Label location plan (as applicable): indicate proposed locations on room elevations or the one-line for major equipment.

1.5 CLOSEOUT SUBMITTALS
A. Final Panel Directories: Typed, framed directories matching as-built drawings. Include unique load descriptions and Owner's and Architect's room names and numbers.
B. Final Tag List: After Owner finalizes room numbers, submit the complete list of all equipment nameplates and door/room tags with the exact text to appear on each tag.
C. Arc-flash and fault-current labels: submit photos of each installed label with equipment ID visible, plus a label log listing equipment ID, label type, incident energy (if applicable), boundary, and date applied. Coordinate content with Section 26 05 73.
D. Conduit/Back-Box Color Coding Legend: Provide the legend used for systems color coding where applied (see 3.3 and 3.4).

1.6 QUALITY ASSURANCE
A. Manufacturer Qualifications: Minimum three (3) years' experience producing identification products of the types specified.
B. Products shall comply with applicable NRTL listings and with NEC 110.21 for durability in the installed environment.
C. Provide UV-stable materials for exterior locations; provide adhesives rated for ambient conditions.

1.7 DELIVERY, STORAGE, AND HANDLING
A. Deliver identification products in original, unopened packaging. Store clean, dry, flat, and protected from sunlight and damage.

1.8 COORDINATION
A. Coordinate label nomenclature with one-line diagrams, panel schedules, and the Owner's room numbering scheme prior to fabrication.
B. Provide additional signage as required by the Authority Having Jurisdiction (AHJ) at no cost to the Owner.

PART 2 – PRODUCTS

2.1 MATERIALS – GENERAL
A. Engraved Phenolic/Plastic Nameplates: Laminated, three-layer plastic per L-P-387; indoor thickness 1/16 inch minimum; exterior/rough-service 1/8 inch minimum unless noted.
B. Safety/Operational Signs: Aluminum (exterior) or plastic (interior), with high-contrast legend per ANSI Z535.4.
C. Appearance and Font: High-contrast text; Arial or similar sans-serif font for labels/signs. Minimum letter height 1/4 inch for general equipment; 3/8 inch for switchboards/switchgear; 1/2 inch minimum for service signage unless noted.
D. Colors: Standard equipment labels – white with black lettering. Emergency power equipment – white lettering on red background (or equal high-contrast) unless otherwise shown.

E. Fastening: Stainless-steel screws or non-corroding rivets where feasible. Pressure-sensitive acrylic adhesive permitted for interior smooth surfaces only; not for textured or exterior surfaces.
F. Wire/Cable Markers: Heat-shrink sleeves or tubing/cloth tape/split sleeve as indicated; printing legible and permanent; colors coordinated with system voltage where applicable.
G. Underground Warning Tape: 4-inch wide plastic, bright red with continuous “CAUTION – BURIED ELECTRIC” legend; suitable for direct burial.
H. Marker Labels/Sleeves: Write-on label with clear laminate flap or pre-printed sleeve sized to the raceway; resistant to moisture and cleaning agents.
I. Arc-flash label material: laminated polyester or engraved phenolic, UV-stable, solvent-resistant, per UL 969. Minimum letter height 1/4 inch for body text; 3/8 inch minimum for hazard word.
J. Adhesive / fastening: pressure-sensitive acrylic adhesive permitted on smooth interior surfaces; for equipment fronts/doors, provide mechanical fasteners where practicable.
K. Color/format: high-contrast safety orange/white or equivalent high-visibility legend; do not use low-contrast or translucent media.
L. QR Code: Provide only where indicated or requested by Owner. Where provided, QR code shall be durable, integral to the label or protected by clear overlay, and shall link only to Owner-approved closeout documentation location in compliance with Owner IT/security requirements.

2.2 EQUIPMENT NAMEPLATES
A. Applications: Panelboards, switchboards, switchgear, transformers, MCCs, safety switches, controllers, time clocks, water heaters, packaged control panels, generators, and other equipment requiring identification.
B. Content – Distribution Equipment (example in parentheses): Panel designation (CHAC); voltage/phase/wires (277/480 V 3Ø 4W); source (Fed from MSB).
C. Content – Equipment/Disconnects: Load served (AHU-2), voltage/phase (480 V 3Ø), circuits used (CHAC-15,17,19).
D. Mounting: Install plumb and parallel to equipment lines; mount on equipment front where visible; on recessed panelboards in finished areas, mount directory inside door and nameplate on the trim or door as indicated.

2.3 PANEL DIRECTORIES
A. Provide frame-mounted typed directories with heat-resistant transparent cover. Fill out completely and coordinate each breaker with the proper load served.
B. Directories shall uniquely identify each circuit per NEC 408.4, including room names and numbers as directed by Owner. Identify spares and spaces as “SPARE” or “SPACE” in typed directory.

2.4 SAFETY/OPERATIONAL SIGNS
A. Main Service Fault-Current Label (NEC 110.24(A)): Field-mark each service disconnect with the available fault current value and the date calculations were performed.

B. Multiple/Remote Service Signs: Provide signage at each service location identifying all other service disconnect locations (NEC 230.2(E)/225.37 as applicable).
C. Arc-flash hazard labels: provide labels at switchboards, switchgear, panelboards, motor-control centers, industrial control panels, variable-frequency drive enclosures, automatic transfer switches, and similar equipment that may require examination, adjustment, servicing, or maintenance while energized. Labels shall be based on the approved arc-flash study under Section 26 05 73 and shall include information required by NFPA 70E, including equipment identifier, nominal system voltage, arc-flash boundary, study date, and incident energy at working distance or PPE category method as used by the study. Where incident energy method is used, include incident energy and working distance.

2.5 CONDUIT AND BACK-BOX IDENTIFICATION
A. Painted bands, marker labels, or marker sleeves for colored system identification on conduits as required by the Drawings, Division 27/28, AHJ, or Owner. Apply every 10 feet maximum, at boxes/panels, and at penetrations.
B. System Colors (typical): Fire Alarm – Red; Voice/Data – Blue; Security – Green; Intercom/AV – Yellow; CATV/MATV – Black; Lighting Controls – Orange; Other (unless noted) – White.
C. Back-Box Covers for systems in Item B: Paint the entire cover or use marker labels to match system color. Marker labels are not acceptable for Fire Alarm covers; paint required.
D. Information on Back-Box Covers: Identify source panel and circuits; if no conductors installed, mark “FUTURE USE.”

2.6 WIRE AND CABLE IDENTIFICATION
A. Identify feeders at both ends and at intermediate pull/junction points with permanent tags indicating source and destination (e.g., “Fed From MSB-A to CHAC-L1”).
B. Identify branch-circuit conductors at panelboards and at the first device or junction box; include panel and circuit number.
C. Use colors consistent with system voltage (see 26 05 19) and provide supplemental tags where colors are not definitive (e.g., multi-conductor cables).

2.7 UNDERGROUND WARNING TAPE
A. Provide tape per 2.1.G for all underground electrical lines—both direct-buried and in raceway.

PART 3 – EXECUTION

3.1 PREPARATION
A. Complete painting prior to installing labels/signs. Degrease and clean mounting surfaces; ensure dry, smooth, and within manufacturer’s ambient condition limits.

3.2 APPLICATION – GENERAL

A. Install identification plumb, level, and parallel to equipment lines. Locate for maximum visibility and access; avoid placement on removable covers where possible.
B. Use mechanical fasteners where feasible; adhesive-only mounting permitted for interior smooth surfaces.
C. Replace damaged or illegible labels at no cost to the Owner.
D. Place arc-flash labels on the equipment front at eye level, adjacent to the operating handle or access-door latch; do not place on removable deadfronts or covers that are routinely removed for service.
E. Place service fault-current labels on or immediately adjacent to the service-disconnect handle/operator, clearly visible without opening covers.

3.3 EQUIPMENT AND PANEL IDENTIFICATION
A. Install nameplates for: switchboards; panelboards; transformers; service disconnects (including enclosed switches); MCCs; stand-alone motor controllers; generators; contactors/relays in individual enclosures; packaged control panels; and other equipment as required by NEC and the Contract Documents.
B. Panelboards/Switchboards/Switchgear: Provide directories per 2.3; mark high-leg where applicable per NEC 408.3.
C. Service Disconnects: Provide available fault-current label per 2.4.A and service signage per 2.4.B.
D. Arc-flash labels: install where specified in 2.4.C. Content shall match the final arc-flash report and settings issued under Section 26 05 73.
E. Settings placards: where adjustable protective devices are provided, affix a small placard or tag inside the equipment door listing the final approved settings; identify the corresponding arc-flash study reference.
F. Relabeling triggers: when equipment, conductor lengths/sizes, or protective-device settings change such that incident energy or available fault current may be affected, update the study under Section 26 05 73 and replace affected labels prior to energization.

3.4 RACEWAY, BACK-BOX, AND JUNCTION BOX IDENTIFICATION
A. Apply colored bands/labels/sleeves per 2.5.A at intervals not exceeding 10 feet, at boxes, and at penetrations. Coordinate colors per 2.5.B and Division 27/28.
B. Above-Ceiling Junction Boxes: Provide permanent labeling indicating the panel name, branch circuit number(s), and voltage within the box. Labels shall be neat, legible, and permanent.
C. Back-Box Covers: Provide identification and color per 2.5.C/D before device installation or concealment.

3.5 UNDERGROUND WARNING TAPE INSTALLATION
A. Install tape continuously along each underground conduit, raceway, or cable run, 6 to 8 inches below finished grade and directly above the line. Where multiple lines share a trench or concrete envelope, install a single tape centered above and do not exceed an overall tape width of 16 inches.

B. Provide tape for all underground wiring, whether direct-buried or in raceway.

3.6 WIRE/CABLE MARKING INSTALLATION

A. Install markers before energization. Provide identification at both ends, and at intermediate accessible points for feeders. Maintain legibility after pulling and terminations.

3.7 FIELD QUALITY CONTROL

A. Prior to Substantial Completion, verify that all required identification is installed, visible, and consistent with as-built drawings and panel schedules.

B. Replace mislabeled or missing identification and update directories/legends to match final conditions.

C. Verify that each label’s equipment ID matches the one-line diagram and panel directory; correct mismatches and re-issue updated photos for the label log.

3.8 CLEANING AND PROTECTION

A. Clean labels and signs; remove fingerprints, adhesive residue, and debris. Protect identification from damage until Final Acceptance.

END OF SECTION

SECTION 26 05 73 – POWER SYSTEM STUDIES

PART 1 – GENERAL

1.1 SUMMARY

A. Provide calculations, settings, and labeling to support selection of equipment interrupting/withstand ratings, protective performance, code compliance, and safe operation and maintenance.

B. Scope includes: available fault-current calculation, equipment short-circuit rating evaluation, arc-flash risk assessment and labeling, protective device settings table for adjustable protective devices, and field adjustment/documentation of electronic trip circuit breakers and other adjustable protective devices.

C. Power system studies shall be provided where required by NEC, Authority Having Jurisdiction, utility requirements, equipment manufacturer, or Contract Documents.

1.2 RELATED REQUIREMENTS

A. Division 01 – Administrative Requirements.

B. Section 26 05 00 – Common Work Results for Electrical.

C. Section 26 05 53 – Identification for Electrical Systems.

1.3 SUBMITTALS

A. Study Plan: One-line to be modeled, assumptions (utility data, transformer kVA/impedance, motor groups, generator data), and list of adjustable devices to be set.

B. Fault-Current Summary: Basis and result at the service; include any utility data provided.

C. Arc-Flash Report: Summary of method, assumptions, and results; include incident energy at working distance, arc-flash boundary, and equipment list.

D. Protective Device Settings Table: Provide preliminary and final settings for each adjustable protective device, including long-time pickup, long-time delay, short-time pickup, short-time delay, instantaneous pickup, ground-fault pickup, ground-fault delay, maintenance mode/reduced energy setting, zone-selective interlocking settings where applicable, and other adjustable functions provided with the device.

E. Label Samples: Service fault-current label and arc-flash label showing proposed wording and layout.

F. Closeout: Label log of installed labels (by equipment and date) and photos showing final settings on each adjustable device.

1.4 QUALITY ASSURANCE

A. Perform studies using SKM, ETAP, or EasyPower (or equal) by a qualified engineer experienced in power system analysis.

B. Coordinate study inputs with approved equipment submittals and available utility data.

PART 2 – PRODUCTS

2.1 LABELS

A. Provide durable, field-applied labels consistent with Section 26 05 53. Arc-flash labels shall show incident energy (cal/cm²) at working distance, arc-flash boundary, nominal voltage, equipment identifier, and study date. Service fault-current labels shall show available fault current and calculation date.

PART 3 – EXECUTION

3.1 AVAILABLE FAULT CURRENT

A. Determine available fault current at the service equipment using current utility information when provided. When utility data are not furnished, compute from transformer kVA/impedance and reasonable X/R assumptions; state the basis used.

B. Retain the worst-case value for equipment selection and labeling.

3.2 EQUIPMENT RATINGS

A. Verify interrupting and short-circuit current ratings of service and distribution equipment are adequate for the calculated duties before procurement.

B. If any rating is inadequate, propose corrective actions (device changes, transformer taps, or feeder revisions) and obtain approval prior to equipment release.

3.3 SERVICE FAULT-CURRENT LABEL

A. Field-mark each service disconnecting means with the available fault current value and the date the calculation was performed.

B. Update the label if changes are made that affect the value.

3.4 ARC-FLASH ANALYSIS AND LABELING

A. Perform an arc-flash risk assessment using an accepted method and software. Base calculations on final device settings and worst-case normal operating scenarios.

B. Provide arc-flash labels at switchboards, switchgear, panelboards, motor-control centers, industrial control panels, variable-frequency drive enclosures, automatic transfer switches, and

similar equipment that may require examination, adjustment, servicing, or maintenance while energized.

C. Where incident energy exceeds the Owner's policy threshold for energized work, identify recommended risk-reduction measures (e.g., maintenance settings, remote racking, or work de-energized).

3.5 PROTECTIVE DEVICE COORDINATION

A. Provide system-wide protective device coordination study and time-current coordination curve submittals for service equipment, switchboards, panelboards, transformers, feeders, major mechanical equipment feeders, emergency/standby distribution equipment, UPS input/output/bypass overcurrent devices, and other adjustable protective devices indicated in the Contract Documents.

B. Coordination study shall include upstream and downstream protective devices from the service disconnecting means through major distribution and branch protective devices where coordination is practical and applicable.

C. Study shall evaluate long-time, short-time, instantaneous, and ground-fault functions of adjustable protective devices. Coordinate settings to provide selective operation of protective devices while maintaining equipment protection, conductor protection, code compliance, and acceptable arc-flash incident energy.

D. Settings shall be selected to reduce nuisance tripping during normal operation, equipment starting, transformer energization, motor starting, inrush current, and other expected operating conditions, while maintaining required protection.

E. Where full selective coordination cannot be achieved due to available fault current, device limitations, equipment constraints, arc-flash considerations, or code requirements, identify the limitation in the study and provide recommended corrective action or explanation for Engineer review.

F. Submit time-current curves showing device coordination, available fault-current markers, transformer damage curves where applicable, conductor protection where applicable, motor starting curves where applicable, and recommended protective device settings.

G. Provide selective coordination to the extent practical using the installed equipment and available protective device settings. Where full selective coordination cannot be achieved without compromising code-required protection, equipment protection, conductor protection, ground-fault protection, or arc-flash energy reduction, identify the limitation in the study and submit recommended settings or corrective options for Engineer review.

3.6 ADJUSTABLE PROTECTIVE DEVICES – SETTINGS AND IMPLEMENTATION

A. Prepare a Protective Device Settings Table covering each electronic trip circuit breaker, adjustable trip unit, relay, ground-fault protection device, and other adjustable protective device.

B. Adjustable protective devices shall not be left at factory default settings unless the approved study specifically confirms that the factory default settings are appropriate.

C. Prior to energization, set all adjustable protective devices to the approved preliminary settings. Where final settings depend on final utility data, final equipment, field conditions, or Owner operating requirements, update the study and settings table before final acceptance.

D. Settings shall be applied by qualified personnel familiar with the installed equipment and manufacturer's adjustment procedures. Coordinate with manufacturer's representative where required by the equipment manufacturer or Contract Documents.

E. Affix a settings placard at each adjustable protective device or inside the equipment door listing the final settings.

F. Document final settings with clear photographs and submit with the closeout label log. Documentation shall identify equipment name, device type, device rating, trip unit type, final settings, date settings were applied, and person/company applying settings.

G. Where energy-reducing maintenance switch, maintenance mode, reduced-energy let-through setting, or equivalent arc-energy-reduction feature is provided, include normal and maintenance-mode settings in the settings table. Label equipment to identify maintenance-mode function, status indication, and instructions for returning equipment to normal mode.

H. Final protective device settings shall balance selective coordination, nuisance-trip avoidance, equipment protection, conductor protection, ground-fault protection, and arc-flash energy reduction. Where these objectives conflict, identify the conflict in the study and submit recommended settings for Engineer review prior to implementation.

I. Where acceptance testing is specified elsewhere, coordinate functional checks with that testing.

3.7 EXCLUSIONS

A. Unless specifically indicated elsewhere, the following are not included: native model turnover files, load-flow analysis, harmonics analysis, power quality monitoring, and voltage-drop calculations beyond those required for design verification.

SECTION 26 08 00 – COMMISSIONING OF ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 SUMMARY

A. Provide start-up assistance, prefunctional checklists, functional performance tests, documentation, and training for electrical systems indicated herein. Coordinate with the project commissioning requirements in Division 01.

B. Systems: normal power distribution (service through panelboards), emergency/standby power (generator and transfer switches if provided), UPS (if provided), lighting controls (if provided), power metering/monitoring (if provided), and interfaces to life-safety and low-voltage systems in Divisions 27 and 28.

1.2 RELATED REQUIREMENTS

A. Section 01 91 00 – Commissioning

B. Section 26 05 53 – Identification for Electrical Systems

C. Section 26 05 73 – Power System Studies

D. Section 26 09 43 – Wireless Network Lighting Controls

E. Section 26 20 00 – Low-Voltage Electrical Distribution

F. Section 26 36 23 – Uninterruptible Power Supply System

G. Division 27 – Communications; Division 28 – Electronic Safety and Security (coordination only).

1.3 DEFINITIONS

A. Commissioning Authority (CxA): Entity designated by the Owner to plan, direct, and document the commissioning process.

B. Prefunctional Checklist (PFC): Start-up and readiness verification completed prior to functional tests.

C. Functional Performance Test (FPT): Demonstration that equipment and systems operate in accordance with the Contract Documents under normal and simulated conditions.

D. Device Settings Table: Final settings for adjustable protective devices associated with Section 26 05 73.

E. Issues Log: Running list of deficiencies and outstanding actions maintained through turnover.

1.4 SUBMITTALS

A. Commissioning plan excerpts: start-up plan, PFC templates, and proposed FPT procedures for each system.

B. Start-up reports: completed PFCs and manufacturer start-up forms.

C. Functional test procedures: final procedures for CxA use, coordinated with shop drawings and sequences.

D. Training: agenda, outline, and training materials; submit sign-in sheets after training.

E. Turnover package: issues log with resolutions, final one-line diagram, protective device coordination study, final device settings table, arc-flash label log, lighting control functional test documentation, wireless lighting control as-programmed documentation, UPS startup/test documentation, and summary of FPT results.

1.5 QUALITY ASSURANCE

A. CxA: Selected by the Owner.

B. Contractor: Assign a commissioning coordinator and technicians with experience in testing the systems specified.

C. Software/tools: Provide any manufacturer-required software, cables, and special tools to execute start-up, testing, and adjustments; leave owner-specific keys or dongles on site at closeout.

1.6 COORDINATION

A. Incorporate commissioning activities into the construction schedule. Provide notice to the CxA at least two weeks prior to planned start-up and testing.

B. Provide temporary power, loads, test equipment, and personnel to execute tests. Coordinate outages and switching with the Owner.

C. Lighting controls vendor shall provide startup, programming, calibration, functional testing, deficiency correction, retesting, documentation, and Owner training for the wireless network lighting control system. Where project commissioning is required, the lighting controls vendor shall coordinate with the CxA and demonstrate lighting control operation for review. Project commissioning requirements do not relieve the lighting controls vendor of responsibility for delivering a complete, programmed, tested, documented, and code-compliant lighting control system.

PART 2 – PRODUCTS

2.1 TEST EQUIPMENT

A. Provide calibrated test instruments suitable for the magnitudes to be measured. Retain calibration certificates available for review.

B. Provide manufacturer-specific tools and software required to interrogate and adjust equipment, including communication adapters and passwords necessary to perform testing.

PART 3 – EXECUTION

3.1 PREFUNCTIONAL CHECKLISTS AND START-UP

A. Prepare start-up plans using manufacturer procedures and project-specific PFCs. Identify responsible trade for each task.

B. Execute start-up; complete PFCs in full. Only personnel who performed or directly observed a task may initial that task.

C. Verify: equipment identification is installed; torque checks are complete where specified; insulation resistance tests are complete where specified; protective device ratings match approved submittals; adjustable protective device settings are loaded and match the approved preliminary Device Settings Table prior to energization; and arc-flash and service fault-current labels are installed where available from Sections 26 05 73 and 26 05 53. Prior to final acceptance, verify final protective device settings match the approved final Device Settings Table.

3.2 FUNCTIONAL PERFORMANCE TESTING

A. General: Conduct FPTs after successful start-up. Demonstrate sequences and performance for each system and interface. Document measured values and outcomes.

B. Normal power: energize equipment, verify phasing, voltage, and loading; demonstrate operation of panelboard schedules and feeder identification.

C. Emergency/standby power, if provided: demonstrate normal-to-emergency transfer and retransfer; verify cooldown, alarms, remote indications, load pickup, and associated control interfaces. Verify protective device settings and selective coordination documentation are complete where required by Section 26 05 73.

D. UPS, if provided: demonstrate normal operation, battery operation, transfer to and from static bypass, operation of internal maintenance bypass, battery test or manufacturer-approved battery verification procedure, alarms, monitoring contacts, network/relay interface where provided, restoration to normal operation, and coordination with connected loads. Verify runtime documentation is provided in accordance with Section 26 36 23.

E. Wireless network lighting controls, if provided: lighting controls vendor shall demonstrate occupancy/vacancy control, manual control, dimming control, daylight-responsive control, time schedules, exterior lighting control, after-hours override where provided, emergency lighting interfaces where applicable, owner adjustment functions, local operation upon loss of

internet/cloud connection, and final as-programmed documentation in accordance with Section 26 09 43.

F. Power metering/monitoring (if provided): verify point lists, naming, accuracy checks against portable reference at light and heavy load, network connectivity, time synchronization, trending, and alarms.

G. Interfaces: verify interlocks and supervisory signals to Divisions 27/28 and BAS where applicable.

3.3 ADJUSTMENTS AND SETTINGS

A. Adjust all adjustable protective devices to the approved settings from Section 26 05 73 prior to energization. Factory default settings shall not be used as final settings unless specifically confirmed by the approved study.
B. Prior to final acceptance, verify final settings match the approved final Device Settings Table and protective device coordination study.
C. Affix a settings placard inside each applicable equipment door listing final settings.
D. Record final settings with clear photographs and include in the turnover package.

3.4 DEFICIENCIES AND RETESTING

A. Record deficiencies in the issues log. Correct and retest until performance meets the Contract Documents.

B. Retesting due to contractor-caused deficiencies shall be provided at no additional cost.

3.5 DOCUMENTATION AND TURNOVER

A. Provide a concise commissioning summary including completed PFCs, FPT results, issues log, label log, protective device coordination study, final device settings table, arc-flash documentation, updated one-line diagram, UPS startup/test documentation where applicable, wireless lighting control as-programmed documentation where applicable, and training records.

B. Post the final one-line and settings summary in the main electrical room.

3.6 TRAINING

A. Provide classroom and hands-on training for Owner personnel. Minimum content: safety considerations, normal operation, transfer/retransfer procedures where applicable, UPS operation and alarm response where applicable, wireless lighting control operation and owner adjustments where applicable, alarm response, routine inspection and maintenance, and location of posted documentation.

B. Provide sign-in sheets and training materials as part of closeout.

3.7 SEASONAL OR DEFERRED TESTING

A. Perform deferred tests where conditions prevent full demonstration at turnover (e.g., utility coordination or load availability). Complete tests before final completion unless otherwise accepted by the Owner.

3.8 WARRANTY-PERIOD VISIT

A. At approximately ten months after substantial completion, meet with Owner staff to review system performance and outstanding issues; recommend corrective actions and updates to posted documentation.

END OF SECTION

SECTION 26 09 23 – LIGHTING CONTROL DEVICES

PART 1 – GENERAL

1.1 SUMMARY
A. Provide room-level automatic shutoff and manual control for interior lighting, and photocell/astronomic control for exterior lighting.
B. Where indicated on the drawings, provide a networked lighting control backbone for time-based, group, and supervisory functions. If not indicated, furnish stand-alone room controls only.
C. Lighting controls shall utilize wired low-voltage sensors, room controllers, power packs, relays, wall stations, and associated control wiring unless specifically indicated otherwise. Combination line-voltage wall-switch occupancy or vacancy sensors are permitted where indicated on the Drawings.

1.2 RELATED REQUIREMENTS
A. Section 26 05 19 – Low-Voltage Conductors and Cables.
B. Section 26 05 33 – Raceways and Boxes for Electrical Systems.
C. Section 26 05 53 – Identification for Electrical Systems.
D. Section 26 08 00 – Commissioning of Electrical Systems.
E. Section 26 27 26 – Wiring Devices.

1.3 DEFINITIONS
A. Occupancy sensor: Automatic on/off by presence detection.
B. Vacancy sensor: Manual on, automatic off by presence detection.
C. Dual-technology sensor: Combines passive infrared and ultrasonic sensing.
D. Room controller: Local control module serving a space or zone.
E. Network controller: Central or distributed controller providing schedules, groups, or supervisory functions.
F. Photocell: Exterior light sensor used to switch exterior lighting based on ambient light level; includes time delay and hysteresis to prevent short-cycling.
G. Daylight sensor (interior): Sensor used to dim or switch luminaires in daylight zones to maintain a target work-plane light level; installed with a direct optical path to the zone (closed-loop) or to the daylight aperture (open-loop).

1.4 SUBMITTALS
A. Product Data: Submit product data for sensors, combination wall-switch sensors, room controllers, power packs, relays, daylight sensors, photocells, time switches, contactors, wall stations, and associated control devices.
B. Lighting-Control Shop Drawings: Submit with the lighting-fixture submittal package. Include a device schedule, reflected ceiling plans showing device locations and control zones, point-to-point wiring diagrams, room-control diagrams, exterior-lighting-control diagrams, and space-by-space sequences of operation.

C. Closeout: As-built device locations, final sequences, and backups of programming files where applicable.
D. Operation and maintenance data.

1.5 QUALITY ASSURANCE
A. Components shall be listed and suitable for the intended application.
B. Provide manufacturer's standard warranties and technical support information.

1.6 COORDINATION
A. Coordinate with Section 26 08 00 for start-up windows, functional testing, and training.
B. Emergency lighting performance is achieved by unit equipment; listed emergency lighting control devices only where specifically indicated.

PART 2 – PRODUCTS

2.1 ROOM-LEVEL CONTROLS (BASELINE)
A. Provide dual-technology occupancy/vacancy sensors with adjustable time-out, sensitivity, and masking/shielding accessories as required.
B. Provide manual switches or dimmers where indicated. Buttons and engraving shall match the sequence of operations and space naming.
C. Provide room controllers where required by the control topology. Install controllers above accessible ceilings or in accessible enclosures. In rooms without ceilings, mount controllers in accessible enclosures tight to structure or wall construction as coordinated with the Drawings. Permanently identify each controller and show its final location on record drawings.
D. Switch lighting loads through listed low-voltage power packs, room controllers, or lighting contactors unless a combination line-voltage wall-switch occupancy or vacancy sensor is specifically indicated on the Drawings.
E. Acceptable manufacturers (sensors, power packs, wall stations): Lutron, Legrand Wattstopper, Acuity SensorSwitch; or equal.
F. Dual-technology ceiling occupancy/vacancy sensors (low-voltage, 24 V nominal):
1. Basis of Design: Legrand Wattstopper DT-305 (360°, dual-tech).
2. Acceptable: Lutron LOS-CDT-2000; Acuity SensorSwitch CM-PDT-10; or equal.
G. Low-voltage power packs / control relays (120/277 V, 20 A ballast/LED min; auxiliary dry contact where needed; relay suitable for high-inrush LED drivers):
1. Basis of Design: Legrand Wattstopper BZ-50.
2. Acceptable: Acuity SensorSwitch PP20; Lutron PP-DV; or equal.
H. Combination Wall-Switch Sensors: Where indicated, provide a combination manual switch and occupancy or vacancy sensor, Lutron Maestro or equal, rated for the connected lighting voltage and load. Provide dimming capability where indicated. Configure operation to comply with the sequence shown on the Drawings and applicable energy-code requirements.

2.2 DAYLIGHT SENSORS (INTERIOR)

A. Provide ceiling- or wall-mounted daylight sensors for each daylight zone indicated. Sensors shall be compatible with the specified dimming method (e.g., 0–10 V) and support target setpoint and gain/trim adjustment.

B. Mounting: locate per manufacturer guidance for the selected strategy (open-loop vs. closed-loop). Avoid direct view of luminaires for open-loop applications; avoid direct sun and high-contrast backgrounds.

C. Provide commissioning aids (status LED or app/GUI) to verify sensor operation and setpoint.

D. Closed-loop daylight sensor:

1. Basis of Design: Legrand Wattstopper LMLS-400 (closed-loop).
2. Acceptable: Lutron LOS-CDS series; Acuity SensorSwitch nCM-ADCX; or equal.

E. Open-loop daylight sensor (skylight/sidelight applications):

1. Basis of Design: Legrand Wattstopper LMLS-500 (open-loop).
2. Acceptable: Equal.

2.3 PHOTOCELLS (EXTERIOR / SITE)

A. Provide weatherproof photocells to control exterior lighting for dusk/dawn operation. Include adjustable setpoint, time delay, and hysteresis.

B. Provide remote-mounted sensors with north-sky orientation where practicable; avoid localized glare sources (windows, signage).

C. Fail-safe: upon sensor failure or control loss, exterior lighting shall default to ON.

D. Photocells shall be listed for the environment and voltage and shall be compatible with the specified lighting contactors or drivers.

E. Astronomic time switch (for exterior scheduling):

1. Basis of Design: Intermatic ET90115C (ET90000 series).
2. Acceptable: TORK E513A/E656 series; or equal.

F. Photocell model guidance:

1. Button-style: Intermatic EK4036S or equal.
2. Locking-type: Intermatic LED4536SC or ELC4536 (or equal).

2.4 LIGHTING CONTACTORS

A. Mechanically-held type with identified short-circuit current rating (SCCR) suitable for the available fault current.

B. Enclosures: NEMA 1 for interior dry locations; NEMA 3R/4/4X where required by environment.

C. Provide hand-off-auto (HOA) switch where indicated.

D. Manufacturers (mechanically-held lighting contactors):

1. Basis of Design: Schneider/Square D 8903 Type S.
2. Acceptable: Eaton C30CN; Siemens CLM; or equal.

2.5 NETWORK CONTROLLER (WHEN INDICATED)

A. Provide a network controller only when shown on the drawings. The controller shall provide an internal time clock, group/scene control, and support for integration as indicated (e.g., BACnet/IP or contact closures).
B. Acceptable manufacturers: Lutron (Vive/Quantum), Acuity (nLight), Legrand (DLM), Crestron; or equal.

2.6 CABLING
A. Provide low-voltage control cabling per manufacturer requirements. Provide plenum-rated cable where installed in environmental air plenums; standard CL2/CL3 cable is acceptable in non-plenum spaces.
B. Provide Category cable (CAT5/5e/6) where required by the selected system.

2.7 EMERGENCY LIGHTING (UNIT EQUIPMENT)
A. Provide emergency lighting by unit equipment (integral emergency drivers/battery packs in designated luminaires) unless noted otherwise.
B. Provide an unswitched normal-power feed to each emergency driver/charger. Normal lighting for the same luminaire may be switched or dimmed.
C. Upon loss of normal power, the emergency driver shall energize automatically for the required duration.
D. Provide a test switch and indicator for each unit as scheduled; coordinate locations with the luminaire schedule.
E. Lighting controls shall not defeat emergency operation.

2.8 STORM SHELTER LIGHTING (UPS SUPPLIED) (NOT USED)
A. Provide general shelter lighting from the UPS/emergency source as shown. Local switches, dimmers, and sensors operate the same on normal power and on UPS/emergency power.
B. Provide emergency egress illumination in the shelter by unit equipment per 2.7 so that egress lighting automatically illuminates upon loss of normal power.

2.9 EMERGENCY LIGHTING CONTROL DEVICES
Where luminaires on an emergency or standby branch circuit are required to operate at full output upon loss of normal power, provide listed UL 924 emergency-lighting-control devices compatible with the indicated switching and 0-10-V dimming method. Acceptable products include Legrand Wattstopper ELCU-200, Acuity SensorSwitch nPP16-ER, or equal.

PART 3 – EXECUTION

3.1 INSTALLATION
A. Locate sensors to provide full coverage and minimize nuisance activation. Follow manufacturer mounting heights and line-of-sight guidance.
B. Conceal control modules above ceilings unless otherwise indicated. Identify concealed device locations on the ceiling grid or as-built drawings.

C. Provide junction boxes, raceways, and cabling in accordance with Division 26 requirements.

3.2 SEQUENCES OF OPERATION
A. Provide vacancy (manual-on, automatic-off) or occupancy (automatic-on, automatic-off) control by space type as shown on the drawings.
B. Provide an adjustable time-out; initial setting 20 minutes unless noted otherwise. Provide a brief pre-off visual cue where dimming is not provided when acceptable to the Owner.
C. Daylight zones (interior): Provide continuous or stepped dimming to maintain the target setpoint using the daylight sensors specified in 2.2. Calibrate during start-up.

3.3 EXTERIOR LIGHTING CONTROL
A. Control exterior lighting by photocell for dusk/dawn operation with astronomic scheduling overlay where indicated.
B. Provide HOA control at designated lighting contactors where shown.

3.4 EMERGENCY AND LIFE-SAFETY BEHAVIOR
A. Emergency luminaires with unit equipment automatically illuminate upon loss of normal power.
B. Storm-shelter general lighting remains under normal local control on both normal and UPS power; no building-wide “all lights on” function is provided.
C. Provide interfaces only where specifically indicated for egress-only zones if directed by the Authority Having Jurisdiction.

3.5 STARTUP, TESTING, AND TRAINING
A. Aim sensors, set time-outs/sensitivity, calibrate daylight sensors, and program sequences as indicated. Document final settings.
B. Perform functional checks for each space type and exterior zone. Coordinate demonstrations and documentation with Section 26 08 00.
C. Provide programming backups and record drawings showing final device locations and network topology where applicable.

3.6 FIELD QUALITY CONTROL
A. Verify proper coverage, sequencing, and daylighting performance; adjust as necessary.
B. Replace or relocate devices that cannot meet performance requirements at no additional cost to the Owner.

3.7 IDENTIFICATION
A. Label controllers, cabinets, and low-voltage cabling per Section 26 05 53. Device IDs shall match the panel schedules and control diagrams.

END OF SECTION

SECTION 26 20 00 – LOW-VOLTAGE ELECTRICAL DISTRIBUTION

PART 1 – GENERAL

1.1 SUMMARY
A. Provide low-voltage electrical distribution equipment and accessories to distribute power to all systems and equipment shown, including switchboards, panelboards, transformers, safety switches, enclosed circuit breakers, motor controllers, and associated appurtenances.

1.2 RELATED REQUIREMENTS
A. Section 26 05 00 – Common Work Results for Electrical.
B. Section 26 05 19 – Low-Voltage Conductors and Cables.
C. Section 26 05 26 – Grounding and Bonding for Electrical Systems.
D. Section 26 05 33 – Raceways and Boxes for Electrical Systems.
E. Section 26 05 53 – Identification for Electrical Systems.
F. Section 26 05 73 – Power System Studies.
G. Section 26 08 00 – Commissioning of Electrical Systems.
H. Section 26 43 00 – Surge Protective Devices.

1.3 REFERENCES
A. UL 67, UL 98, UL 489, UL 891.
B. NEMA PB 1; NEMA KS 1; NEMA ICS 2/5/6.
C. IEEE 1015 (Blue Book) as applicable.
D. Title 10 CFR Part 431 – Distribution transformer efficiency.

1.4 QUALITY ASSURANCE
A. Provide new equipment of current manufacture; each type from a single manufacturer unless noted otherwise.
B. Equipment shall be UL listed and labeled for the intended application. Service-entrance equipment shall bear the UL Service Entrance label.
C. Provide assemblies that are fully rated for the available fault current unless series ratings are expressly indicated. Where series ratings are used, provide UL-listed combinations and field marking per NEC.

1.5 SUBMITTALS
A. Product data for each equipment type, indicating ratings, short-circuit current rating/interrupting capacity, enclosure type, bussing, trip units, and accessories.
B. Shop drawings: scaled equipment-room layouts showing clearances, working space, and coordination with other systems.
C. Indicate whether assemblies are fully rated or series rated (if allowed).
D. Protective device information: trip-unit types and recommended settings for electronic breakers furnished.

E. Closeout: as-built one-line, O&M manuals, final protective settings, and study deliverables per Section 26 05 73.

1.6 COORDINATION

A. Before ordering disconnects, fuses/fuseholders, breakers, whips, conductors, and related accessories for vendor-furnished equipment, verify each unit's MCA (minimum circuit ampacity) and MOCP (maximum overcurrent protection) from the approved equipment submittals. Select and furnish branch-circuit conductors, overcurrent devices, and disconnect ratings that comply with both the NEC and the equipment manufacturer's requirements.

B. Where the nameplate or submittal specifies "maximum fuse" or "fuse only," provide listed fuses and fuseholders of the required class and time-delay characteristics. Where a circuit breaker is permitted, provide an inverse-time breaker with an interrupting rating not less than the available fault current at the point of connection.

C. Adjust upstream breaker ratings, branch-circuit conductor sizes, flexible whip sizes, and disconnect ratings/enclosures as required to meet the verified MCA/MOCP and the selected overcurrent device. Do not exceed the equipment MOCP and do not size conductors below MCA.

D. Coordinate with the Mechanical Contractor to confirm enclosure type (e.g., NEMA 3R for rooftop), short-circuit current rating (SCCR) of the equipment, and any integral supplemental protection. Verify that the available fault current at the equipment does not exceed the equipment SCCR.

1.7 SHORT-CIRCUIT CURRENT RATINGS

A. Mark equipment with maximum short-circuit current rating (SCCR). Assemblies shall withstand and devices shall interrupt the available fault current at the point of installation.

B. Provide UL test basis for any series ratings if specifically used and field-mark equipment accordingly.

1.8 POWER SYSTEM STUDIES

A. Provide short-circuit and protective device coordination in accordance with Section 26 05 73, including time-current curves and device settings for adjustable devices where furnished.

1.9 OWNER TRAINING

A. Provide switchboard/panelboard orientation and maintenance review at completion. Provide O&M manuals on site training.

1.10 FIRE-PUMP POWER-SYSTEM COORDINATION

A. Coordinate final pump motor horsepower, voltage, controller starting method, controller service rating, locked-rotor current, controller SCCR, utility transformer data, and feeder length before procurement. Provide the project-specific starting- and running-voltage verification required by NEC 695.7 and verify that the controller SCCR is not less than the available fault

current. Include the fire-pump power source and controller in the short-circuit, protective-device coordination, and arc-flash studies required by Section 26 05 73. Apply study recommendations without compromising the fire-pump power-supply requirements of NEC Article 695 or the controller listing.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Acceptable manufacturers (gear family consistency preferred): Schneider Electric (Square D), Siemens, Eaton (Cutler-Hammer), ABB/GE.
B. Fuses: Bussmann (Eaton), Littelfuse, or Mersen (Ferraz Shawmut).
C. Dry-type transformers: major listed manufacturers providing the specified efficiency.

2.2 GENERAL REQUIREMENTS

A. Provide copper bussing in panelboards and switchboards.
B. Provide dry-type transformers with copper windings.
C. Enclosures: NEMA 1 for interior dry locations; NEMA 3R for exterior/wet; NEMA 4X where corrosive; factory gray finish. Touch up damaged finishes to match factory.
D. Field finish repair: Where finish is marred or abraded, clean and degloss, remove rust/contaminants to sound metal, prime with a manufacturer-compatible primer, and touch up with the OEM touch-up system to restore an “as new” appearance.
E. Extensive damage: Where damage exceeds touch-up limits or corrosion has penetrated base metal, refinish per the OEM finish system or replace the affected section.
F. Do not paint over nameplates, rating labels, hinges, gaskets, or ventilation openings.
G. Provide identification and nameplates per Section 26 05 53.
H. Equipment interrupting ratings, withstand ratings, and short-circuit current ratings shall not be less than the available fault current indicated by the approved short-circuit study under Section 26 05 73. Ratings shown on Drawings are minimum requirements and shall be increased where required by final utility data or approved study.

2.3 PANELBOARDS – DISTRIBUTION AND BRANCH

A. NEMA PB 1; bolt-on circuit breakers; copper bus; full-length equipment ground and neutral. Provide 200% neutral for isolated-ground/computer panels where indicated.
B. Provide main breakers on distribution panels as indicated; electronic trip with adjustable long/short/instantaneous (LSI) where shown.
C. Provide typed directories and locks; key alike across the project.
D. Panelboards shall be provided with door-in-door trim or hinged trim providing access to circuit breakers without removal of the deadfront. Door-in-door or hinged trim shall be provided for branch panelboards, distribution panelboards, and power panelboards unless specifically unavailable for the specified equipment type and approved by Architect/Engineer prior to procurement.

E. Provide fully rated copper bus, bolt-on breakers, isolated neutral bars where required, equipment grounding bar, and lugs suitable for conductor material indicated.
F. Provide minimum short-circuit interrupting rating as indicated on Drawings or as required by Section 26 05 73, whichever is greater.
G. Distribution panelboards, power panelboards, and I-Line type panelboards shall be UL 67 listed, dead-front construction, with copper bus, fully rated bus bracing, equipment grounding bar, neutral bar where required, bolt-on or plug-on circuit breakers specifically listed for use in the panelboard, and short-circuit rating not less than the available fault current indicated by the approved short-circuit study.
H. Where panelboards include main circuit breakers, feeder breakers, electronic trip breakers, LSIG breakers, LSI breakers, ground-fault protection, maintenance-mode functions, or other adjustable protective devices, provide trip units, sensors, rating plugs, accessories, control power, indication, labeling, and wiring required for complete operation. Final settings shall be determined by the approved power system study under Section 26 05 73 and applied prior to energization.
I. Panelboard interrupting ratings, bus bracing, short-circuit current ratings, and circuit breaker interrupting ratings shall not be less than the available fault current at the point of installation. Ratings shown on Drawings are minimum requirements and shall be increased where required by final utility data or the approved power system study.

2.4 SWITCHBOARDS
A. UL 891 switchboards; front/rear access as indicated; sections bus-connected (no inter-section cable ties). Provide copper bus, full-length ground, and full-size neutral unless noted otherwise.
B. Main and feeder circuit breakers shall be molded-case or insulated-case circuit breakers with trip units as indicated on the Drawings. Where LSIG, LSI, electronic trip, ground-fault protection, maintenance mode, energy-reducing maintenance switch, or other adjustable protective function is indicated, provide trip unit, sensors, rating plug, accessories, control power, indication, and wiring required for complete operation. Final settings shall be determined by the approved power system study under Section 26 05 73 and applied prior to energization.

2.5 TRANSFORMERS (DRY-TYPE)
A. NEMA ST-20, UL 1561; ventilated dry-type; DOE efficiency per Title 10 CFR Part 431.
B. Provide taps ±2.5% (minimum 2 up/2 down).
C. Sound levels per NEMA ST-20.
D. K-rated transformers for nonlinear loads as indicated (e.g., K-13). Provide 200% neutral for K-rated applications.
E. Provide grounding and bonding for separately derived systems in accordance with Section 26 05 26 and NEC 250.30.
F. Provide vibration isolation pads, flexible raceway connections where permitted, and installation clearances required by manufacturer.
G. Coordinate transformer primary and secondary conductor sizes, overcurrent protection, tap

settings, inrush characteristics, and grounding with Drawings and Sections 26 05 19, 26 05 26, and 26 05 73.

2.6 SAFETY SWITCHES AND ENCLOSED CIRCUIT BREAKERS

A. Heavy-duty enclosed switches with visible blades, lockable OFF position, horsepower ratings suitable for the load, and enclosure rating suitable for installed location. Provide fused switches where indicated or where equipment manufacturer requires fuses. Fuse class, rating, and time-delay characteristics shall match equipment manufacturer requirements, Drawings, and Section 26 05 73.

B. Provide enclosed circuit breakers where shown with interrupting capabilities as indicated and accessories required (shunt trip, auxiliary contacts, etc.).

2.7 CIRCUIT BREAKERS

A. UL 489 molded-case circuit breakers; provide thermal-magnetic and electronic types as indicated. Provide features per drawings, including GFCI, shunt trip, auxiliary contacts, metering, communications, ground-fault protection, maintenance-mode functions, and energy-reduction functions where indicated or required.

B. Electronic trip circuit breakers shall be field-adjustable and shall be set in accordance with the approved Protective Device Settings Table prepared under Section 26 05 73. Factory default settings shall not be used as final settings unless specifically confirmed by the approved study. Contractor shall coordinate trip unit type, sensor rating, rating plug, available settings, ground-fault protection, maintenance-mode functions, communication/accessory requirements, and labeling with the power system study.

C. Main circuit breakers shall include LSIG electronic trip units with adjustable long-time pickup, long-time delay, short-time pickup, short-time delay, instantaneous pickup, ground-fault pickup, and ground-fault delay functions where indicated. Final settings shall be determined by the approved power system study and applied prior to energization.

D. Provide energy-reduction means for arc-energy reduction for circuit breakers where required by NEC 240.87 and where indicated, including energy-reducing maintenance switch with local status indicator, zone-selective interlocking, differential relaying, energy-reducing active arc-flash mitigation system, or other approved method. Coordinate method and settings with Section 26 05 73.

E. Provide ground-fault protection of equipment for solidly grounded wye electrical services and feeders where required by NEC, Drawings, or Authority Having Jurisdiction. Provide ground-fault sensors, trip units, test provisions, indication, and accessories required for complete operation. Coordinate settings and testing with Sections 26 05 73 and 26 08 00.

2.8 FUSES

A. Provide fuses of one manufacturer for each class; Class RK-1 (≤600 A) and Class L (≥601 A) time-delay unless noted otherwise.

B. Provide spare fuses equal to 10 percent of each type and size furnished, minimum two of each.

2.9 MOTOR CONTROLLERS / MOTOR CONTROL CENTERS (WHEN APPLICABLE)
A. NEMA ICS 2 controllers with HOA, overload protection, and accessories as indicated.
B. MCCs: UL 845; copper bus; short-circuit rating as shown; dead-front sections on housekeeping pad; provide unit space factors as indicated.

2.10 SERVICE AND METERING APPURTENANCES (WHEN REQUIRED)
A. Coordinate with the serving utility for service type, transformer requirements, secondary enclosures, metering/transocket, and applicable charges. Provide pads, ducts, and conductors per utility requirements.
B. Cable tap box (if required by utility): weatherproof, tamper-resistant, copper bus, short-circuit rating per utility; dual-compartment utility/customer configuration where required.

2.11 SPECIALTIES (AS APPLICABLE)
A. Provide shunt-trip provisions and interlocks for kitchen hoods and similar systems where indicated; coordinate control wiring and interfaces with the appropriate divisions.

PART 3 – EXECUTION

3.1 INSTALLATION
A. Set equipment plumb, straight, and level. Maintain NEC working clearances. Anchor per manufacturer instructions. Provide grounding and bonding per Section 26 05 26.
B. Mount floor-mounted gear on 4-inch concrete housekeeping pads unless noted otherwise; provide exterior pads per details.
C. Mount panelboards with top breaker not higher than 6 feet 7 inches above finished floor. Provide working space and clearances per NEC 110 and 408.

3.2 STORAGE AND HANDLING
A. Protect equipment from moisture, dirt, and damage. Store indoors in a clean, dry area; keep shipping skids in place until equipment is set. Where enclosures are furnished with factory anti-condensation heaters, energize upon receipt and keep energized during storage; provide temporary power as required.
B. If equipment is exposed to water, corrosive contaminants, or physical impact, do not energize. Notify the Architect/Engineer and arrange inspection by the manufacturer or authorized service. Perform cleaning/drying and replace components as recommended.
C. After remediation, perform acceptance tests appropriate to the equipment and submit written certification from the manufacturer/authorized service that the equipment is suitable for continued service and the warranty remains intact.
D. If satisfactory test results and certification cannot be obtained, replace the affected equipment.

3.3 GROUND-FAULT PROTECTION OF EQUIPMENT

A. Provide system performance testing and documentation for ground-fault protection of equipment where furnished. Submit test forms and instructions retained for Owner and Authority Having Jurisdiction.

3.4 TRANSFORMERS – VIBRATION AND VENTILATION
A. Provide vibration isolation per manufacturer recommendations (pads or springs as appropriate). Maintain ventilation openings and clearances as marked by manufacturer.

3.5 KITCHEN HOODS (WHEN APPLICABLE)
A. Provide shunt-trip of electrical sources under hoods upon extinguishing-system operation. Coordinate with fire alarm and mechanical trades.

3.6 ADJUSTING AND FINAL SETTINGS
A. Balance panelboard loads by phase under operating conditions and update directories accordingly.
B. Set transformer taps to achieve proper secondary voltage under load; record final tap positions.
C. Adjustable protective devices shall be set to the approved settings from Section 26 05 73 prior to energization. Factory default settings shall not be used as final settings unless specifically confirmed by the approved study. Record final settings, provide settings placards inside equipment doors, and include documentation in closeout submittals.

3.7 IDENTIFICATION
A. Provide nameplates, labels, and directories per Section 26 05 53.

3.8 FIELD QUALITY CONTROL
A. Inspect distribution equipment for proper installation, anchorage, alignment, clearances, grounding and bonding, conductor terminations, phase identification, labeling, barriers, covers, and cleanliness.
B. Verify torque of bolted electrical connections in accordance with manufacturer’s instructions and Section 26 05 00.
C. Verify overcurrent protective device types, ratings, interrupting ratings, trip units, accessories, and settings match approved submittals and Section 26 05 73.
D. Perform ground-fault protection testing where ground-fault protection of equipment is provided. Submit test reports and settings documentation.
E. Coordinate startup, functional performance testing, documentation, and Owner training with Section 26 08 00 where commissioning is required.

END OF SECTION

SECTION 26 27 26 – WIRING DEVICES

PART 1 – GENERAL

1.1 SUMMARY
A. Provide factory-fabricated wiring devices and associated plates, including switches, receptacles, USB charger receptacles, specialty receptacles, device plates and box covers.
B. Devices shall be specification grade and installed in outlet boxes of adequate size and volume for the device, conductors, and wiring method.

1.2 RELATED REQUIREMENTS
A. Section 26 05 19 – Low-Voltage Conductors and Cables.
B. Section 26 05 33 – Raceways and Boxes for Electrical Systems.
C. Section 26 05 53 – Identification for Electrical Systems.
D. Section 26 09 23 – Lighting Control Devices (networked/0–10 V dimming and sensors).

1.3 REFERENCES
A. NEMA WD 1 – General Purpose Wiring Devices; NEMA WD 6 – Wiring Device Configurations.
B. UL 20 – General Use Snap Switches; UL 498 – Attachment Plugs and Receptacles; UL 943 – Ground-Fault Circuit-Interrupters; UL 1310 – Class 2 Power Units.
C. NFPA 70 – National Electrical Code (NEC), including 210, 314, 404, 406, and 406.9.

1.4 SUBMITTALS
A. Product data: device ratings, configurations, colors/finishes, and accessories. Indicate GFCI/AFCI/WR/TR listings where applicable.
B. Shop drawings: device schedule keyed to drawings, identifying color/finish, label text, and plate type by room/space as required.
C. Closeout: as-built device locations and final labeling engravings/legends where used.

1.5 QUALITY ASSURANCE
A. Devices for a given type (switches, receptacles, plates) shall be furnished from a single manufacturer per project to ensure color/finish match unless noted otherwise. Provide devices of a single color/finish throughout each project, unless otherwise noted.
B. Provide specification-grade, heavy-duty devices, 20 A minimum unless indicated otherwise; screw terminals only (no push-in connections).
C. All devices and plates shall be listed and suitable for the environment (e.g., WR for wet/outdoor).

1.6 COORDINATION
A. Owner location adjustment allowance: Prior to rough-in and concealment, the Owner may direct minor adjustments to device locations at no added cost, provided all of the following are met.

1. Timing: Direction is issued before devices/raceways are rough-in complete and before concealment (gypsum board, tile, paneling) and, for floor boxes, before slab placement.
2. Distance:
   a. Wall devices (switches/receptacles): within 10 feet horizontally of the location shown and within the same room.
   b. Above-counter devices: within 3 feet horizontally along the same counter/backsplash run.
   c. Floor boxes: within 24 inches prior to slab pour (coordinate with rebar/PT).
3. No scope change: Device type, quantity, rating, and circuit remain the same; no additional circuits or homeruns are created; raceway sizes need not increase.
4. No special construction impacts: No new core drilling, trenching, structural penetrations, or cutting of rated assemblies beyond normal box openings; no added firestopping beyond standard.
5. Code/ADA: Revised locations must maintain NEC clearances and ADA reach ranges.
6. Environment: Enclosure/plate type remains suitable for the environment (e.g., WR/extra-duty covers still provided outdoors).
7. One-time move: Limit one no-cost adjustment per device; any subsequent relocation of the same device is a change order.
8. Documentation: Contractor updates device layout on shop drawings and records changes on as-builts.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Wiring devices and plates: Legrand/Pass & Seymour, Leviton, or Hubbell; or equal.

B. Weatherproof boxes and covers: Hubbell/Bell (TayMac), Leviton, Pass & Seymour, Arlington; or equal.

C. Cord reels (when indicated): Reelcraft, Coxreels, Hubbell, Woodhead/Legrand; or equal.

2.2 GENERAL REQUIREMENTS

A. Provide devices of the correct NEMA configuration and voltage rating for the load served. Grounding yokes and terminals provided on all grounding-type devices.

B. Tamper-Resistant (TR): Provide TR receptacles in locations required by NEC 406; exceptions only where specifically indicated (e.g., dedicated, inaccessible, or above 5 ft 6 in AFF where permitted).

C. GFCI/AFCI: Provide GFCI and AFCI protection where required by NEC and as shown. Where GFCI receptacles are used, provide self-test, auto-monitoring type with end-of-life indication.

D. Color/Finish: Coordinate with Owner. Provide red devices/plates for emergency circuits where indicated.

E. Plates: In finished areas provide smooth nylon plates; in gang toilets, mechanical spaces, kitchens, gyms, unfinished and above accessible ceilings provide 302 stainless-steel plates. Use

one-piece multi-gang plates for ganged devices. Provide jumbo plates where needed to fully cover wall openings (match plate size throughout the room).
F. Identification: Provide device and plate labeling per Section 26 05 53. Identify emergency devices with panel and circuit number on plate where indicated.

2.3 AC / TOGGLE SWITCHES
A. Quiet-type snap switches, 20 A, 120/277 V, complying with UL 20 and Federal Specification WC 896.
B. Configurations: single-pole, double-pole, three-way, four-way; pilot-light and locator types where indicated.
C. Key-operated switches: barrel/captive-key type, keyed alike per Owner; provide two keys per switch and stainless-steel plate.
D. Motor-rated switches (local disconnect where indicated): heavy-duty, horsepower-rated; 2-pole or 3-pole as scheduled.
E. Basis of Design/Acceptable series (toggle style): Leviton 1221/1222/1223/1224; Hubbell CS1221/CS1222/CS1223/CS1224; Pass & Seymour CS20AC1/2/3/4; or equal.

2.4 RECEPTACLES
A. Duplex receptacles: NEMA 5-20R, specification grade, heavy duty, back- and side-wire; comply with UL 498 and Federal Specification WC 596.
B. Basis of Design (standard 5-20R): Pass & Seymour 5362; Leviton 5362; Hubbell HBL5362; or equal.
C. TR duplex 5-20R: Pass & Seymour TR5362; Leviton TBR20; Hubbell HBLTR5362; or equal.
D. WR TR duplex (non-GFCI): Pass & Seymour WRTR5362; Leviton WRTR20; Hubbell HBL5362WTR; or equal.
E. Isolated-ground (IG) receptacles: Provide where indicated. Orange face with triangle marking; grounding contact isolated from mounting strap. Provide separate insulated equipment grounding conductor back to the IG panel or point indicated.
F. GFCI receptacles: NEMA 5-20R duplex, self-test, auto-monitoring type, with indicator and end-of-life notification. Provide at each required location; do not use feed-through to protect downstream devices unless specifically shown. Basis families: Pass & Seymour GFRST20; Leviton GFRST20; Hubbell GFRST20; or equal.
G. SPD receptacles (when indicated): Specification grade, integral Type 3 SPD with indicator.
H. USB charger receptacles (when indicated): Duplex NEMA 5-20R with integral dual USB Type-A and Type-C charging ports; UL 1310; TR; 5 V combined output as recommended by manufacturer for phones/tablets.

2.5 WEATHERPROOF DEVICES (EXTERIOR / WET / DAMP)
A. Provide WR receptacles and listed weatherproof covers outdoors and in wet locations per NEC 406.9. Provide extra-duty, while-in-use covers at 15/20 A receptacles exposed to weather.
B. Provide WR self-test GFCI protection at required outlets using WR GFCI devices or GFCI breakers as shown.

C. Weatherproof boxes: cast metal or nonmetallic with gaskets; hubs/reducers listed for wet locations.
D. Acceptable in-use covers (families): Hubbell/Bell (TayMac) extra-duty MM/5200 series; Leviton in-use series; Pass & Seymour/Legrand RWUI; or equal.
E. Provide WP/GFCI in-use covers at exterior areas where receptacles are subject to weather, in addition to NEC 406.9 requirements.

2.6 CORD REELS (WHEN INDICATED)
A. Spring-return industrial cord reels; steel housing; ratchet with positive stop; adjustable roller guide; field-replaceable slip ring rated not less than 20 A.
B. Cable: 12/3 SJEOOW or SJOOW, black, length as shown; ball stop and strain relief at device end.
C. Device end: NEMA 5-20R single receptacle or twist-lock as scheduled; hanging cord drop with guard.
D. Finish: factory enamel; ceiling or wall mounting brackets as required.
E. Acceptable manufacturers: Reelcraft, Coxreels, Hubbell, Woodhead/Legrand; or equal.

2.7 ACCESSORIES
A. Barrier for mixed voltages: Provide permanent barrier when 277-V switches are ganged with 120-V switches in the same box.
B. Handle ties or common-trip breakers for multi-wire branch circuits per NEC.

PART 3 – EXECUTION

3.1 PREPARATION
A. Clean debris from outlet boxes prior to installing devices. Verify ring depths to achieve flush plates with finished surfaces.

3.2 INSTALLATION
A. Install devices plumb and level. Install switches with OFF position down. Install receptacles pin down.
B. Do not install flush boxes back-to-back in walls; provide minimum 24 inches separation.
C. Provide stainless-steel plates on outlets in unfinished areas, above accessible ceilings, and on surface-mounted outlets.
D. Make terminations with conductor wrapped under screw terminals (or per device listing). Torque terminals per manufacturer’s instructions.
E. Do not install devices behind millwork, markerboards, or fixed equipment. Confirm finish locations with Architectural drawings; relocate at Contractor’s cost where installed in unsuitable locations.
F. Coordinate mounting heights with drawings; where not indicated, install per ADA and project standards (see 26 05 33 – RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS).

3.3 GFCI/AFCI APPLICATION

A. Provide GFCI and AFCI protection where required by NEC and as shown. Where GFCI protection is provided by a breaker, provide a standard receptacle at the outlet and affix “GFCI PROTECTED” label.

3.4 FIELD QUALITY CONTROL

A. Verify device heights, alignment, and plate coverage.

B. With circuits energized, verify switch operation; test each receptacle for correct polarity and ground. Test each GFCI for proper operation.

C. Correct deficiencies and replace damaged devices and plates.

3.5 ADJUSTING

A. After painting and finish work, adjust devices and plates to be flush and level. Replace marred plates to match new work.

END OF SECTION

SECTION 26 43 00 – SURGE PROTECTIVE DEVICES

PART 1 – GENERAL

1.1 SUMMARY
A. Provide surge protective devices (SPDs) as indicated on the drawings, as required in NEC Article 242, and as indicated in Part 3.1 – Application.
B. Provide SPDs for electrical power distribution equipment under Division 26. Provide telephone, data, security, fire alarm, controls, and other low-voltage system SPDs only where specifically indicated on the Drawings or required by the respective Division 27 or Division 28 system specifications.

1.2 RELATED REQUIREMENTS
A. Division 26 – Electrical.
B. Section 26 05 26 – Grounding and Bonding for Electrical Systems.
C. Section 26 05 53 – Identification for Electrical Systems.
D. Section 26 20 00 – Low-Voltage Electrical Distribution.
E. Section 26 27 26 – Wiring Devices.
F. Divisions 27 and 28 – Communications and Electronic Safety and Security, for low-voltage/data/security surge protection where required.

1.3 REFERENCES
A. ANSI/IEEE C62 – Guides and Standards for Surge Protection.
B. IEEE 1100 – Recommended Practice for Powering and Grounding Electronic Equipment.
C. NFPA 70 – National Electrical Code (NEC).
D. UL 497 – Paired Conductor Communications Circuits.
E. UL 1283 – Electromagnetic Interference Filters.
F. UL 1449 – Surge Protective Devices (Type 1–3).

1.4 ABBREVIATIONS
A. In – Nominal Discharge Current.
B. MCOV – Maximum Continuous Operating Voltage.
C. SCCR – Short Circuit Current Rating.
D. VPR – Voltage Protection Rating (clamping voltage).

1.5 SUBMITTALS
A. Product data: Device specifications, UL 1449 listing evidence, and third-party testing letters.
B. Include maximum surge current rating, surge life rating, clamping voltage (VPR), nominal discharge current (In), and SCCR.
C. Test reports: Let-through voltage test data and verification of surge current withstand ratings; spectrum analysis per MIL-STD-220B.
D. Manufacturer’s installation instructions.
E. Certificates of compliance.

1.6 QUALITY ASSURANCE
A. SPDs shall be listed to UL 1449 and UL 1283 by an OSHA-approved NRTL (UL, ETL, CSA).
B. Provide all SPDs of each type from a single manufacturer.
C. SPDs shall comply with NEC Article 242 and be permanently marked with SCCR.

D. Provide devices with integral noise filtering (minimum 45 dB attenuation at 100 kHz per MIL-STD-220B).

1.7 CLOSEOUT SUBMITTALS
A. Provide cut sheets and warranty information for all SPDs provided.

PART 2 – PRODUCTS

2.1 MANUFACTURERS
A. Subject to compliance, provide products by one of the following:
1. ABB (GE).
2. Eaton (Cutler-Hammer).
3. Schneider Electric (Square D).
4. Siemens / Advanced Protection Technologies.
5. Mersen.
6. nVent Erico.
7. Surge Suppression Inc. (SSI/ILSCO).
8. Leviton.
9. Hubbell.

2.2 EQUIPMENT
A. Technology: Metal Oxide Varistor (MOV) construction, bidirectional.
B. Protection Modes: Provide all modes of protection appropriate for the system configuration, including line-to-neutral, line-to-ground, neutral-to-ground, and line-to-line modes for wye systems, or line-to-ground and line-to-line modes for delta systems, as applicable.
C. Upstream protection: Provide UL-rated fuse or disconnect.
D. Filtering: EMI/RFI filtering to ≥ 45 dB attenuation at 100 kHz (per MIL-STD-220B).
E. Indicators and Monitoring:
1. Service entrance and major distribution SPDs shall include LED status indicators, audible alarm with silencing switch, dry contacts for remote monitoring, and push-to-test or self-test feature where available.
2. Surge event counter shall be provided for service entrance SPDs where available from the manufacturer as a standard or optional accessory.
3. Panelboard and equipment-level SPDs shall include visual protection status indication at minimum. Audible alarm, dry contacts, event counter, and remote monitoring shall be provided only where indicated or where furnished as manufacturer’s standard.
F. Mounting: Internal or external at panel served.
G. Listing: UL 1449 Type 1, 2, or 3 per application.
H. SCCR of SPD shall not be less than the available fault current at point of installation as determined by Section 26 05 73.

2.3 RATINGS BY APPLICATION
A. Service entrance:
1. Modular, field replaceable; NEMA rated.
2. UL 1449 Type 1 or 2; In = 20 kA.
3. Maximum single impulse surge rating: 135 kA per mode.
4. Life cycle: IEEE C62.41.2 C3 – 10 kA/phase at ≥ 20,000 impulses.
5. SCCR: 200 kAIC minimum.
B. Panelboards:

1. UL 1449 Type 2; In = 20 kA.
2. Maximum single impulse surge rating: 65 kA per mode.
3. Life cycle: IEEE C62.41.2 C3 – 10 kA/phase at ≥ 5,000 impulses.
4. SCCR: 100 kAIC minimum.

C. Outdoor mechanical equipment:
1. NEMA 4X enclosure, nipple mounted.
2. UL 1449 Type 2; In = 20 kA.
3. Maximum single impulse surge rating: 25 kA per mode.
4. Life cycle: IEEE C62.41.2 C3 – 10 kA/phase at ≥ 2,500 impulses.
5. SCCR: 65 kAIC minimum.

D. Receptacles with integral Type 3 SPD: See Section 26 27 26.

E. Low-voltage/telecom/data:
1. Comply with UL 497/497A/497B/497C.
2. Technology: Gas Tube, Silicon Avalanche Diode (SAD), or hybrid.
3. Rated line voltages: 150 V phone, 24 V data/control.
4. Clamp voltage: ≤ 300 V (tip/ring-ground).
5. Maximum surge: 10 kA, 1000+ impulses.

F. Voltage ratings per UL 1449:
1. 120/240 V or 120/208 V systems: MCOV 150 V; VPR 800 V (L-N, L-G), 1200 V (L-L).
2. 240/480 V or 277/480 V systems: MCOV 320 V; VPR 1200 V (L-N, L-G), 1800 V (L-L).
3. 480 V delta systems: MCOV 600 V; VPR 1800 V (L-G), 3000 V (L-L).

PART 3 – EXECUTION

3.1 APPLICATION

A. Provide SPDs at the following:
1. Each service entrance.
2. Each computer/isolated ground/nonlinear panelboard.
3. All emergency system switchboards and panelboards.
4. Each panelboard noted on drawings.
5. All rooftop units and packaged units mounted on the ground.
6. One SPD receptacle at each Energy Management/Controls Panel.
7. Each new incoming telecom, video, data, or alarm line.
8. In or on each fire pump controller (per NEC 695.15).

3.2 INSTALLATION

A. Install per manufacturer’s instructions and IEEE 1100.

B. Mount externally adjacent to panel if not integral; minimize lead length per manufacturer. Conductors shall be as short and straight as practical, with no sharp bends or unnecessary loops. Do not exceed manufacturer’s maximum lead length. Where externally mounted, locate SPD immediately adjacent to equipment served.

C. Connect via dedicated breaker or directly to bus as recommended.

D. Provide proper grounding and bonding per NEC 242.

E. Verify status indicators and alarms functional after installation.

END OF SECTION

SECTION 26 50 00 – LIGHTING

PART 1 – GENERAL

1.1 SUMMARY
A. Section includes interior and exterior lighting fixtures, LED light sources, drivers, emergency battery packs where indicated, exit signs where included in fixture schedule, poles and pole-mounted luminaires where indicated, mounting accessories, and appurtenances required for a complete installation.
B. Furnish lighting fixtures as scheduled on Drawings. Fixtures shall comply with requirements of this Section.
C. Related work specified elsewhere includes:
1. Common work results for electrical.
2. Equipment wiring connections.
3. Low-voltage electrical power conductors and cables.
4. Raceway and boxes for electrical systems.
5. Wireless network lighting controls.
6. Identification for electrical systems.
7. Concrete work for pole bases, where applicable.
D. Lighting fixtures, drivers, fixture-integral control modules, sensors, and accessories shall be coordinated with Section 26 09 43 – Wireless Network Lighting Controls.

1.2 REFERENCES
A. Comply with the latest adopted editions of applicable codes and standards, including the following:
1. NFPA 70.
2. UL standards applicable to luminaires, drivers, emergency equipment, and exit signs.
3. NEMA standards applicable to lighting products and enclosures.
4. NFPA 101 for emergency illumination and exit signage where applicable.
5. Section 26 09 43—Wireless Network Lighting Controls

1.3 SUBMITTALS
A. Product Data: Submit manufacturer’s product literature for each fixture type proposed. Include:
1. Dimensions.
2. Voltage.
3. Mounting type.
4. Driver characteristics.
5. Input wattage.
6. Delivered lumens or lumen package.
7. Color temperature.
8. CRI.
9. Listings and ratings.
10. Lens, trim, housing, and finish data.
11. Emergency battery pack data where applicable.
12. Dimming driver type, dimming range, dimming protocol, minimum dimming level, and compatibility with specified wireless network lighting control system.

13. Fixture-integral wireless control modules, sensors, antennas, control wiring, interfaces, or accessories where provided.
14. Emergency lighting components, UL 924 interfaces, and emergency control compatibility where applicable.
B. Fixture Submittal Schedule: Submit fixture schedule identifying each proposed fixture type and clearly indicating deviations from fixture schedule shown on Drawings.
C. Lighting Controls Coordination: Submit written confirmation that proposed fixtures, drivers, dimming interfaces, fixture-integral control modules, emergency drivers, and accessories have been coordinated with Section 26 09 43 – Wireless Network Lighting Controls. Fixture submittals shall identify fixtures requiring fixture-integral wireless control modules, remote-mounted control modules, dimming drivers, emergency drivers, or UL 924 interfaces.
D. Photometric Data:
1. Submit manufacturer's photometric data for exterior luminaires and for interior luminaires where specifically requested.
2. Submit point-by-point calculations where indicated on Drawings or required to demonstrate emergency egress illumination or exterior design intent.
E. Shop Drawings: Submit mounting details, pole base interface information where applicable, and details for nonstandard installation conditions.
F. Operation and Maintenance Data: Submit manufacturer's maintenance literature, replacement part information, and cleaning recommendations.

1.4 QUALITY ASSURANCE
A. Provide luminaires listed and labeled for intended use.
B. Fixtures installed in outdoor areas unprotected from weather shall be listed for wet locations.
C. Fixtures installed in insulated ceilings shall be listed for such application where required by the installed condition.
D. Provide complete fixture assemblies with compatible trims, housings, LED boards/modules, drivers, accessories, and emergency components.
E. Provide products of the same type from a single manufacturer where practical to promote uniform appearance and maintenance.

1.5 WARRANTY
A. Provide manufacturer's standard warranty, not less than one year from date of Substantial Completion.
B. LED fixtures, LED boards/modules, and drivers shall be warranted for not less than five years.

PART 2 – PRODUCTS

2.1 GENERAL
A. Fixtures shall be as described in the fixture schedule on the Drawings and shall be furnished complete and properly installed.
B. Basis-of-design manufacturers shall be as scheduled on Drawings. Equivalent products may be submitted in accordance with Division 01 substitution requirements, provided proposed products match scheduled requirements for form, fit, function, dimensions, mounting, electrical characteristics, photometric performance, finish, controls compatibility, and listing.
C. Provide complete factory-fabricated luminaires with housings, trims, reflectors, lenses, louvers, LED modules, drivers, mounting brackets, plaster frames, support accessories, and accessories required for a complete installation.

D. Fixtures, LED drivers, emergency drivers, fixture-integral wireless control modules, sensors, dimming interfaces, and accessories shall be fully compatible with Section 26 09 43 – Wireless Network Lighting Controls.
E. Where fixture-integral wireless control modules are indicated or required for the lighting control system, coordinate factory installation with fixture manufacturer and lighting controls vendor. Remote-mounted control modules shall be provided only where fixture-integral modules are not available or not suitable for the application.
F. Fixture substitutions shall not be accepted where proposed fixtures, drivers, emergency components, or control accessories are not compatible with the specified wireless network lighting control system.

2.2 LED FIXTURES
A. Interior and exterior luminaires shall be LED type unless specifically noted otherwise.
B. Minimum fixture requirements unless noted otherwise on Drawings:
1. Voltage as indicated on Drawings.
2. Minimum CRI of 80.
3. Color temperature as scheduled on Drawings. Where not scheduled, provide 3500K unless otherwise required by project conditions.
4. Driver compatible with Section 26 09 43 – Wireless Network Lighting Controls, including dimming protocol, dimming range, minimum dimming level, control module interface, and emergency lighting control requirements where applicable.
5. Suitable for installed environment.
6. Factory finish, color as standard unless noted otherwise.
7. Provide fixture-integral or remote-mounted wireless control module interface where required for complete lighting control operation.
C. Exterior fixtures and fixtures exposed to outdoor conditions shall be listed and rated for such service.
D. Fixtures exposed to outdoor temperatures shall be rated for 0 degrees F operation minimum.

2.3 DRIVERS
A. Drivers shall be integral to the fixture or remote-mounted where approved by the fixture manufacturer.
B. Drivers shall be fully compatible with the fixture and with Section 26 09 43 – Wireless Network Lighting Controls.
C. Dimming drivers shall be provided where fixtures are indicated to dim, where required by code, or where required for proper operation with the specified wireless network lighting control system.
D. Dimming drivers shall be compatible with the dimming method, control module, low-end trim, high-end trim, and control sequence required by Section 26 09 43.
E. Drivers shall be replaceable where fixture construction permits.
F. Coordinate driver selection with emergency battery packs, UL 924 devices, fixture-integral wireless control modules, and remote-mounted control modules.

2.4 FIXTURE-INTEGRAL WIRELESS CONTROL MODULES
A. Where indicated or required for the wireless network lighting control system, provide fixture-integral wireless control modules factory-installed in luminaires.
B. Fixture-integral wireless control modules shall be compatible with Section 26 09 43 – Wireless Network Lighting Controls and shall be coordinated with the lighting controls vendor.

C. Fixture-integral wireless control modules shall be accessible for service or replacement in accordance with manufacturer's instructions.
D. Provide antennas, leads, interfaces, sensors, labels, and accessories required for complete lighting control operation.
E. Where fixture-integral modules are not available or not suitable for the application, provide remote-mounted wireless control modules in accessible locations as coordinated with Section 26 09 43.

2.5 EMERGENCY LIGHTING COMPONENTS
A. Where indicated on Drawings or fixture schedule, provide integral emergency battery packs or other emergency power arrangement compatible with the fixture and controls.
B. Emergency battery packs shall be factory installed where available.
C. Emergency fixtures shall operate for code-required duration and shall provide required emergency illumination levels.
D. Emergency lighting components shall be compatible with wireless lighting controls, dimming drivers, emergency drivers, and UL 924 interfaces where applicable.
E. Lighting controls shall not defeat emergency lighting operation. Coordinate emergency lighting components with Section 26 09 43 – Wireless Network Lighting Controls.

2.6 EXIT SIGNS
A. Where included in fixture schedule, provide LED exit signs complete with directional arrows, mounting accessories, and battery backup where indicated.
2.6 Poles and Pole-Mounted Luminaires
A. Where indicated on Drawings, provide poles, pole-mounted luminaires, arms, handhole covers, anchor bolts, and appurtenances required for a complete installation.
B. Pole bases shall be coordinated with structural/concrete documents and fixture manufacturer requirements.

PART 3 – EXECUTION

3.1 INSTALLATION
A. Install fixtures in accordance with manufacturer's written instructions and the Contract Documents.
B. Support each fixture independently from the building structure in a neat and workmanlike manner.
C. Contractor shall review architectural finish schedules, reflected ceiling plans, and field conditions and shall furnish proper mounting accessories or trim as required to properly mount each fixture type.
D. Recessed fixtures shall be provided with mounting frames or rings as required and shall finish flush with ceiling surfaces without light leaks.
E. Install recessed ceiling luminaires at locations indicated on Drawings and reflected ceiling plans.
F. Install surface-mounted luminaires plumb, aligned with building lines, and secure against movement.
G. Coordinate fixture locations with mechanical diffusers, grilles, access panels, sprinkler heads, ceiling systems, and architectural features.
H. Install pole bases and pole-mounted fixtures at locations indicated on Drawings. Install poles plumb.

I. Junction boxes and fixture whips shall be installed in accordance with Division 26 requirements.
J. Coordinate installation of fixtures with wireless control modules, sensors, antennas, gateways, relay/dimming modules, emergency lighting interfaces, and control zones required by Section 26 09 43.
K. Do not release lighting fixtures for procurement until fixture driver and control module compatibility has been coordinated with lighting controls vendor.

3.2 FIELD QUALITY CONTROL
A. Test each fixture after installation to verify proper operation.
B. Verify proper operation of emergency fixtures and exit signs upon loss of normal power where applicable.
C. Replace defective fixtures, drivers, boards/modules, lenses, trims, and accessories prior to Substantial Completion.
D. Coordinate fixture testing with lighting controls vendor. Verify each fixture operates properly with the wireless network lighting control system, including switching, dimming, emergency operation where applicable, and control response.

3.3 ADJUSTING
A. Adjustable fixtures, both interior and exterior, shall be aimed and adjusted by the Contractor to illuminate intended areas as directed by Architect/Engineer.
B. Perform aiming of exterior or other directional fixtures during hours of darkness where necessary to verify final orientation and coverage.

3.4 CLEANING AND EXTRA MATERIALS
A. Clean fixtures after installation.
B. Replace damaged or blemished fixtures.
C. Provide spare materials to Owner at Substantial Completion as follows unless noted otherwise:
1. One spare driver of each type installed.
2. One spare LED board/module of each replaceable type installed.
3. Additional attic stock where specifically indicated on Drawings or required by specifications.

END OF SECTION

SECTION 27 05 33 – CONDUITS AND BACKBOXES FOR COMMUNICATIONS SYSTEMS

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes conduit, tubing, outlet boxes, pull and junction boxes, sleeves, and handholes for communications systems.

B. Provide complete raceway pathways for data, telecommunications, fiber optic, audiovisual, wireless access points, security, and other low-voltage systems.

C. Related requirements:

1. Section 26 05 26 – Grounding and Bonding.
2. Section 26 05 33 – Raceways and Boxes for Electrical Systems.
3. Section 26 05 53 – Identification for Electrical Systems.
4. Section 26 27 26 – Wiring Devices.
5. Section 26 43 00 – Surge Protective Devices.

1.2 REFERENCES

A. ANSI C80.1 – Rigid Steel Conduit, Zinc Coated.

B. ANSI C80.3 – Electrical Metallic Tubing, Zinc Coated.

C. ANSI C80.5 – Aluminum Rigid Conduit.

D. NEMA FB 1 – Fittings, Cast Metal Boxes, and Conduit Bodies.

E. NEMA OS 1 – Sheet Steel Outlet Boxes, Covers, and Supports.

F. NEMA OS 2 – Nonmetallic Outlet Boxes, Covers, and Supports.

G. NEMA RN 1 – PVC-Coated Galvanized Rigid Steel Conduit.

H. NEMA TC 2 – Electrical PVC Conduit.

I. NEMA TC 3 – PVC Fittings for Rigid PVC Conduit and Tubing.

J. TIA/EIA-568 – Commercial Building Telecommunications Cabling Standard.

1.3 DESIGN REQUIREMENTS

A. Raceway and boxes located as indicated on the drawings and as required for a complete communications cabling pathway.

B. Raceway minimum size: 3/4 inch unless otherwise indicated. Provide minimum 1 inch conduit to data, AV, and wireless outlet boxes.

C. Conduit fill shall not exceed 40 percent of interior cross-sectional area.

D. Provide spare capacity: maintain 25 percent spare space in sleeves, trays, and racks; i.e., for every four conduits installed, provide one spare. Spare conduits shall be capped and labeled.

E. Provide long-radius sweeps for all communications conduits to support copper and fiber optic cabling.

F. Provide pull boxes at intervals not exceeding 100 feet or after two 90-degree bends for fiber optic pathways.

1.4 SUBMITTALS

A. Product data: Submit catalog information for conduit, fittings, outlet boxes, pull/junction boxes, handholes, and sleeves.

B. Manufacturer’s installation instructions: Submit handling, storage, and installation requirements.

C. Firestopping: Submit UL 1479/ASTM E814 tested systems for all rated penetrations.

D. Closeout submittals: Record drawings showing actual conduit routing, outlet box locations, mounting heights, and spare conduits provided.

1.5 COORDINATION
A. Coordinate with architectural finishes, millwork, and casework to locate outlet boxes clear of conflicts.
B. Coordinate with Section 26 27 26 to ensure device plate alignment and finishes match adjacent electrical devices.
C. Coordinate box heights with countertops, benches, backsplashes, and other finished surfaces.
D. Coordinate ceiling box locations for wireless access points with IT contractor for proper Wi-Fi coverage.
E. Coordinate with Section 26 43 00 for routing conduits to support surge protective devices where required for telecom/data entrances.

PART 2 – PRODUCTS

2.1 CONDUIT AND TUBING
A. Rigid steel conduit: ANSI C80.1.
B. Intermediate metal conduit (IMC): Galvanized rigid steel.
C. Electrical metallic tubing (EMT): ANSI C80.3, steel, compression fittings.
D. Rigid aluminum conduit: ANSI C80.5.
E. Nonmetallic conduit: NEMA TC 2, Schedule 40 or 80 PVC as permitted. Avoid exposed use in projects requiring green building certification.
F. Fittings: Material to match conduit type; NEMA FB 1.
G. Flexible conduit: Use only where permitted, maximum 6 feet.

2.2 OUTLET BOXES
A. Sheet metal outlet boxes: NEMA OS 1, minimum 4-11/16 inch square with single-gang plaster ring for outlets.
B. Nonmetallic outlet boxes: NEMA OS 2.
C. Cast metal boxes: NEMA FB 1, Type FD with gasketed cover.
D. Provide minimum 1 inch conduit to all data, AV, and wireless outlet boxes unless otherwise noted.
E. Do not install back-to-back boxes in walls. Provide minimum 24 inch separation in acoustically rated walls.
F. Provide ceiling-mounted outlet boxes for wireless access points with 1 inch conduit stub to accessible ceiling space.

2.3 PULL AND JUNCTION BOXES
A. Sheet metal boxes: NEMA OS 1, galvanized steel.
B. Provide pull boxes at intervals not exceeding 100 feet for fiber optic conduit runs and where more than two 90-degree bends occur.
C. Provide hinged enclosures for large pull boxes in accessible locations.
D. Pull and junction boxes shall be installed no higher than 12 feet above finished floor unless access panels are provided.

PART 3 – EXECUTION

3.1 INSTALLATION – GENERAL
A. Install raceway and boxes in accordance with NECA 1, manufacturer’s requirements, and referenced standards.

B. Ground and bond per Section 26 05 26. Provide grounding bushings on metallic conduits entering telecommunications rooms.
C. Support raceway and boxes per Section 26 05 29. Conduit supports, strap spacing, and rack requirements shall be consistent with Division 26 electrical raceway standards.
D. Identify raceway and boxes per Section 26 05 53. Provide labeling specific to communications (e.g., blue conduit for data, green for telecom). Label with system type and destination.
E. Provide continuous conduit pathway from outlet box to nearest telecommunications room or cabinet.
F. Provide bushings, grommets, or other protective fittings at all conduit ends to protect cabling.
G. Provide sleeves through walls, floors, and roofs consistent with Division 26 requirements. Extend sleeves 2 inches above finished floors; cap spare sleeves until used.

3.2 INSTALLATION – RACEWAY
A. Arrange raceway to maintain headroom, avoid obstructions, and present neat appearance.
B. Route exposed raceway parallel and perpendicular to building lines. Route above ceilings in similar manner.
C. Maintain 12 inch clearance from piping and other hot surfaces exceeding 104°F.
D. Limit bends: Maximum of three 90-degree bends between pull points.
E. Provide long-radius bends or sweeps for conduits serving copper and fiber optic cabling.
F. Install pull string rated at 200 lb minimum tensile strength in each empty conduit.
G. Seal unused conduit ends and openings to prevent dust and moisture entry.

3.3 INSTALLATION – BOXES
A. Install outlet boxes at heights indicated on drawings; adjust prior to rough-in to accommodate finishes and devices.
B. Orient boxes to suit device mounting as specified in Section 26 27 26.
C. Do not install boxes back-to-back in partitions; maintain minimum separation as specified.
D. Support boxes independently of conduits.
E. Locate pull and junction boxes in accessible ceilings or unfinished areas only. Provide access panels where required.
F. Align adjacent outlet boxes with power outlets and switches where shown.

3.4 INTERFACE WITH OTHER WORK
A. Maintain fire-resistance ratings of walls, floors, and ceilings. Provide firestopping materials tested to UL 1479 or ASTM E814 for all penetrations. Firestopping installation shall comply with Division 26 firestopping requirements.
B. Coordinate roof penetrations with roofing contractor; provide pitch pockets or boots where required.
C. Coordinate box locations with architectural finish schedules and reflected ceiling plans.

3.5 FIELD QUALITY CONTROL
A. Verify routing and termination locations prior to cable installation.
B. Inspect all pathways for continuity, cleanliness, and protection prior to cable pull.
C. Mandrel test or pull string test conduits exceeding 50 feet or containing bends to verify pathway integrity.
D. Document test results as part of closeout submittals.

3.6 CLEANING

A. Clean interior of boxes and raceway to remove dust and debris prior to pulling cable.
B. Restore finish of exposed raceway and boxes damaged during installation.

END OF SECTION

SECTION 28 31 00 - FIRE DETECTION AND ALARM SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Provide a complete addressable fire detection and alarm system. Work includes control and annunciation equipment, initiating devices, notification appliances, sprinkler and fire-pump monitoring where applicable, elevator and building-system interfaces where applicable, power supplies, supervising-station communications, wiring, programming, testing, training, and closeout documentation.

B. This Section is written as a master specification. Project-specific requirements in Article 1.2 govern the system configuration for this Project. Requirements stated as 'where indicated,' 'where provided,' or 'where required' remain applicable master requirements but do not create scope for features excluded by Article 1.2 and not shown or required for the Project.

1.2 PROJECT-SPECIFIC REQUIREMENTS

A. Provide a complete new, standalone, addressable fire detection and alarm system for McClendon Baptist Church, including the main building and remote fire-pump building.

B. Provide occupant notification by listed horns, strobes, and horn/strobes. Emergency voice/alarm communications, mass notification, and school intercommunications are not required for this Project.

C. Monitor the wet-pipe sprinkler system.

D. Devices indicated on the Drawings establish the Engineer's design intent, intended device locations, minimum coverage, and required major interfaces. Verify final quantities, locations, candela settings, circuiting, power supplies, and accessories by code-compliant shop drawings. Do not omit, reduce, or relocate indicated devices without written acceptance by the Engineer and approval by the Authority Having Jurisdiction.

E. Provide every component, license, programming service, connection, and accessory required for a complete, listed, operable, and accepted system whether or not each item is individually indicated.

1.3 RELATED REQUIREMENTS

A. Section 21 13 13 - Wet-Pipe Sprinkler System.

B. Section 21 30 13 - Electric-Driven Fire Pumps.

C. Section 23 09 00 - Temperature Controls.

D. Division 26 - Power, grounding and bonding, raceways, identification, and surge protection.

E. Section 27 05 33 - Conduits and Backboxes for Communications Systems.

1.4 REFERENCES

A. Comply with the editions adopted for the Project and amendments enforced by the Authority Having Jurisdiction, including NFPA 13, NFPA 20-2019, NFPA 70-2020, NFPA 72-2019, NFPA 101-2015, the Louisiana-adopted 2021 IBC and IFC, accessibility requirements, Louisiana State Fire Marshal requirements, and local requirements.

B. Equipment shall be listed and labeled for its intended fire-alarm use, including applicable requirements of UL 38, UL 268, UL 268A, UL 464, UL 521, UL 864, UL 1481, UL 1638, UL 1971, and UL 2075.

C. Where a referenced standard, equipment listing, manufacturer instruction, or Authority Having Jurisdiction imposes a more stringent requirement, comply with the more stringent requirement.

1.5 SYSTEM DESCRIPTION AND DESIGN BASIS

A. System Type: New protected-premises, microprocessor-based, addressable fire-alarm system with off-premises supervising-station transmission. Provide one compatible system with equipment listed for operation together.

B. Circuit Arrangement: Signaling-line circuits and notification-appliance circuits shall be Class B unless indicated otherwise or a more stringent pathway is required by the approved shop drawings, equipment listing, adopted code, or Authority Having Jurisdiction. Circuits shall be power limited where permitted.

C. Capacity: Provide installed system capacity plus not less than 20 percent spare addressable-point capacity and 20 percent spare notification-appliance power capacity at each control unit or remote power supply. Provide cabinet space, circuit capacity, and battery capacity for the required spare load.

D. Secondary Power: Provide not less than 24 hours of standby operation followed by 5 minutes of alarm operation, or greater capacity required by NFPA 72, the selected supervising-station transmission arrangement, equipment listing, or Authority Having Jurisdiction. Apply required safety and aging factors to battery calculations.

E. Remote Fire-Pump Building: Coordinate waterflow and valve supervisory devices with Section 28 31 00. Division 21 shall furnish and install the devices and provide accessible terminals. Division 28 shall provide monitor modules, fire-alarm wiring, addressing, programming, signal classification, annunciation, supervising-station transmission, and end-to-end testing.

F. Manual Stations: Provide addressable manual fire-alarm stations where indicated and at additional locations required by the adopted code or Authority Having Jurisdiction. Where manual stations are required, locate them within 5 feet of required exit doorways and so travel distance to a station does not exceed 200 feet.

G. Existing-System Interface, Where Indicated: Survey existing control equipment, devices, circuits, programming, communications, and spare capacity. Provide listed and compatible equipment, interfaces, programming, phasing, and temporary protection required to extend or replace the existing system without impairing areas that remain in service.

H. Conditional Interfaces: Provide elevator recall and shunt-trip interfaces, door-holder release, smoke-control and fire/smoke-damper interfaces, special-suppression-system monitoring, emergency voice/alarm communications, and other life-safety interfaces where indicated or required by the adopted code or Authority Having Jurisdiction.

1.6 NONPROPRIETARY SYSTEM AND OWNER ACCESS

A. The system shall be serviceable, testable, programmable, and expandable by qualified independent fire-alarm firms selected by the Owner. Routine service and programming shall not be restricted to one dealer, one service organization, or a manufacturer-owned service organization.

B. With the submittal, identify not fewer than two independent service firms, not under common ownership, that regularly support the proposed system in the Project region and can obtain replacement components, programming tools, technical documentation, and training required for continued service.

C. Before acceptance, deliver to the Owner a complete editable copy of the final programming database; current programming and diagnostic software required for the installed system; perpetual, fully paid licenses required for local use; installer-level passwords and credentials; license keys, hardware keys, interface cables, and adapters; and instructions required to upload, download, back up, restore, modify, and troubleshoot the system.

D. Do not apply undisclosed passwords, encrypted lockouts, remote-access restrictions, dealer codes, or other controls that prevent the Owner or the Owner's qualified service provider from accessing and servicing the installed system. Change manufacturer default credentials and deliver final credentials securely to the Owner.

E. Local operation, testing, programming, database backup, and routine maintenance shall not require a continuing software subscription, cloud subscription, or remote connection to the installing contractor. This requirement does not prohibit recurring fees for the Owner-selected supervising-station service or optional Owner-selected cloud services.

F. Replacement detectors, modules, notification appliances, batteries, and common service parts shall be obtainable through not fewer than two distribution or service sources available to the Owner. Use of a qualified service provider selected by the Owner shall not invalidate the equipment listing or standard manufacturer warranty.

G. A proposed system that cannot satisfy every requirement of this Article is not an approved equal, regardless of manufacturer listing elsewhere in this Section.

1.7 SEQUENCE OF OPERATIONS

A. General Alarm Inputs: Operation of a manual station, area smoke detector, heat detector, or sprinkler waterflow device shall:

1. Annunciate and latch an alarm at the fire-alarm control unit and remote annunciator, with clear point identification.
2. Operate general alarm audible and visible notification appliances as indicated and required.
3. Transmit an alarm signal and point description to the supervising station.
4. Initiate associated control functions required by the approved sequence of operations.

B. Sprinkler Supervisory Inputs: Operation of a valve supervisory switch, low-air supervisory device where furnished, or other water-based system supervisory device shall annunciate, record, and transmit a supervisory signal with individual point identification. It shall not initiate general alarm notification unless required by the approved sequence or Authority Having Jurisdiction.

C. Fire-Pump Monitoring: Individually monitor every remote contact or listed output required by NFPA 20-2019, Sections 10.4.7 and 10.4.8, as applicable to the approved controller and final power-source arrangement. Classify, annunciate, record, and transmit each condition in accordance with NFPA 20, NFPA 72, the controller listing, and Authority Having Jurisdiction requirements. Do not aggregate conditions that are required to be separately identifiable, and do not treat an example point list as exhaustive.

D. Duct Smoke Detectors: Activation shall annunciate the signal classification required by the adopted code, shut down the associated air-moving equipment through a listed interface, and transmit the required signal to the supervising station. Provide remote test and reset where the detector is not readily accessible and where required.

E. Elevator Recall and Shunt Trip, Where Applicable: Provide individually addressable initiating devices and listed control interfaces required for primary recall, alternate-floor recall, fire-service operation, elevator machine-room or control-space monitoring, and shunt-trip initiation. Coordinate the final sequence with the elevator supplier, electrical distribution, sprinkler design, adopted elevator code, NFPA 72, and Authority Having Jurisdiction. Do not initiate elevator shunt trip from a smoke detector.

F. Door Holders, Where Applicable: Release magnetically held fire and smoke doors upon the initiating conditions required by the approved sequence, loss of releasing power, or system impairment where required. Door holders shall not reenergize until the fire-alarm system is reset and the releasing condition is normal.

G. Smoke Control and Fire/Smoke Dampers, Where Applicable: Initiate the indicated fan, damper, and smoke-control functions through listed interfaces. Monitor required proof and fault conditions and coordinate priorities, manual controls, and reset with the approved smoke-control sequence.

H. Special Suppression Systems, Where Applicable: Monitor alarm, supervisory, and trouble outputs from kitchen hood, clean-agent, preaction, or other suppression systems as required. Initiate building notification and associated equipment shutdowns in accordance with the approved sequence.

I. Emergency Voice/Alarm Communications, Where Applicable: Upon the required alarm input, activate the approved evacuation tone and message in the required zones, maintain strobe synchronization, and provide live paging priority and fault monitoring in accordance with NFPA 72.

J. Trouble Conditions: Primary-power loss, low battery, charger failure, open or shorted supervised circuit, ground fault, communication-path failure, remote power-supply trouble, and other required off-normal conditions shall annunciate and transmit trouble signals in accordance with NFPA 72.

K. Priorities and Reset: Alarm signals shall take priority over supervisory and trouble signals. Life-safety functions shall take priority over non-life-safety functions. Restoration of an initiating device shall not automatically silence notification appliances or reset a latched alarm. Reset shall restore controlled equipment only after the initiating condition has cleared and the associated system is ready for normal operation.

1.8 ACTION SUBMITTALS

A. Product Data: Submit data for control units, annunciators, communicators, initiating devices, notification appliances, modules, relays, power supplies, batteries, surge protectors, wire and cable, enclosures, and accessories. Identify listing, ratings, environmental limits, and compatibility.

B. Shop Drawings: Submit complete system shop drawings before installation. Include floor plans; device locations and mounting heights; ceiling heights; circuiting; addresses; candela and horn settings; control equipment; power supplies; conduit and cable routing; riser diagram; point list; terminal and point-to-point wiring diagrams; circuit class and pathway designation; building-to-building connections; and interfaces to sprinkler, fire-pump, HVAC, and supervising-station systems.

C. Calculations: Submit battery calculations for each control unit and power supply, notification-appliance voltage-drop calculations, strobe-coverage calculations, audible-notification calculations or design data, circuit loading, and required spare-capacity calculations.

D. Sequence Matrix: Identify each initiating input, displayed message, signal classification, notification response, control output, supervising-station transmission, and restoration response.

E. Fire-Pump Monitoring Matrix: Coordinate with the approved fire-pump controller and final power-source arrangement. For each required condition, identify initiating condition, contact or output type, normal and active state, controller terminal designation, monitor-module input, point description, signal classification, supervising-station transmission, and restoration response.

F. HVAC Interface Schedule: Identify each duct detector or fire-alarm control function, associated equipment, interface relay location, normal and alarm contact state, equipment-side control terminal, shutdown action, reset action, and responsible trade.

G. Conditional Interface Diagrams: Where applicable, submit point-to-point diagrams and sequence data for elevator recall and shunt trip, door-holder release, smoke control and fire/smoke dampers, special suppression systems, emergency voice/alarm communications, access-control release, and other life-safety interfaces.

H. Nonproprietary Compliance: Submit a point-by-point statement demonstrating compliance with Article 1.6, including proposed software and license turnover, credential turnover, identified independent service firms, and replacement-part sources.

I. Qualifications: Submit evidence of required firm licensing, personnel qualifications, and manufacturer training.

J. Authority Submittals: The Fire Alarm Contractor shall prepare and submit complete shop drawings, calculations, applications, and fees required by the Louisiana State Fire Marshal and other Authorities Having Jurisdiction. Obtain approval before installation and maintain approved documents at the site.

1.9 CLOSEOUT SUBMITTALS

A. Submit record floor plans and riser diagrams; final point list; final sequence matrix; as-programmed editable database; software, licenses, credentials, keys, and interface hardware required by Article 1.6; final battery and voltage-drop calculations; final device and circuit schedule; supervising-station account documentation; inspection and test reports; and Authority Having Jurisdiction approvals.

B. Submit completed NFPA 72 Record of Completion and inspection and testing documentation, including identification of tested devices, measured audible levels, visual appliance settings, interface tests, fire-pump signals, communication-path tests, deficiencies, corrective actions, and final results.

C. Submit operation and maintenance manuals, manufacturer service documentation, warranty documents, training records, software installation media or authorized download instructions, and a secure credential schedule.

1.10 QUALITY ASSURANCE

A. Fire Alarm Contractor shall hold the fire-alarm endorsements, firm registration, and personnel licenses required by Louisiana and shall be regularly engaged in systems of similar size and complexity.

B. Shop drawings and system design shall be prepared under the supervision of personnel qualified for the work and accepted by the Authority Having Jurisdiction. Where certification is required, provide a NICET Level III Fire Alarm Systems technician or a Louisiana-licensed Professional Engineer qualified for fire-alarm design.

C. Programming, startup, and final testing shall be performed by manufacturer-trained personnel. Manufacturer training shall not be interpreted to waive the nonproprietary requirements of Article 1.6.

D. Furnish control equipment, addressable devices, modules, annunciators, and power supplies as a compatible listed system. Notification appliances may be by another listed manufacturer only where compatibility and synchronization are specifically listed for the proposed combination.

1.11 WARRANTY AND SERVICE

A. Provide a one-year Contractor warranty from Substantial Completion and assign longer standard manufacturer warranties to the Owner.

B. During the warranty period, respond to system impairments within 24 hours of notice and correct warranty deficiencies without additional cost to the Owner. Warranty service shall not require an Owner subscription or exclusive service agreement.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with every requirement of this Section, including Article 1.6, provide a system by one of the following:

1. Potter Electric Signal Company.

2. Fire-Lite Alarms by Honeywell.

3. Approved equal.

B. Manufacturer name alone does not establish compliance. A product line requiring exclusive factory service, restricted programming access, withheld software or credentials, or continuing subscription for local programming is not acceptable.

2.2 EQUIPMENT - GENERAL

A. Provide new equipment of current manufacture, listed for the intended application, and compatible with the complete system. Do not provide discontinued products or products announced for discontinuation.

B. Equipment exposed to temperature, humidity, weather, washdown, corrosive atmosphere, or physical damage shall be listed or housed for the environment. Provide listed weatherproof enclosures and accessories where required.

C. Enclosures shall be steel with corrosion-resistant finish, keyed locks, and access for inspection and service. Key control units and remote power supplies alike where available.

D. Conventional initiating devices and ionization smoke detectors are not permitted unless specifically indicated and accepted by the Engineer and Authority Having Jurisdiction.

2.3 FIRE-ALARM CONTROL UNIT

A. Provide a UL 864-listed, microprocessor-based, addressable control unit with integral power supply, battery charger, display, controls, event history, real-time clock, nonvolatile program memory, supervised signaling-line and notification-appliance circuits, ground-fault detection, auxiliary relays, and communications interfaces required for the complete system.

B. Operator Interface: Provide dedicated acknowledge, alarm silence, drill, and system reset controls; backlit alphanumeric display; status LEDs; local audible signal; and password-controlled access levels. Display complete custom point text for each addressable device and system condition.

C. Programming: Permit field programming of input/output relationships, point text, signal classification, notification zones, time delays permitted by code, and system reports. Programming shall be retained through complete primary and secondary power loss.

D. System Functions: Provide detector sensitivity display and testing, drift compensation, maintenance alerts, alarm verification where permitted, walk test, automatic device inventory, duplicate-address detection, point disable with indication, event history, and reports required for service.

E. Supervision: Monitor primary power, batteries, charger, signaling-line circuits, notification-appliance circuits, remote power supplies, communications paths, ground faults, and internal failures. An open, short, or ground fault shall not cause an alarm or prevent required annunciation of other unaffected points.

F. Capacity: Provide sufficient native or installed expansion capacity to satisfy Article 1.5. Do not count unused capacity that requires replacement of the control unit.

G. Provide an addressable photoelectric smoke detector at the fire-alarm control-unit location in the main building in accordance with NFPA 72. Coordinate detector location so it protects the equipment without being obstructed by the cabinet or room construction.

2.4 REMOTE ANNUNCIATOR

A. Where indicated, provide a listed remote annunciator with alphanumeric display, common status indicators, local audible signal, and authorized acknowledge, silence, and reset functions. Annunciator point text shall match the control unit.

B. Provide key or password protection against unauthorized control. Loss of communication or power shall produce a trouble signal at the control unit.

2.5 SUPERVISING-STATION COMMUNICATIONS

A. Provide listed communications equipment and transmission path or paths compatible with the Owner-selected supervising station and accepted by the Authority Having Jurisdiction. Permitted technologies include listed IP, cellular, radio, or combination communicators complying with NFPA 72.

B. Transmit individually identifiable alarm, supervisory, and trouble signals, including communication-path failure and required periodic test signals. Coordinate account setup, signal descriptions, and acceptance testing with the Owner and supervising station.

C. Do not rely on conventional analog telephone lines unless specifically accepted by the Owner and Authority Having Jurisdiction. Owner will pay recurring monitoring charges after acceptance unless indicated otherwise.

2.6 POWER SUPPLIES, BATTERIES, AND SURGE PROTECTION

A. Primary Power: Division 26 shall provide and terminate a dedicated 120-V branch circuit, maximum 20 amperes, for each fire-alarm control unit, remote power supply, and separately powered fire-alarm interface device requiring line-voltage power. Provide lock-on provisions and permanent red identification at each breaker reading “FIRE ALARM – DO NOT SWITCH OFF.” Division 28 shall identify required circuit quantities and locations before rough-in and coordinate final connections. Ground and bond equipment in accordance with NFPA 70 and manufacturer instructions.

B. Remote Power Supplies: Provide listed, supervised power supplies and synchronization equipment as required by approved calculations. Each power supply shall report primary-power failure, battery trouble, charger trouble, ground fault, and other listed trouble conditions to the control unit.

C. Batteries: Sealed, maintenance-free rechargeable batteries listed for the equipment. Size for connected load, required standby and alarm duration, spare capacity, and required aging factor. House batteries in the control-unit cabinet or a listed adjacent cabinet.

D. Exposed Circuits: Provide listed surge-protective devices for fire-alarm circuits routed outdoors, underground, between buildings, or otherwise exposed to lightning-induced surges. Install protection at each building entrance, coordinate with the fire-alarm manufacturer, and bond with the shortest practical conductor path.

E. Surge-protective devices shall be listed for the circuit type and voltage and shall not impair circuit supervision, signal integrity, or system listing. Coordinate low-voltage protection with Section 26 43 00.

2.7 INITIATING DEVICES

A. Addressable Manual Stations: Non-breakglass, key-reset type with positive operated indication, red housing, permanent operating instructions, and addressable interface integral to the station or listed assembly.

B. Addressable Smoke Detectors: Photoelectric or multicriteria type as indicated, with separate twist-lock base, visible status/alarm indication, automatic drift compensation, maintenance reporting, remote test capability where required, and sensitivity testing through the control unit in accordance with the listing.

C. Addressable Heat Detectors: Fixed-temperature or combination fixed-temperature/rate-of-rise type selected for the ambient environment. Provide high-temperature devices where required by normal ambient conditions.

D. Duct Smoke Detectors: Addressable photoelectric detector in listed sampling housing with sampling and exhaust tubes sized for the duct, airflow direction indicator, accessible test features, and remote test/reset station with status indication where the detector is not readily accessible or where required. Duct detectors shall not substitute for required open-area detection.

E. Beam or Imaging Detectors: Provide only where indicated. Detectors shall be listed for the installed range and environment, include alignment and compensation features, and be accessible for testing and maintenance.

F. Detector bases, remote indicators, guards, and accessories shall be listed with the detector. Provide guards where devices are subject to impact without obstructing detector operation.

G. Carbon Monoxide Detectors, Where Indicated: Addressable or monitored detectors listed to UL 2075 and compatible with the control unit. Provide distinct carbon-monoxide signal annunciation and temporal-four audible signaling where required by the adopted code and approved sequence.

2.8 ADDRESSABLE MODULES AND FIRE-PROTECTION INTERFACES

A. Monitor Modules: Individually addressable, supervised modules listed with the control unit. Provide one separately identifiable input for each waterflow switch, valve supervisory switch, fire-pump controller condition, duct detector interface, power-supply trouble, and other monitored device unless a listed multipoint module provides equivalent individual identification and supervision.

B. Control and Relay Modules: Individually addressable modules with dry contacts or supervised output suitable for the connected load. Provide listed interposing relays where equipment load or voltage exceeds module ratings. Do not route HVAC line voltage through an addressable module unless specifically listed for that use.

C. Isolation Modules: Provide short-circuit isolators where required by NFPA 72, the manufacturer, or approved shop drawings, and at building transitions as required to prevent a single fault in one building or underground segment from disabling the remainder of the system.

D. Sprinkler Interfaces: Waterflow switches, valve supervisory switches, and other sprinkler alarm/supervisory devices are furnished and installed under Division 21. Division 28 shall provide monitor modules, fire-alarm wiring, addressing, programming, signal classification, supervising-station transmission, and end-to-end testing.

E. Fire-Pump Interfaces: The fire-pump controller manufacturer shall provide the required isolated remote contacts or listed outputs under Section 21 30 13. Division 28 shall provide the required number of monitor modules, wiring, addressing, programming, signal classification, supervising-station transmission, and point-to-point testing based on the final approved controller and monitoring matrix.

2.9 CONDITIONAL INTERFACE EQUIPMENT

A. Elevator Interface Equipment, Where Applicable: Provide addressable smoke and heat detectors, monitor modules, control modules, listed interposing relays, power-supervision relays, and accessories required for primary-floor recall, alternate-floor recall, machine-room or control-space functions, hoistway functions, and shunt-trip initiation. Interface equipment shall be compatible with the elevator controller and comply with NFPA 72 and the adopted elevator code.

B. Elevator Shunt-Trip Power Supervision, Where Applicable: Monitor presence of control power used for elevator shunt trip and annunciate loss as a supervisory signal where required. Use a listed relay or monitor arranged so shunt trip cannot be initiated by loss of monitoring power alone.

C. Door Holders, Where Applicable: Listed, fail-safe magnetic holders suitable for door weight and mounting conditions. Provide integral or separate releasing relays and power supplies as required. Loss of power shall release the door.

D. Smoke-Control and Damper Interfaces, Where Applicable: Addressable control and monitor modules, listed relays, and firefighter smoke-control-panel interfaces required to execute and supervise the approved smoke-control sequence. Provide modules individually identifiable by controlled equipment or function.

E. Special-Suppression Interfaces, Where Applicable: Addressable monitor modules for alarm, supervisory, and trouble contacts from kitchen hood, clean-agent, preaction, deluge, and other suppression control units. Provide control modules only where required by the listed suppression-system interface.

F. Access-Control and Egress Interfaces, Where Applicable: Listed relays and monitored interfaces required to release controlled egress doors upon fire alarm or loss of power. Fire-alarm operation shall not depend on an access-control processor or network.

G. Existing Conventional Circuits, Where Applicable: Use listed addressable monitor modules compatible with the existing initiating devices and end-of-line supervision. Individually identify retained zones, verify circuit integrity and device compatibility, and replace incompatible or unreliable components.

2.10 NOTIFICATION APPLIANCES

A. Audible Appliances: UL 464-listed electronic horns suitable for 24-V dc nominal operation, capable of the required temporal-three fire alarm signal, and field adjustable for sound output where permitted. Secure final settings against casual adjustment.

B. Visible Appliances: UL 1971-listed strobes with field-selectable candela settings sufficient for the indicated mounting height, room geometry, and approved coverage calculations. Mark the final candela setting on the device where required by the listing.

C. Combination Appliances: Listed horn/strobes meeting the requirements for both audible and visible appliances. Appliance synchronization shall be compatible throughout each required field of view and audible notification zone.

D. Audible performance shall satisfy NFPA 72 throughout occupiable areas without exceeding maximum permitted sound pressure levels. Visible coverage and synchronization shall satisfy NFPA 72 and accessibility requirements.

2.11 EMERGENCY VOICE/ALARM COMMUNICATIONS, WHERE INDICATED

A. Provide a listed emergency voice/alarm communications control unit, digital message generator, amplifiers, microphone, supervised speaker circuits, power supplies, batteries, interface modules, and accessories required for the approved sequence.

B. Provide 25- or 70.7-V listed speakers and speaker/strobes with transformer taps suited to the coverage and intelligibility design. Provide matching backboxes, baffles, guards, and end-of-line devices.

C. Amplifier and speaker-circuit capacity shall exceed connected load by not less than 20 percent. Provide backup amplifier capacity where required by NFPA 72, the approved risk analysis, or the Authority Having Jurisdiction.

D. Provide 24 hours of standby operation followed by not less than 15 minutes of alarm operation, or longer duration required by NFPA 72 or the Authority Having Jurisdiction.

E. Provide prerecorded messages, tones, zoned evacuation where required, and live paging. Fire-alarm evacuation shall have highest priority; live emergency paging shall override prerecorded messages; non-fire paging, if permitted, shall have lowest priority.

F. Maintain visual-appliance synchronization during voice operation. Supervise amplifiers, speaker circuits, power supplies, microphones, and communications, and return separately identifiable required trouble conditions to the fire-alarm control unit.

G. Design and test for audibility and intelligibility in accordance with NFPA 72 and approved shop drawings. Submit speaker layouts, tap schedules, amplifier loading, battery calculations, message scripts, and intelligibility test results.

2.12 WIRE, CABLE, AND RACEWAYS

A. Wiring shall be listed for fire-alarm use and comply with NFPA 70 Article 760, NFPA 72, manufacturer requirements, and approved shop drawings. Use copper conductors sized by circuit loading and voltage-drop calculations, not smaller than 18 AWG unless a larger size is required.

B. Cable not installed in raceway shall have the plenum or riser rating required by the installation. Provide red-jacketed fire-alarm cable where available. Maintain required separation from power and Class 1 circuits.

C. Install raceways and boxes where indicated and as required by Division 27, NFPA 70, the equipment listing, and the Authority Having Jurisdiction. Conceal raceway in finished areas. Exposed raceway shall be neatly routed parallel or perpendicular to building lines.

D. Do not install non-fire-alarm conductors in fire-alarm raceways or boxes. Do not splice conductors except in accessible listed boxes or cabinets. Provide terminal blocks in cabinets; do not use wire nuts within control equipment.

E. T-taps on Class B signaling-line circuits are permitted only where allowed by the selected system listing and manufacturer, shown on approved shop drawings, and included on record drawings. Do not T-tap notification-appliance circuits.

F. Locate end-of-line devices in accessible, identified boxes or at the last device as required by the system listing. Do not conceal end-of-line devices above inaccessible construction.

G. Provide conductors, raceways, pull boxes, fittings, supports, seals, firestopping, and accessories required for complete circuits between the main building and remote fire-pump building.

2.13 IDENTIFICATION AND SPARE MATERIALS

A. Permanently identify control units, annunciators, communicators, remote power supplies, batteries, modules, relays, terminal cabinets, circuits, junction boxes, end-of-line devices, surge protectors, and dedicated power sources.

B. Point labels shall identify building, floor, room or area, device type, and equipment served. Use consistent point text at the control unit, annunciator, supervising station, shop drawings, and record documents.

C. Provide two spare keys of each type; two spare addressable smoke detectors with bases; one spare heat detector of each type with base; one spare manual station; one spare monitor module; and one spare control/relay module. Deliver in labeled original packaging.

PART 3 - EXECUTION

3.1 EXAMINATION AND COORDINATION

A. Verify site conditions, ceiling types and heights, wall construction, environmental conditions, equipment locations, sprinkler devices, fire-pump controller terminals, HVAC shutdown terminals, communications availability, and power sources before preparing final shop drawings or beginning installation.

B. Coordinate device locations with architectural features, reflected ceiling plans, lighting, sprinklers, diffusers, structure, equipment access, and operable partitions. Resolve conflicts before rough-in.

C. Verify final device locations and quantities using NFPA 72 spacing and mounting rules, listed appliance coverage, obstructions, ceiling geometry, approved calculations, and Authority Having Jurisdiction requirements. Report material conflicts with the Contract Documents before installation.

3.2 INSTALLATION

A. Install in accordance with approved shop drawings, NFPA 70, NFPA 72, manufacturer instructions, equipment listings, and Authority Having Jurisdiction requirements.

B. Flush mount devices and control equipment in finished areas unless indicated otherwise. Surface mounting is permitted in unfinished utility and equipment spaces. Support devices independently of suspended ceilings.

C. Mount manual-station operable parts between 42 and 48 inches above finished floor and locate stations as required by Article 1.5. Coordinate so open doors do not obscure stations.

D. Mount wall visible-notification appliance lenses between 80 and 96 inches above finished floor, or as otherwise permitted by NFPA 72 for low ceilings. Where ceiling- or structure-mounted strobes are indicated, select candela and spacing for the actual mounting height and do not exceed the appliance listing or NFPA 72 height limitations.

E. Install duct detector housings and sampling tubes in accessible locations with correct airflow orientation and straight duct conditions required by the manufacturer. Provide permanent access to detector, tubes, filters, test switches, and reset controls.

F. Protect smoke detectors from dust, paint, moisture, and physical damage during construction. Do not install detector heads until the area is clean and system programming is ready for testing. Replace contaminated devices.

G. Install inter-building surge protection and isolation at accessible building-entry locations. Seal underground raceways against moisture and gases and provide drainage or listed sealing fittings as required.

3.3 HVAC SHUTDOWN INTERFACES

A. Division 28 shall furnish, install, wire, address, program, and test duct smoke detectors, remote test/reset stations, monitor modules, control modules, interposing relays required on the fire-alarm side, and fire-alarm wiring through the dry-contact interface.

B. Division 23 shall provide accessible shutdown input terminals, HVAC controls, and equipment-side wiring from the fire-alarm dry-contact interface to starters, variable-frequency drives, packaged equipment controllers, or other HVAC control equipment. Division 23 shall implement the required shutdown and reset sequence.

C. Locate the interface adjacent to the controlled equipment or at another mutually coordinated accessible location. Fire Alarm Contractor and Temperature Controls Contractor shall jointly verify contact ratings, normal state, fail-safe behavior where required, shutdown action, reset action, and final operation.

3.4 CONDITIONAL LIFE-SAFETY INTERFACES

A. Elevator Systems, Where Applicable: Division 28 shall provide fire-alarm detectors, monitor and control modules, relays required on the fire-alarm side, fire-alarm wiring, programming, and testing through the dry-contact interface. The Elevator Contractor shall provide elevator-controller terminals, elevator-controller programming, and elevator-system operation. Division 26 shall provide shunt-trip breakers, shunt-trip control power, power-monitoring sources, and line-voltage wiring. Coordinate exact division of work before rough-in.

B. Coordinate elevator detector locations and functions with sprinkler locations and the approved elevator shop drawings. Provide separate control outputs for primary recall, alternate-floor recall, and shunt trip where required. Jointly test each function with the Elevator Contractor and Electrical Contractor.

C. Where heat detection is required to initiate elevator shunt trip because sprinklers are installed in the elevator machine room, control room, control space, or hoistway, locate a heat detector within 24 inches of each applicable sprinkler and coordinate detector temperature rating and response with the sprinkler temperature rating and adopted elevator requirements.

D. Door Holders and Access-Control Release, Where Applicable: Coordinate holder power and door-release interfaces with Division 26, door hardware, and access-control work. Verify release upon required alarm inputs and loss of power, and verify doors close and latch without obstruction.

E. Smoke Control and Fire/Smoke Dampers, Where Applicable: Coordinate interface points and the approved sequence with Division 23 and smoke-control commissioning. Provide point-to-point testing of commands, proof signals, faults, manual overrides, and reset.

F. Special Suppression Systems, Where Applicable: Coordinate dry-contact outputs, signal classifications, equipment shutdowns, and acceptance testing with the suppression-system contractor. Do not connect until the suppression control unit and fire-alarm sequence are approved.

G. Existing Systems, Where Applicable: Survey before bid where practical and before work. Provide an impairment, phasing, and cutover plan accepted by the Owner and Authority Having Jurisdiction. Maintain protection of occupied areas and do not abandon active circuits until replacement work is operational and accepted.

H. Emergency Voice/Alarm Communications, Where Applicable: Coordinate speaker locations with reflected ceiling plans and architectural features. Balance speaker taps, verify amplifier loading and spare capacity, program messages and priorities, maintain strobe synchronization, and complete integrated audibility and intelligibility testing.

3.5 PROGRAMMING AND STARTUP

A. Program clear English point text identifying building, floor, room or area, device type, equipment served, and condition. Use the final room names and numbers shown on the architectural record documents.

B. Program signal classifications, notification zones, control functions, priorities, supervising-station transmissions, and restoration responses in accordance with the approved sequence matrix.

C. Program each required fire-pump controller condition as an individually identifiable point coordinated with the approved controller submittal and final fire-pump monitoring matrix.

D. Before acceptance testing, verify every device, circuit, interface, power supply, battery, ground-fault monitor, surge protector, and communications path. Correct deficiencies and complete a documented pretest.

3.6 ACCEPTANCE TESTING

A. Perform and document 100-percent testing in accordance with NFPA 72. Notify the Authority Having Jurisdiction, Owner, Architect/Engineer, supervising station, and affected contractors as required before testing.

B. Test manual stations; smoke, heat, beam, duct, and carbon-monoxide detectors; sprinkler waterflow; valve supervisory devices; every required fire-pump controller point; notification-appliance operation and synchronization; audible levels; visible settings; HVAC shutdowns; primary-power loss; batteries; chargers; ground faults; circuit opens and shorts; remote power supplies; surge protection status; communication paths; supervising-station receipt; and restoration.

C. Coordinate fire-pump monitoring tests with the NFPA 20 acceptance test specified in Section 21 30 13. Demonstrate each required controller output from initiation through control-unit annunciation and supervising-station receipt.

D. Coordinate duct-detector and HVAC shutdown testing with Division 23. Demonstrate shutdown, annunciation, transmission, manual reset where required, and restoration to normal operation for each affected unit.

E. Measure audible levels at representative locations under normal ambient conditions and verify visible-appliance candela settings and synchronization. Correct deficient coverage and retest without additional cost to the Owner.

F. Where conditional interfaces are included, test elevator recall and shunt trip, door-holder and access-control release, smoke-control functions, fire/smoke dampers, special-suppression-system signals, existing-system interfaces, emergency voice/alarm communications, and carbon-monoxide signaling as applicable.

G. Correct deficiencies before requesting final inspection. Repeat failed tests and tests affected by programming or hardware changes. Submit final test records and obtain Authority Having Jurisdiction acceptance.

3.7 TRAINING AND CLOSEOUT

A. Provide not less than two hours of hands-on training for Owner personnel covering normal operation, alarm/supervisory/trouble response, acknowledge/silence/reset, impairment procedures, routine testing, supervising-station coordination, and basic troubleshooting.

B. Provide additional hands-on turnover to the Owner's designated service representative covering database backup and restore, software installation, credential management, point-text changes, device replacement, report generation, and access to technical support.

C. Deliver all closeout submittals, spare materials, keys, editable programming database, software, licenses, credentials, interface hardware, and final Authority Having Jurisdiction approvals before Final Acceptance.

END OF SECTION

SECTION 312300 - EXCAVATION AND FILL

PART 1 GENERAL

1.1 SUMMARY

A. Scope of Work:
   1. The Contractor shall furnish all labor, materials, equipment and incidentals necessary to perform all excavation, backfill, grading and wall protection required to complete the work shown on the Drawings and specified herein. The Work shall include, but not necessarily be limited to excavation, filling and grading to attain subgrades and grades indicated on the Drawings including all backfilling, grading, disposal of surplus or unsuitable materials and all related work such as sheeting, bracing and water handling. All sheeting, bracing and water handling, whether for safety of workmen or to protect structures, will be performed as part of required work with no additional cost to the Owner.

1.2 REFERENCES

A. ASTM International:
   1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).
   2. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft3 (2,700 kN-m/m3)).
   3. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
   4. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

1.3 QUALITY ASSURANCE

A. The Contractor shall perform Work in compliance with applicable requirement codes and standards of governing authorities having jurisdiction.

B. The Owner will engage and pay for soil testing and inspection services for quality control testing during trenching and backfill operations.

1.4 JOB CONDITIONS

A. The Contractor shall examine the site and review the available test borings or undertake his own soil borings prior to submitting his bid, taking into consideration all conditions that may affect his work.

B. Existing Utilities: Locate existing underground utilities in the areas of the work. If utilities are to remain in place, provide adequate means of protection during earthwork operations.
   1. The locations of all pipes, ducts, or underground structures is not warranted to be exact, nor is it warranted that all underground pipes, ducts, or structures or shown. The Contractor shall contact Louisiana One-Call or the appropriate

utility company for location of their underground service a minimum of 48 hours prior to beginning construction in each area. It is the Contractor's responsibility to verify and locate all utilities in the field at no additional cost to the Owner.

2. Cooperate with the Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to the satisfaction of the utility owner or make the site available to the utility owner for his work crews to make the necessary repairs at no additional cost to the Owner.
3. Examine the areas and conditions under which excavating, filling and grading are to be performed. Do not proceed with the work until unsatisfactory conditions have been corrected.
4. It is determined that existing utilities are to be relocated by the owner of those utilities, the Contractor shall be responsible for that coordination. The Contractor shall notify the utility owner in sufficient time as to avoid any delays to the Contractor's schedule. The Contractor is solely responsible for this coordination, and no delay or extension of time will be allowed as a result of or the cause of inaction by the Contractor or utility owner.

1.5 PROTECTION

A. Slope sides of excavations to comply with OSHA regulations and any applicable local codes and ordinances. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.

B. Dewatering, Drainage and Flotation:
1. The contractor shall furnish all materials and equipment and perform all work required to install and maintain the drainage system he proposes for handling groundwater and surface water encountered during construction of structures, pipelines and compacted fills.
2. The Contractor shall construct and place in-the-dry all pipelines, concrete work, compacted fill and bedding. In addition, the Contractor shall make the final 24-inches of excavation for this work in-the-dry and not until the water level is a minimum of twelve inches below proposed bottom of excavation.
3. The Contractor shall, at all times during construction, provide and maintain proper equipment and facilities to promptly remove and dispose of all water entering excavations and keep such excavations dry so as to obtain a satisfactory undisturbed subgrade foundation condition until the fill, structure, utility or drainage pipe to be built thereon have been completed to such extent that they will not be floated or otherwise damaged by allowing water levels to return to natural elevations.
4. Dewatering shall at all times be conducted in such a manner as to preserve the natural undisturbed bearing capacity of the subgrade soils at proposed bottom of excavations.

C. Protection of Persons and Property:
1. Barricade open excavations occurring as part of this work and post with warning lights in accordance with local requirements. Operate warning lights as recommended by authorities having jurisdiction.
2. Protect structures, utilities, sidewalks, pavements and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

PART 2 PRODUCTS

2.1 SOIL MATERIALS

A. Definitions:

1. Select Fill: Select fill shall conform to Louisiana DOTD designation TR 423 Classes A-1-a, A-1-b, A-2-4, A-2-6, A-3, A-4 or A-6 having a maximum liquid limit of 35 and a maximum plasticity index of 18. This material is referred to as "selected soils" in the Louisiana DOTD Specifications. Based on an approved geotechnical engineering report, particularly A-6 soils, a higher elasticity index of up to 25 will be considered. Select fill can be used for backfill in over-excavated areas, for backfill from 12 inches above the top of the utility or pipe to the top of the subgrade and as structural fill/backfill.
2. Bedding Materials: Bedding materials shall conform to Louisiana DOTD Specifications Section 1003.10.. These materials shall be used for placement under the utilities or drainage pipes in the trench and as a bedding material as defined on the Drawings and shall have a minimum thickness of 6 inches. These materials shall also be used for backfill in over-excavated trench areas and may be used for backfill from above the top of the utility or pipe to the top of subgrade and as structural fill/backfill.
3. Granular Fill: Granular fill shall conform to Louisiana DOTD Specifications Section 1003.08. These materials shall be used for backfilling around pipes from the bedding material up to at least 12 inches above the top of the pipes or to subgrade and in confined areas around structures. These materials may also be used as structural fill/backfill.
4. Usable Excavated Soils: Usable excavated soils, referred to as "usable soils" in Louisiana DOTD Specifications, shall conform to Classes A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-3, A-4, A-5, A-6, A-7-5 and/or A-7-6 except for soils in Classes A-5, A-6, A-7-5 and A-7-6 which may be considered unusable by the Engineer. Any soil with a plasticity index exceeding 60 will not be accepted in accordance with paragraph 203.06 in the Louisiana DOTD Specifications. Usable excavated soils can be used for backfill from 12 inches above the top of the pipe up to surface grades in unimproved areas only.

B. General

1. Materials used as fill and backfill shall be as described above. The Contractor shall notify the Engineer of the source of each material and shall furnish to the Engineer for testing and approval a representative sample of each material weighing approximately 20 pounds. Sample shall be furnished at least ten (10) calendar days prior to the date of anticipated use of such material.
2. Additional materials shall be furnished as required from off-site sources and hauled to the site.

C. Structural Fill

1. Structural fill shall be used below spread footing foundations, slab-on-grade floors and other structures and as backfill within three feet of the below grade portions of structures, except that, when stabilization layers of courses are shown on the drawings, stabilization material shall be placed and compacted over the structural fill material in accordance with the requirements for structural fill.
2. Material falling within the above specification which is encountered during the excavation may be stored in segregated stockpiles for reuse. All material which,

in the opinion of the Engineer, is not suitable for reuse shall be spoiled as specified herein for disposal of unsuitable materials.

PART 3 EXECUTION

3.1 LINES AND GRADES

A. Perform earthwork operations to lines and grades indicated on Drawings.
   1. Owner reserves right to make changes in lines and grades when changes are required for Project conditions.

B. Use laser-beam instrument with qualified operator to establish lines and grades.

3.2 PREPARATION

A. Call Louisiana One Call at 1-800-272-3020 not less than three working days before performing Work.
   1. Request underground utilities to be located and marked within and surrounding construction areas.

B. The Contractor shall examine the site and review available test borings or undertake his own soil borings prior to submitting his bid, taking into consideration all conditions that may affect his work.

C. Identify required lines, levels, contours, and datum locations.

D. Protect plant life, lawns, and other features remaining as portion of final landscaping.

E. Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

F. Maintain and protect above and below grade utilities indicated to remain.

G. Establish temporary traffic control when trenching is performed in public right-of-way. Relocate controls as required during progress of Work.

3.3 EXCAVATION

A. Excavate existing material as required to establish required grade elevations and dimensions as indicated on drawings.

B. Slope sides of excavations to comply with OSHA regulations and any applicable local codes and ordinances. When side walls can not be sloped, provide sheeting and shoring to protect excavation as specified in this section. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.

C. When subsurface materials at bottom of excavations are loose or soft, excavate to greater depth as directed by Engineer until suitable material is encountered.

D. Cut out soft areas of subgrade not capable of compaction in place. Backfill with select fill and compact to density equal to or greater than requirements for subsequent backfill material.

E. Unsuitable and surplus excavated materials, unless otherwise specified, shall become the property of the Contractor to be removed from the site and disposed of by the Contractor off the project site in an approved manner.

3.4 SHEETING AND SHORING

A. Sheet, shore, and brace excavations to prevent danger to persons, structures and adjacent properties and to prevent caving, erosion, and loss of surrounding subsoil.

B. Support trenches more than 5 feet deep excavated through unstable, loose, or soft material. Provide sheeting, shoring, bracing, or other protection to maintain stability of excavation.

C. Design sheeting and shoring to be removed at completion of excavation work.

D. Repair damage caused by failure of the sheeting, shoring, or bracing and for settlement of filled excavations or adjacent soil.

E. Repair damage to new and existing Work from settlement, water or earth pressure or other causes resulting from inadequate sheeting, shoring, or bracing.

3.5 FILL PLACEMENT

A. Material placed in fill areas shall be deposited within the lines and to the grades shown on the drawings or as directed by the Engineer, making due allowance for settlement of the material. Fill shall be place only on properly prepared surfaces which have been inspected and approved by the Engineer. If sufficient fill material is not available from on site excavations, the Contractor shall provide borrows as required to establish final grades.

B. Remove vegetation, debris, unsatisfactory soil materials, obstructions and deleterious materials from ground surface prior to placement of fills. Plow strip or break-up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material bill bond with existing surface.

C. Fill shall be brought up in substantially level lifts throughout the site, starting in the deepest portion of the fill. Place fill material in continuous layers not exceeding 8 inches in thickness and compact to 98% of the maximum density as determined by ASTM D698. The entire surface of the work shall be maintained free from ruts, and in such condition that construction equipment can readily travel over any section.

D. Fill shall be dumped and spread in layers by a bulldozer or other approved method. During the process of dumping and spreading, all roots, debris, and other objectionable material shall be removed from the fill areas, and the Contractor shall assign a sufficient number of men to this work to insure satisfactory compliance with these requirements.

E. Systematically place fill to allow maximum time for natural settlement. Do not place fill over porous, wet, frozen, or spongy subgrade surfaces.

F. Maintain moisture content of fill materials to within ± 2% of optimum to attain required compaction density.

G. If the compacted surface of any layer of material is determined to be too smooth to bond properly with the succeeding layer, it shall be loosened by harrowing or by another approved method before the succeeding layer is placed.

H. All fill materials shall be placed and compacted “in-the-dry”. The Contractor shall dewater excavated areas and is required to perform the work in such a manner as to preserve the undisturbed state of natural inorganic soils.

3.6 COMPACTION

A. GENERAL

1. Contractor shall control soil compaction during construction and obtain the minimum required percentage of the total maximum dry densities as specified herein and as shown on the drawings. The Contractor shall maintain the fill for a period of one (1) year after final acceptance and shall restore any fill that fails and repair any pavement or other structures which may be damaged as a result of fill failure. It shall be the Contractor’s responsibility to notify the Engineer in writing that compaction tests can be performed.
2. The frequency of density tests will be a minimum of one (1) test per lift per 500 square yards under pavements and one (1) test per lift per 1,000 square yards for open areas. If the density tests indicate that the work does not meet specified density requirements, the Engineer may require additional density tests to determine the extent of the deficient Work. The Contractor will not be allowed an extension of contract time as a result of any density testing.
3. It is the Contractor’s responsibility to provide equipment and labor as needed to achieve the required compaction as specified herein. Should the rates of compaction fall below the values specified herein, the Engineer has the right to instruct the Contractor to alter his work to assure that the required fill quality is consistently achieved. Any decision by the Engineer to forgo such instructions shall in no way relieve the Contractor of his responsibility to provide fill of the specified quality.
4. Compaction as required pertains to undisturbed earth as well as fill material.

B. MOISTURE CONTROL

1. Condition subgrade or layer material as required to correct moisture content.
2. When the material is too dry to be compacted efficiently, the Contractor shall uniformly apply water to surface of layer of soil material and thoroughly mix the soil to achieve a moisture content near the optimum level to facilitate compaction.
3. Remove and replace or scarify and air dry soil material that is too wet to permit compaction to specified density.
4. Soil material that has been removed because it is too wet to permit compaction but is otherwise satisfactory may be stockpiled or spread and allowed to dry. The Contractor may assist the drying process by disking, harrowing or pulverizing to reduce the moisture content to a satisfactory level.

C. Areas adjacent to structures and other confined areas inaccessible to roller type equipment shall be compacted with approved hand guided mechanical compaction equipment.

Compaction of fill by such means shall be to the same degree of compaction as obtained by roller type equipment and the Engineer may make the necessary tests to determine the amount of compactive effort necessary to obtain compaction. Unless such test indicated that modifications may be made, the fill compacted by mechanical compactors shall be placed in 6-inch layers and thoroughly tamped over the entire surface. Compaction equipment is subject to approval by the Engineer.

3.7 FILLING AROUND STRUCTURES

A. Fill shall be placed in layers having a maximum thickness of eight inches in loose state and shall be compacted sufficiently to prevent settlement. If compaction is by rolling or ramming, material shall be wet down as required. Where material can be suitably compacted by flooding, the Contractor may use this method.

B. Filling shall be carried up evenly on all walls of an individual structure simultaneously. A longitudinal variation of two feet and a horizontal variation of three inches in elevation will be the maximum allowable. No fill shall be allowed against the walls until the walls and their supporting slabs, if applicable, have attained sufficient strength. Fill shall be subjected to approval of the Engineer.

C. In locations where pipes pass through structure walls, the Contractor shall take the following precautions to consolidate the filling up to an elevation of at least one foot above the bottom of the pipes:
   1. Place fill in such areas for a distance of not less than three feet either side of the centerline of the pipe in level layers not exceeding six inches in thickness.
   2. Wet each layer to the extent directed by the Engineer and thoroughly compact each layer with a power tamper to the satisfaction of the Engineer.

D. The final finished surface of the filled areas shall be graded to smooth true lines, strictly conforming to the grades indicated on the drawings, and no soft spots or uncompacted areas will be allowed in the work.

E. Temporary bracing shall be provided as required during construction of all structures to protect partially completed structures against all construction loads, hydraulic pressure, and earth pressure. The bracing shall be capable of resisting all loads applied to the walls as a result of the fill operation.

3.8 GRADING

A. Uniformly grade areas within limits of grading under this Section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are shown or between such points and existing grades as are required or shown on the Drawings.

B. Grading Outside Building Lines: Grade areas adjacent to building lines, as shown on the Drawings, to drain away from structures and to prevent ponding. Finish surface free from irregular surface changes and as follows:
   1. Lawn or Unpaved Areas: Finish areas to within not more than 0.10 feet above or below the required elevation.
   2. Walks: Shape surface of areas under walks to line, grad and cross-section, with finish surface not more than 0.10 feet above or below the required subgrade.

C. Grading Surface of Fill Under Building Slabs: Grad smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of ½ inch when tested with a 10 foot straightedge.

D. Compaction: After grading, compact surfaces to the depth and percentage of maximum dry density for each area classification.

E. Grading shall be performed at such places as are indicated on the Drawings, to the lines, grades and elevations shown or as directed by the Engineer and shall be made in such a manner that the requirements for formation of embankments can be followed. All unacceptable material encountered, of whatever nature within the limits indicated, shall be removed and disposed of in accordance with this Section. During the process of excavation, the grade shall be maintained in such condition that it will be well drained at all times. When directed, temporary drains and drainage ditches shall be installed to intercept or divert surface water which may affect the prosecution or condition of the work.

F. If at the time of excavation it is not possible to place any material in its proper section of the permanent structure, it shall be stockpiled in approved areas for later use. No extras will be considered for the stockpiling or double handling of excavated material.

G. The right is reserved to make adjustments or revisions in lines or grades if found necessary as the work progresses, due to discrepancies on the Drawings or in order to obtain satisfactory construction.

H. All fill slopes shall be uniformly dressed to the slope, cross-section and alignment shown on the Drawings, or as directed by the Engineer.

I. In cuts, all loose material on the back slopes shall be barred loose or otherwise removed to the line or finished grade of the slope. All cut and fill slopes shall be uniformly dressed to the slope, cross-section and alignment shown on the Drawings or as directed by the Engineer.

J. No grading is to be done in areas where there are existing pipelines that may be uncovered or damaged until such lines, which must be maintained, are relocated, or where lines are to be abandoned, all required valves are closed and drains plugged at manholes.

3.9 DISPOSAL OF UNSUITABLE AND SURPLUS MATERIAL

A. Unsuitable and surplus excavated materials, unless otherwise specified herein, and pavement shall become the property of the Contractor to be removed and disposed of by the Contractor off the project site in an approved manner.

B. Usable, excavated material may be used for fill or backfill if it meets the specifications and is approved by the Engineer. Excavated material so approved may be neatly stockpiled at the site where designated by the Engineer provided there is an area available that will not interfere with the Engineer’s access nor inconvenience traffic or adjoining property owners.

C. Surplus suitable excavated material shall be used to fill depressions as the Engineer may direct.

3.10 PROTECTION OF FINISHED WORK

A. Protect newly graded areas from traffic and erosion. Keep areas free of trash and debris and repair and re-establish grades in settled, eroded and rutted areas to specified tolerances.

B. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape and compact to required density prior to further construction.

END OF SECTION

SECTION 312317 - TRENCHING EXCAVATION AND BACKFILL

PART 1 GENERAL

1.1 SUMMARY

A. Scope of Work: The Contractor shall furnish all labor, materials, equipment and incidentals necessary to perform all excavation, backfill, grading and wall protection required to complete the utility or drainage installation shown on the Drawings and specified herein. The Work shall include, but not necessarily be limited to excavation, filling and grading under and around precast and cast in place structures to attain subgrades and grades indicated on the Drawings; trenching operations to install utility or drainage piping, manholes, catch basins and other structures including all backfilling, grading, disposal of surplus or unsuitable materials and all related work such as sheeting, bracing and water handling. All sheeting, bracing and water handling, whether for safety of workmen or to protect structures, will be performed as part of required work with no additional cost to the Owner.

B. Section Includes:
1. Excavating trenches for utilities and drainage piping including manholes, catch basins and other structures.
2. Compacted fill from top of utility bedding to finish grade.
3. Backfilling and compaction.

1.2 MEASUREMENT AND PAYMENT

A. All cost associated with trenching and backfilling for utilities shall be included in bid price for utility line or drainage piping for which trenching and backfilling is being performed.

1.3 REFERENCES

A. ASTM International:
1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).
2. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft3 (2,700 kN-m/m3)).
3. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
4. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

1.4 DEFINITIONS

A. Utility: Any buried pipe, duct, conduit, or cable.

1.5 SUBMITTALS

A. Excavation Protection Plan: Describe sheeting, shoring, and bracing materials and installation required to protect excavations and adjacent structures and property; include structural calculations to support plan.

B. Product Data: Submit data for any required geotextile fabric indicating fabric and construction.

C. Samples: Submit, in air-tight containers, 20 lb sample of each type of proposed fill to testing laboratory for approval. Samples shall be furnished a minimum of ten (10) calendar days prior to the date of anticipated use of fill.

D. Materials Source: Submit name of imported fill materials suppliers and location of borrow pit.

1.6 QUALITY ASSURANCE

A. The Contractor shall perform Work in compliance with applicable requirement codes and standards of governing authorities having jurisdiction.

B. The Owner will engage and pay for soil testing and inspection services for quality control testing during trenching and backfill operations.

1.7 COORDINATION

A. Verify Work associated with lower elevation utilities is complete before placing higher elevation utilities.

B. Cooperate with Owner and utility companies in keeping existing services and facilities in operation. Repair damaged utilities to satisfaction of utility owner or make the site available to the utility owner for his work crews to make the necessary repairs at no additional cost to the Owner.

PART 2 PRODUCTS

2.1 FILL MATERIALS

A. Select Fill: Select fill shall conform to Louisiana DOTD designation TR 423 Classes A-1-a, A-1-b, A-2-4, A-2-6, A-3, A-4 or A-6 having a maximum liquid limit of 35 and a maximum plasticity index of 18. This material is referred to as “selected soils” in the Louisiana DOTD Specifications. Based on an approved geotechnical engineering report, particularly A-6 soils, a higher elasticity index of up to 25 will be considered. Select fill can be used for backfill in over-excavated areas, for backfill from 12 inches above the top of the utility or pipe to the top of the subgrade and as structural fill/backfill.

B. Bedding Materials: Bedding materials shall conform to Louisiana DOTD Specifications Section 1003.08; however, shell will not be allowed as bedding material. These materials shall be used for placement under the utilities or drainage pipes in the trench and as a bedding material as defined on the Drawings and shall have a minimum thickness of 6

inches. These materials shall also be used for backfill in over-excavated trench areas and may be used for backfill from above the top of the utility or pipe to the top of subgrade and as structural fill/backfill.

C. Granular Fill: Granular fill shall conform to Louisiana DOTD Specifications Section 1003.07. These materials shall be used for backfilling around pipes from the bedding material up to at least 12 inches above the top of the pipes or to subgrade and in confined areas around structures. These materials may also be used as structural fill/backfill.

D. Usable Excavated Soils: Usable excavated soils, referred to as "usable soils" in Louisiana DOTD Specifications, shall conform to Classes A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-3, A-4, A-5, A-6, A-7-5 and/or A-7-6 except for soils in Classes A-5, A-6, A-7-5 and A-7-6 which may be considered unusable by the Engineer. Any soil with a plasticity index exceeding 60 will not be accepted in accordance with paragraph 203.06 in the Louisiana DOTD Specifications. Usable excavated soils can be used for backfill from 12 inches above the top of the pipe up to surface grades in unimproved areas only.

PART 3 EXECUTION

3.1 LINES AND GRADES

A. Lay pipes to lines and grades indicated on Drawings.
   1. Owner reserves right to make changes in lines, grades, and depths of utilities when changes are required for Project conditions.

B. Use laser-beam instrument with qualified operator to establish lines and grades.

3.2 PREPARATION

A. Call Louisiana One Call at 1-800-272-3020 not less than three working days before performing Work.
   1. Request underground utilities to be located and marked within and surrounding construction areas.

B. The Contractor shall examine the site and review available test borings or undertake his own soil borings prior to submitting his bid, taking into consideration all conditions that may affect his work.

C. Identify required lines, levels, contours, and datum locations.

D. Protect plant life, lawns, and other features remaining as portion of final landscaping.

E. Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

F. Maintain and protect above and below grade utilities indicated to remain.

G. Establish temporary traffic control when trenching is performed in public right-of-way. Relocate controls as required during progress of Work.

3.3 TRENCHING

A. Excavate subsoil as required for utility or drainage pipe installation.

B. Do not advance open trench more than 200 feet ahead of installed pipe.

C. Cut trenches sufficiently wide to enable installation and allow inspection. Remove water or materials that interfere with Work.

D. Excavate bottom of trenches maximum 2 feet wider than outside diameter of pipe.

E. Excavate trenches to depth indicated on Drawings. Provide uniform and continuous bearing and support for bedding material and pipe or other utility.

F. Slope sides of excavations to comply with OSHA regulations and any applicable local codes and ordinances. When Project conditions permit, slope side walls of excavation starting 2 feet above top of pipe. When side walls can not be sloped, provide sheeting and shoring to protect excavation as specified in this section. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.

G. When subsurface materials at bottom of trench are loose or soft, excavate to greater depth as directed by Engineer until suitable material is encountered.

H. Cut out soft areas of subgrade not capable of compaction in place. Backfill with select fill and compact to density equal to or greater than requirements for subsequent backfill material.

I. Unsuitable and surplus excavated materials, unless otherwise specified, shall become the property of the Contractor to be removed from the site and disposed of by the Contractor off the project site.

3.4 SHEETING AND SHORING

A. Sheet, shore, and brace excavations to prevent danger to persons, structures and adjacent properties and to prevent caving, erosion, and loss of surrounding subsoil.

B. Support trenches more than 5 feet deep excavated through unstable, loose, or soft material. Provide sheeting, shoring, bracing, or other protection to maintain stability of excavation.

C. Design sheeting and shoring to be removed at completion of excavation work.

D. Repair damage caused by failure of the sheeting, shoring, or bracing and for settlement of filled excavations or adjacent soil.

E. Repair damage to new and existing Work from settlement, water or earth pressure or other causes resulting from inadequate sheeting, shoring, or bracing.

3.5 DEWATERING, DRAINAGE AND FLOTATION

A. The contractor shall furnish all materials and equipment and perform all work required to install and maintain the drainage system he proposes for handling groundwater and surface water encountered during construction.

B. The Contractor shall construct and place in-the-dry all utilities, drainage piping, structures and bedding. In addition, the Contractor shall make the final 24-inches of excavation for this work in-the-dry and not until the water level is a minimum of twelve inches below proposed bottom of excavation.

C. The Contractor shall, at all times during construction, provide and maintain proper equipment and facilities to promptly remove and dispose of all water entering excavations and keep such excavations dry so as to obtain a satisfactory undisturbed subgrade foundation condition until the fill, structure, utility or drainage pipe to be built thereon have been completed to such extent that they will not be floated or otherwise damaged by allowing water levels to return to natural elevations.

3.6 BACKFILLING

A. Backfill trenches to contours and elevations with unfrozen fill materials of the types specified herein.

B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.

C. Place fill material in continuous layers not exceeding 8 inches in thickness and compact to 98% of the maximum density as determined by ASTM D698.

D. Employ placement method that does not disturb or damage utilities or drainage piping in trench.

E. Maintain optimum moisture content of fill materials to attain required compaction density.

F. Protect all open trenches to prevent danger to the public.

3.7 TOLERANCES

A. Top Surface of Backfilling Under Paved Areas: Plus or minus 0.05 feet from required finish grades.

B. Top Surface of General Backfilling: Plus or minus 0.10 feet from adjacent natural grades or required finish grades.

3.8 FIELD QUALITY CONTROL

A. Perform laboratory material tests in accordance with ASTM D698.

B. Perform in place compaction tests in accordance with the following:
   1. Density Tests: ASTM D2922.
   2. Moisture Tests: ASTM D3017.

C. When tests indicate Work does not meet specified requirements, remove Work, replace, compact, and retest at no additional cost to the Owner.

D. The frequency for density tests will be a minimum of one (1) test per lift per 1,000 linear feet under pavements, within street and highway rights-of-way and under building slabs and one (1) randomly selected test per 2,500 linear feet for open areas (testing of each lift in open areas is not required). If the density tests indicated that the work does not meet specified density requirements, the Engineer may require additional density tests to determine the extend of the deficient Work. The Contractor will not be allowed an extension of contract time as a result of any density testing.

3.9 PROTECTION OF FINISHED WORK

A. Protect newly graded areas from traffic and erosion. Keep areas free of trash and debris and repair and re-establish grades in settled, eroded and rutted areas to specified tolerances.

B. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape and compact to required density prior to further construction.

END OF SECTION

SECTION 31 23 20 - EARTHWORK FOR STRUCTURES

1. PART 1 GENERAL

1.1. DESCRIPTION

A. Perform all work including excavation, backfilling, filling, and grading for the foundation structures and all site work concrete other than pavements as indicated by the Contract Documents.

1.2. RELATED WORK SPECIFIED ELSEWHERE

1.3. DEFINITIONS

A. Excavation consists of the removal of material encountered to subgrade elevations and the reuse or disposal of materials removed.
B. Subgrade: The uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
C. Borrow: Soil material obtained off-site when sufficient approved soil material is not available from excavations.
D. Subbase Course: The layer placed between the subgrade and base course in a paving system or the layer placed between the subgrade and surface of a pavement or walk.
E. Base Course: The layer placed between the subbase and surface pavement in a paving system.
F. Select Fill: The layer placed between the drainage fill and the subgrade.
G. Drainage Fill: Course of washed granular material supporting slab-on-grade placed to cut off upward capillary flow of pore water.
H. Unauthorized excavation consists of removing materials beyond indicated subgrade elevations or dimensions without direction by the Owner.
I. Structures: Buildings, footings, foundations, retaining walls, slabs, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below ground surface.
J. Utilities include on-site underground pipes, conduits, ducts, and cables, as well as underground services to five feet within building lines.

1.4. QUALITY ASSURANCE

A. Codes and Standards: Perform earthwork complying with requirements of authorities having jurisdiction.
B. Testing and Inspection Service: General Contractor will employ an Earthwork Testing and Inspection Service to classify proposed on-site and borrow soils to verify that soils comply with specified requirements and to perform required field and laboratory testing and inspection service for quality control during earthwork operations. See Section 02 20 10 for requirements.

1.5. SUBMITTALS

A. Submit under provisions of Section 01 33 00.
B. Test Reports. In accordance with Section 01 33 00, the Engineer and Contractor shall receive the following reports from testing services:
    1 Liquid limits and plasticity index on borrow or existing material to be used as a base beneath concrete slabs, paving and walks. Approval of tests on base material shall be obtained prior to placement of base material.
    2 Field soil density test reports.

3 Topsoil Report. Submit copies of soil analysis report for stock piled on-site and proposed new off-site topsoil if on-site topsoil is unacceptable or of insufficient quantity.
4 Before delivery of off-site topsoil, furnish a written statement giving the location of the properties from which the topsoil is to be obtained, the names and addresses of the owners, the depth to be stripped and the crops grown during the past 2 years.
5 Before placement of on-site topsoil, furnish a soil analysis made by an approved soil testing laboratory stating the percentages of silt, clay, sand and organic matter, the pH and the mineral and plant nutrient content of the topsoil.

1.6 SITE CONDITIONS

A. Unknown Utilities. If any unknown or uncharted utilities are encountered during excavation, promptly notify the Utility Company and the Engineer and if no emergency exists wait for the Engineer's recommendation before proceeding.
B. If it is ascertained that such utility line has been abandoned, the Contractor shall properly cap the line at a depth of 12 inches or more below finish grade.
C. If such unknown utilities are encountered and work is continued without contacting the Utility Company, and damage is caused to said utilities, the Contractor shall repair, at his own expense, such damage to the satisfaction of the utility company concerned.
D. Unknown Obstacles: Should Contractor encounter any unforeseen major obstacle (or rock) in excavation, it is the intention of the Owner to cause an investigation to be made to determine a course of action that will provide for a fair and equitable solution.
E. Rock is defined as boulders measuring 1/2 cubic yard or more and materials that cannot be removed without systematic drilling and blasting such as rock material in ledges, bedded deposits, unstratified masses and conglomerate deposits, and below ground concrete or masonry structures, exceeding 1/2 cubic yard in volume, except that pavements will not be considered rock.
F. Control of Water. The Contractor shall exercise reasonable care to maintain the site and all excavations free of water at all times. The Contractor shall, after inspection, testing and approval fill all excavations and trenches as soon as possible as specified. The Contractor shall maintain at the site, or have available to him within one hour notice, workable pumps to remove water from excavations and trenches. Standing water shall not be allowed at the site and shall be removed within a reasonable period of time.

PART 2 PRODUCTS

2.1 Sand Base.

A Sand in the mixture shall be siliceous or other approved material containing not more than 4 percent organic matter and conforming to the following graduation:

U. S. Sieve	Percent Passing
No. 4	85-100
No. 40	65-100
No. 200	0-60

B. Sand shall conform to the following requirements:

Liquid Limit (Max.)	25 (AASHTO T-89)
Plasticity Index (Max.)	6 (AASHTO T-90)

2.2 Select Fill

A. Select material conforming to the following requirements. Excavated materials may be used from the Project site provided it complies with the following requirements or is made to comply through the use of approved admixtures such as sand or lime.
B. Liquid Limit: 35 max. (AASHTO T-89).
C. Plasticity Index: 18 max. (AASHTO T-90).
D. The fill shall contain no organic matter, debris and stones larger than 2 inches in any dimension.

2.3 Backfill

A. Approved sand-clay mixture, free of vegetation, debris, waste, and other deleterious matter. Stones larger than 2 inches, maximum dimension shall not be used in upper 6 inches of fill. Material removed from Project excavation, if approved, shall be used for backfill. Provide any additional fill material from off-site source as necessary to produce required grades.
B. Pervious Backfill material shall consist of gravel, crushed gravel, crushed rock, natural sands, manufactured sand, or combinations thereof and shall conform to the following grading requirements:

Sieve Size	Percentage Passing
3/4"	100
3/8"	80 - 100
No. 100	0 - 8
No. 200	0 - 3

C. Gravel Fill (Pea Gravel) fill shall be washed uniformly graded mixture of crushed stone or uncrushed gravel, free from deleterious matter. Grade by weight to pass sieves as follows:

Sieve Size	Percentage Passing
1/2 in.	100%
3/8 in.	85-100%
No. 4	10-30%
No. 8	0-10%
No. l6	0-5%

D. Impervious Fill material classified as CL or CH soil as per ASTM D-2487. Plasticity Index of material shall be a minimum of 30.

E. Top soil: A natural, fertile, friable soil possessing characteristics of representative productive soils in the vicinity. It shall not be excessively acid or alkaline or contain toxic substances which may be harmful to plant growth. It shall be free of weeds, seeds, lumps, stones, debris, roots or similar substances larger than one inch. Soil may be used from the Project site with approval from the Engineer provided it complies with these

requirements.

F. Temporary Erosion Control: Baled hay.

PART 3 EXECUTION

3.1. Protection.

A. Existing Utilities. Before starting any excavation work, Contractor shall locate all existing utilities. Existing utilities to remain shall be protected at all times by approved methods. Damage to existing utilities as the result of Contractor's operations and/or improper protection shall be repaired immediately to the satisfaction of the utility company and/or the Owner without additional expense to the Owner.

B. Other Trades. Protect, as necessary to avoid damage, the equipment, materials, and the installations of other trades who are executing work currently with work of this Section until all work of this Section has been completed.

C. Excavations and new work shall be maintained and protected from cave-ins, slides, settlement, and other injurious conditions by bracing, shoring, and other methods which will enable the work to be carried on safely and expeditiously.

D. Temporary Erosion Control. All erosion control methods indicated on the Drawings or implemented by the Contractor shall be constructed in accordance with "Erosion and Sedimentation Control Guide for Developing Areas in Louisiana" published by the United States Department of Agricultural, Soil Conservation Service. Other methods may be used if approved by the Engineer.

3.2. Topsoil Removal.

A. Remove topsoil to its entire depth from the areas within lines of project limits 10 feet outside of foundation walls of proposed building and from areas to be occupied by roads, walks and from cut and fill areas. Pile topsoil in designated or approved locations where it will not interfere with lawn maintenance. Topsoil shall be reasonably free from subsoil, debris and stones larger than one inch in diameter. The stored topsoil shall be left in piles to be used for finished grading.

3.3. Excavation.

A. Unclassified. All excavation shall be unclassified, which shall comprise and include the satisfactory removal and disposition of all materials excavated regardless of the nature of the materials encountered, at no additional expense to the Owner. Neither the condition of the material at the time it is excavated nor the manner in which it is excavated will have any bearing on or will be given consideration in the classifying of the excavation.

1. Storage. Excavated material shall not be deposited in any manner that will endanger a partly finished structure or that may be detrimental to the work or adjacent facilities and structures in any way. Excavated material shall be handled in such manner as to allow all selected material to be sued for backfilling and filling operations of this project. Excess material shall be removed from Project site and legally disposed of by the Contractor.
2. Cuts. Excavations shall be cut accurately to the lines, levels, and dimensions necessary for the completion of all work as indicated and specified.

B. Piers. The excavation for piers and abutments shall be completed to the bottom of the footings before any piles are driven therein, and excess material remaining in the excavation after pile driving shall be removed to the elevation of the bottom of the footings. When ground displacement results from pile driving operations, the Contractor shall at his expense excavate or backfill the footing area of the grade of the bottom of the

footing as shown on the plans with structure backfill material.

C. Unauthorized Excavation. Except for concrete footing and foundation work requiring soil bearing, all unauthorized excavations below the required depths shall be backfilled with approved material and compacted, as specified herinafter, without additional expense to the Owner.

D. Unauthorized excavations below the required depths for concrete footing and foundation work requiring soil bearing, shall be filled with approved concrete by extending the footing to the new depth, without additional expense to the Owner.

3.4. Cribbing and Shoring.

A. Provide temporary and/or permanent cribbing and shoring as necessary to safely retain earth banks and protect excavations from caving and other damage. Responsibility for the design, installation and maintenance of cribbing, sheathing, and shoring required by job conditions is the obligation of the Contractor. All temporary cribbing and shoring shall be removed and legally disposed of off the site when directed or when no longer necessary.

3.5. Backfill, Fill and Embankment

A. Preparation. Backfill excavations as promptly as work permits, but not until completion of following:
   1. Completion of construction below finish grade including, where applicable, dampproofing, waterproofing.
   2. Inspection, testing, approval, and recording locations of underground formwork.
   3. Removal of concrete formwork.
   4. Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Cut off temporary sheet piling driven below bottom of structures and remove in manner to prevent settlement of the structure or utilities, or leave in place if required.
   5. Removal of trash and debris.

B. Placement and Compaction. Place backfill and fill materials in layers 6" to 8" thick in loose depth for material compacted by heavy compaction equipment and not more than 4" in loose depth for material compacted by hand-operated tampers. Soil density requirements are specified herein this Section.
   1. Before compaction, moisten or aerate each layer as necessary to provide the optimum moisture content of the soil material. Compact each layer to the required percentage of maximum dry density or relatively dry for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
   2. Place backfill and fill materials evenly adjacent to structures, to the required elevations. Take care to prevent wedging action of the backfill against the structures by carrying the material uniformly around the structure to approximately the same elevation in each lift.
   3. Provide and place additional earth fill materials needed to bring existing grades to new subgrades indicated in preparation for placing topsoil, paving, or other indicated construction.

C. Embankment. Pond embankments shall be constructed from satisfactory materials free of organic or frozen material and rocks with any dimension greater than 3 inches. The

upper 12 inches of pond base and pond side of embankments shall be constructed of impervious fill material as specified hereinbefore this section. Excavate and remove existing base material if it does not meet specification requirements.

3.6. Compaction and Soil Tests.

A. Quantity. The number and location of compaction and soil tests shall be as follows:
   1. For each type of soil encountered, perform one optimum moisture - maximum density curve test.
   2. For each layer of compacted fill, make at least one field density test for every 2,000 square feet of building area, but in no case less than two tests.
   3. Payment. Refer to Section 01410.

B. Test Requirements.
   1. Soil Density - degree of compaction of fill shall be the percent of maximum density as specified hereinafter at (1%above to 2%below) optimum moisture content. Degree of compaction shall be as determined by ASTM D--698 (Standard Proctor lab test) and AASHTO T-238 (Nuclear Method field test). Each layer shall be compacted, tested, and approved before another layer is added.

C. Schedule of Requirements.
   1. General. The percentages stated in the following schedule refer to the soil density requirements as stated in preceding article "Test Requirements." Compaction requirements shall be considered to be uniform throughout for the indicated area: i.e., in cut, fill, and undisturbed soils.
   2. Beneath Structures.
      a. Subgrade. Grade (cut and/or fill) to elevations indicated. Add select fill to bring the grade up to required elevations and compact to 95%.
      b. Finish-grade. Top layer to be type and thickness of soil material and compaction required for the specific area.
   3. Lawns and Landscaped Areas.
      a. Sub-grade - Grade (cut and/or fill) to the elevations required by the drawings and specifications. Use the existing soil from the site or add soil equal to the site's soil to bring the grade up to the required elevations and compact to the approximate density of the material soil at the site. The soil shall be free of all plant material, wood, trash, building materials, rock, and stones larger than one inch.
      b. Finish-grade - Install a minimum of 4 inches thickness of top soil, grade to elevations required and compact to the approximate density of the material soil at the site.

3.7. Rough and Finish Grading.

A. Grading (cut and/or fill) shall be to the elevations as shown and as specified. Unless closer tolerances are required, the maximum deviation from indicated or interpolated elevations shall be plus or minus 1 inch in ten feet.
   1. Areas paved with concrete paving. Grade to elevations coinciding with the bottom of the concrete paving which is specified to be furnished in installed under another section. Maximum deviation from indicated or interpolated elevations shall be plus or minus 1/2 inch in ten feet.
   2. Areas under concrete slabs on grade. Grade to elevations coinciding with bottom of the sand fill. Maximum deviation from indicated or interpolated elevations shall be plus "O" inches or minus 1/2 inch in ten feet.
   3. Grass and Landscaped Areas. Rough grade to elevations indicated, less

approximately 4" for placement of loose top soil obtained from the site or from approved sources from off the site. Approval shall be obtained before using material from the site. Just prior to completion of the project, all areas shall be raked, compacted if necessary, and finish graded to indicated elevations with a maximum deviation of plus or minus 1 inch. All areas shall be clean and free from debris and rocks.

4. Tolerances referred to above are not additive and can occur only within their specific length.

3.8. Placing Sand Fill.

A. Place sand over subgrade where indicated or specified to required thickness (4 in. min.). Spread evenly over the area and compact to maximum density. Bring to even grade at required elevation.

3.9. Placement of Pervious Material.

A. Pervious backfill material shall be placed in layers by the same methods specified for structure backfill. Pervious backfill material at any one location shall be approximately the same grading, and at locations where the material would otherwise be exposed to erosion shall be covered with at least one foot of earthy material.

3.10. Placing Top Soil.

A. After rough grading has been compacted approved top soil material where indicated to a min. depth of 4". Sprinkle with water to compact. Re-grade after compaction to smooth, uniform condition free of debris and stones larger than one inch.

3.11. Disposal of Excess and Waste Materials.

A. Remove waste materials including excavated material classified as unsatisfactory soil material, trash, and debris, and dispose of it off the Owner's property.

3.12. Protection of Graded Surfaces.

A. Newly graded areas shall be protected from traffic, erosion, and any settlement or washing away that may occur from any cause, prior to date of Substantial Completion, and shall be repaired and grades re-established to required elevations and slopes.

END OF SECTION 31 23 20

SECTION 312513 - TEMPORARY EROSION AND SEDIMENTATION CONTROL

PART 1 GENERAL

1.1 SUMMARY

A. The work specified in this Section consists of designing, providing, maintaining and removing temporary erosion and sedimentation controls as necessary.

B. Temporary erosion controls include, but are not limited to, grassing, mulching, setting, watering, and reseeding onsite surfaces and spoil and borrow area surfaces and providing interceptor ditches at ends of berms and at those locations which will ensure that erosion during construction will be either eliminated or maintained within acceptable limits as established by the Owner.

C. Temporary sedimentation controls include, but are not limited to, silt dams, traps, barriers, and appurtenances at the foot of sloped surfaces which will ensure that sedimentation pollution will be either eliminated or maintained within acceptable limits as established by the Owner.

D. Contractor is responsible for providing effective temporary erosion and sediment control measures during construction or until final controls become effective.

E. It shall be the responsibility of the Contractor to attain all permits and associated documentation necessary to provide a Stormwater Pollution Prevention Plan for the construction site as required by the Louisiana Department of Environmental Quality.

1.2 REFERENCE DOCUMENTS

A. Applicable State of Louisiana or City Building Code and Standard Building Code.

PART 2 PRODUCTS

2.1 EROSION CONTROL

A. Netting — fabricated of material acceptable to the Owner.

B. Straw mulch shall be utilized on all newly graded areas to protect areas against washouts and erosion. Straw mulch shall be comprised of threshed straw of oats, wheat, barley, or rye that is free from noxious weeds, mold or other objectionable material. The straw mulch shall contain at least 50 percent by weight of material to be 10-in, or longer. Straw shall be in an air-dry condition and suitable for placement with blower equipment.

2.2 SEDIMENTATION CONTROL

A. Bales - clean, seed-free cereal-hay type.

B. Netting - fabricated of material acceptable to the Owner.

C. Filter stone - crushed stone conforming to State D.O.T.D. Specifications.

D. Concrete block - hollow, non-load-bearing type.

E. Concrete - exterior grade not less than one inch thick.

2.3 SILT FENCE

A. Steel posts shall be a minimum of 5-ft in. length, 2-1/2-in, by 2-1/2-in, by 1/4in. angle post with self-fastening tabs and a 5-in, by 4in. (nominal) steel anchor plate at bottom.

B. Welded wire fabric shall be 4-in, by 4-in, mesh of 12 gauge by 12 gauge steel wire.

C. Silt fence fabric shall be a woven, polypropylene, ultraviolet resistant material such as Mirafi 100X as manufactured by Mirafi, Inc., Charlotte, NC or equal.

D. Tie wires for securing silt fence fabric to wire mesh shall be light gauge metal clips (hog rings), or 1/32-in, diameter soft aluminum wire.

E. Prefabricated commercial silt fence may be substituted for built-in-field fence. Prefabricated silt fence shall be “Envirofence” as manufactured by Mirafi Inc., Charlotte, NC or equal.

PART 3 EXECUTION

3.1 EROSION CONTROL

A. Minimum procedures for grassing are:
1. Scarify slopes to a depth of not less than six inches and remove large clods, rock, stumps, roots larger than 2-inch in diameter and debris.
2. Sow seed within twenty-four (24) hours after the ground is scarified with either mechanical seed drills or rotary hand seeders.
3. Apply mulch loosely and to a thickness of between 3/4-inch and 1-1/2-inches.
4. Apply netting over mulched areas on sloped surfaces.
5. Roll and water seeded areas in a manner which will encourage sprouting of seeds and growing of grass. Reseed areas which exhibit unsatisfactory growth. Backfill and seed eroded areas.

3.2 SEDIMENTATION CONTROL

A. Install and maintain silt dams, traps, barriers, and appurtenances as shown on the approved descriptions and working drawings. Hay bales which deteriorate and filter stone which is dislodged shall be replaced.

B. Silt Fence Installation
1. Silt Fences shall be positioned as necessary to prevent off site movement of sediment produced by construction activities as directed by the Engineer.
2. Dig trench 6-in wide and 6-in deep along proposed fence lines.
3. Drive metal-stakes, 8-ft on center (maximum) at back edge of trenches. Stakes shall be driven 2-ft (minimum) into ground.

4. Hang 4 by 4 woven wire mesh on posts, setting bottom of wire in bottom of trench. Secure wire to posts with self-fastening tabs.
5. Hang filter fabric on wire carrying to bottom of trench with about 4-in, of fabric laid across bottom of trench. Stretch fabric taut along fence length and secure with tie wires 12-in. O.C. both ways.
6. Backfill trench with excavated material and tamp.
7. Install pre-fabricated silt fence according to manufacturer's instructions.

C. Staging areas and access ways shall be surfaced with a minimum depth of 4-in, crushed stone.

3.3 MAINTENANCE AND INSPECTIONS

A. Inspections:
1. Make a visual inspection of all sedimentation control devices once per week and promptly after every rainstorm. If such inspection reveals that additional measures are needed to prevent movement of sediment to offsite areas, promptly install additional devices as needed. Sediment controls in need of maintenance shall be repaired promptly.

B. Device Maintenance:
1. Silt Fences:
   a. Remove accumulated sediment once it builds up to one-half of the height of the fabric.
   b. Replace damaged fabric or patch with a 2-ft minimum overlap.
   c. Make other repairs as necessary to ensure that the fence is filtering all runoff directed to the fence.
2. Add crushed stone to access ways and staging area as necessary to maintain a firm surface free of ruts and mud holes.

3.4 PERFORMANCE

A. Should any of the temporary erosion and sediment control measures employed by the Contractor fail to produce results which comply with the requirements of the State of Louisiana and the Owner, Contractor shall immediately take whatever steps are necessary to correct the deficiency at his own expense.

END OF SECTION

SECTION 320523 – CEMENT & CONCRETE FOR EXTERIOR IMPROVEMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Scope of Work:
1. This section includes all materials, equipment, labor and incidentals to provide cast-in-place concrete to the lines, grades, thicknesses and strengths indicated in the plans as required to complete the project. Formwork, reinforcement, jointing, accessories, finishing and curing are all included in this section.

B. Related Sections:
1. Section 32 16 13 - Concrete Curbs and Sidewalks.
2. Section 33 40 00 - Storm Drainage Utilities.

1.2 REFERENCES

A. American Concrete Institute (ACI):
1. ACI 116R – Cement and Concrete Terminology
2. ACI 117 – Standard Specifications for Tolerances for Concrete Construction and Materials.
3. ACI 221.1 – Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete.
4. ACI 211.2 – Standard Practice for Selecting Proportions for Structural Lightweight Concrete.
5. ACI 301 – Standard Specifications for Structural Concrete.
6. ACI 302.1R – Guide for Concrete Floor and Slab Construction.
7. ACI 303.1 – Standard Specification for Cast-In-Place Architectural Concrete.
8. ACI 304R – Guide for Measuring, Mixing, Transporting, and Placing Concrete.
9. ACI 304.2R – Placing Concrete by Pumping Methods.
10. ACI 305R – Hot Weather Concreting.
11. ACI 306.1 – Standard Specification for Cold Weather Concreting.
12. ACI 308 – Standard Practice for Curing Concrete.
13. ACI 309R – Guide for Consolidation of Concrete.
14. ACI 315 – Details and Detailing of Concrete Reinforcement.
15. ACI 318 – Building Code Requirements for Structural Concrete.
16. ACI 347 – Formwork for Concrete.
17. ACI 502.4 – Standard Specification for Repairing Concrete with Epoxy Mortars.

B. American Society for Testing and Materials (ASTM):
1. ASTM A185 – Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
2. ASTM A615 – Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
3. ASTM C31 – Standard Practice for Making and Curing Concrete Test Specimens in the Field.
4. ASTM C33 – Specification for Concrete Aggregates.

5. ASTM C39 – Test Method for Compressive Strength of Cylindrical Concrete Specimens.
6. ASTM C40 – Test Method for Organic Impurities in Fine Aggregates for Concrete.
7. ASTM C42 – Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
8. ASTM C94 – Specification for Ready-Mixed Concrete.
9. ASTM C114 – Test Methods for Chemical Analysis of Hydraulic Cement.
10. ASTM C117 – Test Method for materials finer than No. 200 Sieve in Mineral Aggregates by Washing.
11. ASTM C123 – Test Method for Lightweight Particles in Aggregate.
12. ASTM C127 – Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate.
13. ASTM C128 – Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate.
14. ASTM C136 – Test Method for Sieve Analysis of Fine and Coarse Aggregates.
15. ASTM C142 – Test Method for Clay Lumps and Friable Particles in Aggregates.
16. ASTM C143 – Test Method for Slump of Hydraulic Cement Concrete.
17. ASTM C150 – Specification for Portland Cement.
18. ASTM C171 – Specification for Sheet Materials for Curing Concrete.
19. ASTM C172 – Standard Practice for Sampling Freshly Mixed Concrete.
20. ASTM C309 – Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
21. ASTM C330 – Specification for Lightweight Aggregates for Structural Concrete.
22. ASTM C470 – Specification for Molds for Forming Concrete Test Cylinders Vertically.
23. ASTM C494 – Specification for Chemical Admixtures for Concrete.
24. ASTM C618 – Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.
25. ASTM C979 – Specification for Pigments for Integrally Colored Concrete.
26. ASTM C1017 – Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
27. ASTM D994 – Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
28. ASTM D1190 – Specification for Concrete Joint Sealer, Hot-Applied Elastic Type.
29. ASTM D1751 – Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
30. ASTM D3405 – Specification for Joint Sealant, Hot-Applied, for Concrete and Asphalt Pavements.
31. ASTM D3406 – Specification for Joint Sealant, Hot-Applied, Elastomeric-Type, for Portland Cement Concrete Pavements.
32. ASTM E329 – Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.

C. American Welding Society (AWS):
1. AWS D1.4 – Structural Welding Code – Reinforcing Steel.

D. Concrete Reinforcing Steel Institute (CRSI):

1. CRSI Manual of Standard Practice
2. CRSI Publication – Placing Reinforcing Bars

E. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.3 DESCRIPTION

A. Portland cement concrete shall be composed of Portland cement, fine aggregate, coarse aggregate and water, with or without admixtures as approved by the Engineer, proportioned and mixed as specified herein.

1.4 SUBMITTALS

A. Concrete mix designs: Submit mix designs including laboratory test reports of trial strength and shrinkage tests.

B. Submit Shop Drawings:
1. Indicate pertinent dimensioning, form materials, arrangement of joints and ties, location of bracing and temporary supports, schedule of erection and stripping.
2. Indicate reinforcement sizes, spacings, locations, and quantities, bending and cutting schedules, supporting and spacing devices.
3. Indicate the location of all joints in concrete, including construction joints, expansion joints, isolation joints and contraction joints.

C. Product Data: Submit manufacturer's product data for proposed concrete admixtures.

D. Affidavits/Certificates: For each shipment of materials, submit evidence of compliance with specification requirements for cement, aggregate and admixtures. Mill tests and manufacturer's certification of compliance with ASTM Specifications will be accepted in lieu of testing of cement and analysis of aggregates. Certificates of Compliance shall be signed by the materials manufacturer and the Contractor.

E. Batch Tickets: Submit a delivery ticket with each batch of concrete delivered to the site in accordance with the requirements of ASTM C94.

1.5 QUALITY ASSURANCE

A. Design, construct, erect and maintain concrete formwork in accordance with ACI 301, ACI 318 and ACI 347, as applicable.

B. Perform concrete reinforcing work in accordance with ACI 301, ACI 318 and CRSI Manual of Practice, as applicable.

C. Perform cast-in-place concrete work in accordance with ACI 301 and ACI 318, as applicable.

D. Cold joints in concrete will not be permitted unless planned and treated properly as construction joints.

E. Concrete tolerances shall comply with the requirements of ACI 117 as applicable.

F. The Contractor shall select a qualified concrete supplier capable of meeting project requirements and the requirements of these specifications.

G. The concrete supplier shall be certified by the National Ready Mix Concrete Association and shall hold a valid certificate of conformance for concrete production facilities.

H. Finishing of and finishes for concrete surfaces shall conform to the applicable requirements of ACI 301.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver reinforcing bars to the fabricator in bundles, limited to one size and length of bar, securely tied and identified with plastic tags in an exposed position indicating the mill, the melt or heat number and the grade and size of bars.

B. Deliver steel reinforcement to the jobsite, store and cover in a manner which will ensure that no damage shall occur to it from moisture, dirt, grease, oil or other cause which might impair bond with concrete.

C. Store form panels to prevent warping. Protect panels from damage and contamination which could adversely affect concrete.

D. Lift form panels by methods that will project panels from damage and distortion.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Hot Weather Concreting:
1. Batching, mixing and delivering of concrete in hot weather shall conform to the applicable requirements of ACI 305R.
2. Maximum ambient temperature for placing concrete shall be 90 degrees F. If the ambient temperature exceeds 90 degrees F, the mix shall be cooled by an appropriate method approved by the Engineer. Maintain uniform concrete temperature for succeeding batches placed.

B. Cold Weather Concreting:
1. Batching, mixing and delivering of concrete in cold weather shall conform to the applicable requirements of ACI 306.1.
2. No concrete shall be placed when the ambient temperature drops below 35 degrees F, or is below 40 degrees F and falling except by written approval by the Engineer.
3. All concrete shall be protected against freezing for at least 36 hours after placing.

C. Do not place concrete in, or adjacent to, any structure where piles are required until all piles in the structure have been driven or installed.

D. Do not place concrete when the rate of evaporation of surface moisture from concrete exceeds 0.2 pounds per square foot per hour as indicated in Figure 2.1.5 of ACI 305R.

PART 2 PRODUCTS

2.1 PORTLAND CEMENT CONCRETE MATERIALS

A. Portland Cement: ASTM C150, Type I or Type II, low alkali. Type III Portland cement may be used where high early strength concrete is a requirement as approved by the Engineer.

B. Aggregates:
1. Coarse Aggregate: ASTM C33, clean and uniformly graded from 3/8 inch to the maximum size indicated or specified. If not specified, provide 1 inch maximum size (ASTM C33, Size No. 57). Deleterious materials in aggregates shall not exceed the limits specified in ASTM C33.
2. Fine Aggregate: ASTM C33, uniformly graded from 3/8 inch to fines, washed clean. Deleterious materials in fine aggregates shall not exceed the limits specified in ASTM C33.
3. Lightweight Aggregates: ASTM C330, uniformly graded to a maximum size indicated or specified. When not specified, provide 3/4 inch to No. 4 coarse aggregate combined with ASTM C33 graded fine aggregate.
4. Aggregate for Exposed Concrete: Aggregate for concrete which will be exposed to the public shall be obtained from one source for each type of aggregate required in order to produce uniform color.

C. Concrete Admixtures and Cementitious Materials: The Contractor may include accepted concrete admixtures and cementitious materials in the mix to improve the water-cement ratio or water-cementitious ratio or workability of the concrete, providing the strengths specified and other desirable characteristics of the concrete can be achieved and maintained. Admixtures require the Engineer’s acceptance before they may be used, and shall be included in the design mix, introduced in solution form. Admixtures shall be added at the batch plant, except as otherwise noted herein.
1. Chemical Admixtures, Water-Reducing: ASTM C494, Type A.
2. Pozzolanic Admixtures: ASTM C618, Class N or F.
3. Fly Ash: ASTM C618, Class F, with a maximum of 25 percent retained on the No. 325 mesh sieve and a loss on ignition of 1.0 percent maximum.
4. Pigments for Integrally Colored Concrete: ASTM C979, for synthetic or natural iron oxides (red).
5. Chemical Admixtures, Plasticizing: ASTM C1017, or ASTM C494 Type F or Type G, high-range water-reducing admixtures.
6. Prohibited Admixtures: Admixtures containing chlorides or sulfides are not acceptable.

D. Water: Water for concrete mixes, curing and cleaning shall be clean and potable, free of impurities detrimental to concrete.

E. Reinforcement Fibers: Chopped strands of alkali-resistant polypropylene fibers added to the concrete mix for protection against shrinkage cracks where indicated or required.

2.2 CONCRETE MIX

A. Mix and deliver concrete in accordance with ASTM C94, Option A.

B. Furnish concrete of the following strengths as specified in the construction plans:
   1. Class A(M) Concrete:
      a. Compressive strength 4,500 psi (28 day).
      b. Slump 2 to 5 inches.
      c. Minimum Cement Content: 564 lbs/cu yd.
      d. Maximum water-cement ratio: 0.53 lbs/lb.
   2. Class A Concrete:
      a. Compressive strength 4,000 psi (28 day).
      b. Slump 2 to 5 inches.
      c. Minimum Cement Content: 564 lbs/cu yd.
      d. Maximum water-cement ratio: 0.53 lbs/lb.
   3. Class F Concrete:
      a. Compressive strength 3,500 psi (28 day).
      b. Slump 2 to 5 inches.
      c. Minimum Cement Content: 517 lbs/cu yd.
      d. Maximum water-cement ratio: 0.44 lbs/lb.
   4. Class M Concrete:
      a. Compressive strength 3,000 psi (28 day).
      b. Slump 2 to 5 inches.
      c. Minimum Cement Content: 545 lbs/cu yd.
      d. Maximum water-cement ratio: 0.53 lbs/lb.
   5. Class R Concrete:
      a. Compressive strength 1,800 psi (28 day).
      b. Slump 2 to 5 inches.
      c. Minimum Cement Content: 376 lbs/cu yd.
      d. Maximum water-cement ratio: 0.70 lbs/lb.

C. Select admixture proportions for normal weight concrete in accordance with ACI 318.

D. Each class of concrete shall be proportioned to result in the minimum compressive strength as specified and shall have the minimum amount of water necessary to produce a plastic, workable mix that will enter into the corners and angles of the forms and voids to be filled and around the reinforcement by utilizing placing methods which are as specified herein and as is considered good practice.

E. If concrete is to be placed by pumping, concrete mixes shall be designed in accordance with the applicable requirements of ACI 304R and ACI 304.2R, and shall include strengths and slumps.

2.3 BATCHING, MIXING AND TRANSPORTING

A. Batching, mixing and transporting Portland cement concrete shall conform to the applicable requirements of ACI 301 and ACI 304R.

B. Concrete shall be central-mixed concrete from a central batch plant, to be transported to the jobsite in a truck mixer, in accordance with the requirements of ASTM C94. Equipment used in the manufacture of concrete shall be kept clean at all times.

C. Mixers shall be equipped with automatic device for recording the number of revolutions of the drum prior to completion of the mixing operation. Each transit mixer shall also be

equipped with water measuring devices consisting of either accurately calibrated water tanks or water meters.

D. Concrete in truck mixer shall be mixed continuously until discharged. The discharge time for concrete after introduction of mixing water shall not exceed 60 minutes. The discharge time for concrete after cement has been mixed with aggregate shall not exceed 90 minutes. Delivery tickets shall show departure time from plants.

E. Ready-mixed concrete shall be mixed for a period of not less than 10 minutes and at least 3 minutes of the mixing period shall be immediately prior to discharging at the job site.

2.4 FORM MATERIALS AND ACCESSORIES

A. Forms shall be of wood, steel, masonite or other approved material. Formwork shall meet the requirements of ACI 301, ACI 318 and ACI 347.

B. All form material shall be of good quality, free from loose knots, holes, dents or other irregularities. All forms shall be true to line and grade, mortar tight and rigid to prevent objectionable deformation. The Contractor will be required to remove and replace any concrete that has bulged or sagged as a result of inadequate forms. Forms or form lumber to be re-used shall be maintained clean and in good condition so as not to warp, deteriorate or otherwise change properties which might result in an inferior finished product.

C. Falsework: All falsework shall be true to line and grade and shall be sufficiently rigid including any necessary bracing to carry the implied loads without excessive or objectionable settlement or deformation.

D. Steel Forms: Forms shall be proprietary, patented or fabricated steel forms, using standard or commercial quality, uncoated steel sheet or plate, 3/16 inch minim thickness, for panel facings. Use material which is clean, smooth and free from warps, bends, kinks, rust, cracks and matter which may stain concrete. Provide surfaces that will not impart corrosion residue to concrete. Include panel framing, reinforcement and erection accessories.

E. Round Column Forms: Forms shall be pressed or molded fiber-reinforced plastic or steel manufactured round column forms. The forms shall be seamless or one-piece (one vertical seam) with smooth surface. Provide forms that will not deflect under pressure of concrete placement.

F. Form Ties: Rod type, with ends or end fasteners which can be removed without spalling the concrete and which leave a hole equal in depth to the required reinforcement clearance. Form ties shall be of a design in which the hole left by the removed end or end fastener is easily filled to match the surface of the hardened concrete. Provide removable cones 1-1/4 inches in diameter by 1-1/2 inches deep. Provide preformed mortar plugs to match the color of concrete exposed to the public, recessed 1/4 inch, adhered with an approved epoxy adhesive.

G. Water stops: Water stops shall be of polyvinyl chloride (PVC) and shall be 6 inches wide with 3/16 inch web similar to “Durajoint” as manufactured by Electronvent, Inc.

H. Chamfer Strips: 3/4 inch by 3/4 inch triangular fillets milled form clear, straight-grain pine, surfaced on each side.

I. Form Release Agent: Commercial formulation, silicone-free form-release agent, designed for use on all types of forms, which will not bond with, stain nor adversely affect concrete surfaces, and which will not impair subsequent treatment of concrete surfaces requiring bond or adhesion nor impede wetting of surfaces which will be cured with water, steam or curing compounds.

J. Formed Construction Joints for Slab-on-Grade: Galvanized steel, tongue and groove type profile, knockout holes to receive doweling as detailed in construction plans.

2.5 REINFORCEMENT MATERIALS AND FABRICATION

A. Deformed Reinforcement Bars: ASTM A615; Grade 60, steel bars. ASTM A615 bars may be welded only if more stringent requirements of AWS D1.4 are followed.

B. Welded Plain Wire Fabric: ASTM A185; in flat sheets or coiled rolls, with wire sizes and center-to-center spacings as indicated.

C. Accessories: Provide reinforcement accessories, consisting of bar supports, spacers, hangers, chairs, ties and similar items as required for spacing, assembling and supporting reinforcement in place. Conform with SRSI referenced standards and the following requirements:
1. For footings, grade beams, and slabs on grade, provide supports with precast concrete or mortar bases or plates or horizontal runners where wetted base materials will not support chair legs.
2. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms or are in close proximity to finished surfaces, provide supports with legs which are galvanized, plastic-coated or stainless steel.

D. Tie Wire: No. 16 gage or heavier, black or galvanized, soft or commercial grade steel tie wire.

E. Fabricate concrete reinforcement in accordance with applicable requirements of ACI 301, ACI 318 and CRSI Manual of Standard Practice.

F. Cutting and bending shall be performed at a central location, equipped and suitable for the purpose. Bars shall be accurately cut and bent as indicated. Bars shall be bent cold. Heating of bars for bending or straightening will not be permitted. Bars shall not be bent or straightened in any manner which will injure the material.

G. Weld reinforcement in accordance with AWS D1.4 using E90XX low hydrogen electrodes (for shielded metal arc welding).

2.6 FINISHING TOOLS AND EQUIPMENT

A. The Contractor shall furnish all materials, tools, equipment, facilities and services as required for performing the required concrete finishing work.

B. Repair and Finishing Materials:

1. Portland Cement: ASTM C150, Type II, of the same brand as used in the work. Furnish white Portland cement where required to produce color matching color of surrounding concrete.
2. Aggregate:
   a. For Bonding Grout: ASTM C33, washed clean sand passing a No. 30 sieve.
   b. For Patching Mortar: ASTM C33, washed clean, graded fine aggregate of suitable size for areas to be repaired. Clean coarse aggregate up to Size No. 8 may be added for repair of larger pockets or voids.
3. Commercial Patching Mortar: A structural repair mortar may be furnished if appropriate for the use and approved by the Engineer.
4. Epoxy Patching Mortar: As specified in ACI 503.4 for Epoxy Mortar.
5. Epoxy Adhesive: ASTM C881, Type II or Type V, epoxy-based bonding agent.
6. Anti-Slip Abrasive Grit: Virgin grain Aluminum Oxide or Silicon Carbide particles, or a mixture of the two.

2.7 COMPOUNDS, HARDENERS AND SEALERS

A. Curing Compound: ASTM C309, liquid membrane-forming curing compound, Type 1, Class A or B as appropriate for the use or location.

B. Waterproof Sheet Materials: ASTM C171, waterproof paper with white paper face, polyethylene film pigmented white, or white burlap-polyethylene sheeting.

C. Joint Filler: Pre-molded, of sizes and thicknesses indicated, conforming to ASTM D994 or ASTM D1751, as applicable. For structural joints and joints subject to movement, provide elastomeric joint seals conforming to ASTM D2628 or ASTM D3542, as applicable.

D. Joint Sealing Compound: Concrete joint sealant, conforming to ASTM D1190, ASTM D3405 or ASTM D3406, as applicable, for sealing of expansion (isolation) and contraction (control) joints in slabs and pavement and at junction of slabs and pavement with other poured concrete. Color of joint sealant shall blend in with finished concrete surface. For asphalt pavements, provide ASTM D3405 sealant only. For concrete pavements and roadways, provide ASTM D3406 sealant only.

PART 3 EXECUTION

3.1 FORMWORK ERECTION

A. Erect formwork, shoring and bracing in a manner that will produce finished concrete surfaces conforming to indicated design and within specified tolerances.

B. Make joints and seams mortar-tight. Install leakage control materials in accordance with the manufacturer’s installation instructions, and in a manner that will maintain a smooth continuity of plane between abutting form panels and which will resist displacement by concreting operations

C. Provide bracing to ensure stability of formwork. Support joints with extra studs or girts in a manner that will ensure true square intersections.

D. Assemble forms in a manner that will facilitate their removal without damage to the concrete.

E. Provide camber in formwork as required to compensate for deflections caused by weight and pressures of fresh concrete and construction loads and as otherwise indicated. Provide camber strips to compensate for deflections due to permanent loads and long-term deflections due to shrinkage and creep as required.

F. Provide construction openings in forms where required for concrete pour pockets, vibrator access holes and inspection openings to aid in proper placement and consolidation of concrete. Close up openings during placement of concrete as applicable.

G. Form external corners of exposed concrete with 3/4 inch chamfer.

H. Apply form release agent to formwork prior to placing form accessories and reinforcement. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings affected by agent.

I. Clean forms as erection proceeds, to remove foreign matter.

J. Locate concrete joints as indicated in the construction plans. Support forms for joints in concrete so as to rigidly maintain their positions during placement, vibration and curing of concrete.

K. Locate and install joints, for which locations are not indicated, so as not to impair strength and appearance of the finished product. Changes to the proposed joint layout require Engineer’s approval.

L. Provide keyed construction joints as indicated in the construction drawings. Continue reinforcement across construction joints.

3.2 INSERTS, EMBEDDED COMPONENTS, AND OPENINGS

A. Install conduit, pipe sleeves, water stops, appliance boxes, frames for items recessed in walls, door frames, drains, metal ties, inserts, nailing strips, blocking, grounds and other fastening devices required for anchorage or attachment of other work. Firmly secure products in position, located accurately as indicated, before beginning concrete placement.

B. Coordinate work of other sections in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors, and other inserts.

C. Install concrete accessories straight, level, and plumb.

D. Install water stops continuous without displacing reinforcement.

3.3 REINFORCEMENT PLACEMENT

A. Placing Standards: Reinforcing steel shall be placed in accordance with the Contract Drawings, approved Shop Drawings, and the applicable requirements of ACI 301, ACI 318, CRSI Manual of Standard Practice and SRSI Placing Reinforcing Bars. Install reinforcement accurately and secure against movement, particularly under the weight of workers and the placement of concrete.

B. Reinforcing Supports: Bars shall be supported on metal or plastic chairs, spacers and hangers, accurately placed and securely fastened to steel reinforcement in place. Support legs of accessories in forms with out embedding in the form surface. Hoops and stirrups shall be accurately spaced and wired to the reinforcement.

C. Placing and Tying: Reinforcing steel shall be installed in place, spaced and rigidly and securely tied or wired with tie wire at all splices and a crossing points and intersections in the positions indicated. It is not necessary to tie bars at every intersection. Comply with the requirements of CRSI Placing Reinforcing Bars, Chapter 10. Rebending of bars on the job to fit different conditions will not be permitted. Point ends of wire ties away from adjacent surfaces.

D. Spacing: Center-to-center distance between parallel bars shall be in accordance with the Contract Drawings or, where not indicated, the minimum clear spacing shall be in accordance with ACI 318. Where bars are indicated in multiple layers, place upper bars directly above lower bars.

E. Longitudinal Location of Bends and Ends of Bar: A maximum of plus or minus 3 inches from the indicated location will be permitted, provided that the specified protective concrete cover at ends of members is not reduced by more than 1/2 inch.

F. Lapped Splices:
1. Laps of splices shall be securely tied together to maintain the alignment of the bars, to provide the required clearances, and to transfer stress by bond. Lapped splices and development lengths not shown shall be detailed to develop Class B lapping lengths and development lengths in tension, respectively, in accordance with ACI 318.
2. Splices of alternate bars shall be staggered a minimum clear offset of 2 feet between splices. Splices shall be tied with tie wire, or splices may be lap welded in accordance with AWS D1.4. Lapped splices are not permitted for No. 14 and No. 18 bars, or when specifically excluded by Contract provisions regardless of size.

G. Dowels: Provide dowels where indicated or required for connecting construction and for maintaining structural and reinforcement continuity. Dowels shall be tied securely in place before concrete is deposited. Provide additional bars for proper support and anchorage where required. Do not bend dowels after embedment.

H. Welded Wire Fabric:
1. Wire fabric shall be installed in lengths as long as practicable and shall be wire-tied at all laps and splices. End laps shall be offset in adjacent widths. Lap welded wire fabric in accordance with applicable requirements of ACI 318.

2. Where required, welded wire fabric shall be secured in position with suitable supports, accessories and tie wire as indicated and required to ensure against movement from workers and placement of concrete to assure proper embedment at position indicated.

I. Ensure reinforcing is clean, free of loose scale, dirt, or other foreign coatings.

J. Weld reinforcement in accordance with AWS D1.4. Do not weld crossing reinforcement bars for assembly.

K. Maintain minimum concrete cover around reinforcement in accordance with ACI 301, ACI 318 and CRSI Manual of Standard Practice. If there is a conflict between the standards specified, the thicker concrete coverage shall govern.

3.4 PLACING CONCRETE

A. Inspect forms, earth bearing surfaces, reinforcement and embedded items and obtain the Engineer's approval before placing concrete.

B. Place concrete under the observation of the Engineer.

C. Whenever possible, place concrete during normal working hours. When concrete placement schedules require concrete placement at times other than normal working hours, ensure that the Engineer is notified and is present at the time of placement.

D. Prior to placement of concrete, the subgrade shall be in a firm, well-drained condition, and of adequate and uniform load-bearing nature to support construction personnel, construction materials, construction equipment and steel reinforcing mats without tracking, rutting, heaving or settlement. All weak, soft, saturated or otherwise unsuitable material shall be removed and replaced with approved backfill.

E. Earth bottoms or bearing surfaces for footings and slabs shall be dampened but not saturated or muddied just before placement of concrete.

F. Transporting:
1. Concrete shall be central-mixed concrete from a central batch plant, transported to the jobsite in a truck mixer, in accordance with the requirements specified herein and ASTM C94.
2. Transport concrete to the jobsite in a manner that will assure efficient delivery of concrete to the point of placement without adversely altering specified properties with regard to water-cement ratio, slump, air entrainment and homogeneity.

G. Placement Standards: Conveying and placing of concrete shall conform with applicable requirements of ACI 301, ACI 302.1R, ACI 304R and ACI 318.

H. Handling and Depositing:
1. Concrete placing equipment shall have sufficient capacity to provide a placement rate that will preclude cold joints and that shall deposit the concrete without segregation or loss of ingredients
2. Concrete placement, once started, shall be carried on as a continuous operation until the section of approved size and shape is completed.

3. Concrete shall be handled as rapidly as practicable from the mixer to the place of final deposit by methods that prevent the separation or loss of ingredients. Concrete shall be deposited, as nearly as practicable, in its final horizontal position to avoid redistribution or flowing.
4. Concrete shall not be dropped freely where reinforcing will cause segregation, nor shall it be dropped freely more than 5 feet. Concrete shall be deposited to maintain a plastic surface approximately horizontal.
5. In placing wall, columns or thin sections (6 inches or less in thickness) or heights greater than 10 feet, concrete placement rate, lift thickness and time intervals between lifts shall be as indicated on approved Shop Drawings. Openings in the form, elephant trunk tremies, or other approved devices shall be used that will permit the concrete to be placed without segregation or accumulation of hardened concrete on the forms or metal reinforcement above the level of the fresh concrete.
6. Concrete that has partially hardened shall not be deposited in the work. The discharge of concrete shall be started no later than 60 minutes after the introduction of mixing water.

I. Pumping:
1. Concrete may be placed by pumping if the maximum slump can be maintained and if accepted in writing by the Engineer for the location proposed.
2. Placing concrete by pumping methods shall conform with applicable requirements of ACI 304R and ACI 304.2R.
3. Equipment for pumping shall be of such size and design as to ensure a continuous flow of concrete at the delivery end without separation of materials. Concrete from end of hose shall have a free fall of less than 5 feet. Pump hosed shall be supported on horses or similar devices so that reinforcement or post-tensioning ducts or tendons are not moved from their original position.
4. The concrete mix shall be designed to the same requirements as specified herein and may only be altered for placement purposes with the prior approval of the Engineer.

J. Consolidation:
1. Concrete shall be thoroughly consolidated and compacted by mechanical vibration during placement in accordance with the requirements of ACI 309R.
2. The Engineer will inspect concrete placement to confirm that proper placing methods are being employed, and that special techniques are being used in congested areas and around obstructions such as pipes and other embedded items.
3. Conduct vibration in a systematic manner by competent, skilled and experienced workers, with regularly maintained vibrators, and with sufficient back-up units at the jobsite. Use the largest and most powerful vibrator that can be effectively operated in the given work, with a minimum frequency of 8,000 vibrations or impulses per minute, and of sufficient amplitude to effectively consolidate the concrete.
4. Insert and withdraw the vibrator vertically at uniform spacing over the entire area of the placement. Space the distance between insertions such that “spheres of influence” of each insertion overlap.
5. Conduct vibration so as to produce concrete that is of uniform texture and appearance, free of honeycombing, air and rock pockets, streaking, cold joints and visible lift lines.

K. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent.

L. Separate slabs-on-grade from vertical surfaces with preformed expansion joint filler, extended from bottom of slab to within 1/2 inch of finished slab surface.

M. Place concrete continuously between predetermined expansion, control and construction joints. Do not break or interrupt successive pours creating cold joints.

N. Where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack with non-shrink grout as detailed in the construction plans.

O. Screed slabs-on-grade level.

3.5 FORM REMOVAL

A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.

B. Remove forms by methods which will not injure, mar, gouge or chip concrete surfaces, overstress concrete members or distort formwork. Do not pry against concrete. Cut off nails flush. Leave surfaces clean and unblemished.

3.6 CURING AND PROTECTION

A. Curing of concrete shall conform with applicable requirements of ACI 301 and ACI 308.

B. Concrete shall be cured with waterproof sheet materials, damp burlap or curing compounds.

C. Application of curing compounds shall conform to the applicable requirements of ACI 308.

D. Vertical surfaces shall be cured by keeping the forms wet at all times and by leaving the forms in place as long as possible. Protect exposed surfaces by covering with sheet materials or burlap kept continuously moist.

E. Horizontal surfaces shall be cured and protected by covering the finished surfaces with waterproof sheet materials or damp burlap kept continuously moist.

F. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

G. Protect fresh concrete from hot sun, drying winds, rain, damage or soiling. Fog spray freshly placed slabs after bleed water dissipates and until finishing operations commence. Allow no slabs to become dry at any time until finishing operations are complete.

H. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete for not less than 7 days.

I. Protect concrete from injurious action of the elements and defacement of any kind. Project exposed concrete corners from traffic or use that will damage them in any way.

J. Protect concrete during the curing period from mechanical and physical stresses that may be caused by heavy equipment movement, subjecting the concrete to load stress, load shock, or excessive vibration.

3.7 JOINT SEALING

A. Verify that joint surfaces are dry to the extend necessary for successful sealant application and long service life as recommended by the sealant manufacturer.

B. Verify that ambient and concrete surface temperatures and humidity are within the ranges recommended by the manufacturer for successful sealant applicant.

C. Thoroughly clean joints free of dirt, debris, dust and laitance.

D. Prime joint surfaces, where required, as recommended by the manufacturer of the joint sealing compound or elastomeric joint seal.

E. Joint fillers and sealing compound shall be installed in accordance with the respective manufacturer's installation and application instructions. Comply with ASTM D1190, ASTM D3405 and ASTM D3406 for application of sealants, as applicable.

F. Expansion (Isolation) Joints: Provide pre-molded joint filler to full depth of slabs, less 1/2 inch. Install joint filler with top edge 1/2 inch below finished surface and tool adjacent concrete edges to a 1/4 inch radius. After a minimum of 28 days after concrete has been placed and finished, fill expansion joints with joint sealing compound to 1/8 inch below finished surfaced. No traffic shall be permitted to travel over sealed joints until sealing compound has properly cured.

G. Contraction (Control) Joints: Saw-cut contraction joints and weekend plane joints shall be filled with joint sealing compound in areas and locations indicated. Joints shall be filled and tooled flush to within 1/16 inch of the finished concrete surface.

3.8 FINISHING OF CONCRETE SURFACES

A. Unexposed Formed Surfaces: Concrete that will not be exposed in the completed structure shall be any form finish as specified herein and in ACI 301 for "rough form finish."

B. Exposed Formed Surfaces: Unless indicated otherwise, concrete that will be exposed in the completed structure shall receive a "smooth rubbed finish" conforming with the requirements of ACI 301.

C. Slabs and Flatwork: Slabs and flatwork shall be placed, consolidated and finished in accordance with applicable requirements of ACI 301.
   1. Slabs and flatwork shall be placed and finished monolithically. Strike off and screed slabs to true, plane surfaces at required elevations, and thoroughly compact concrete with vibrators, floats and tampers to force coarse aggregate

below the surface. Finish slab and flatwork within four hours of concrete placement.

2. Slab Finishes: Unless otherwise indicated, slabs and flatwork shall receive the following finishes as indicated:
   a. Scratched Finish: Conform to ACI 301; provide “scratched finish” for slab substrates to receive cementitous toppings or finishes, such as terrazzo or mortar setting bed for ceramic tile.
   b. Floated Finish: Conform to ACI 301; provide “floated finish” for track slabs and mud slabs and for slabs and flatwork to receive roofing and membrane waterproofing.
   c. Troweled Finish: Conform to ACI 301; provide “troweled finish” for interior slabs and flatwork to be exposed in the completed structure, for slabs to receive resilient floor coverings and for flatwork to receive elastomeric bearing pads.
   d. Broom Finish: Conform to ACI 301; exact texture and coarseness of the broom finish shall be as approved by the Engineer. Provide fine or medium-coarse “broom finish” as indicated for exterior sidewalks and paving, exterior ramps, and equipment and transformer pads.
   e. Non-slip Finish: Conform to ACI 301; non-slip materials shall be aluminum oxide and silicone carbide grit particles. Provide “non-slip finish” for interior pedestrian ramps, walkways and other floor areas where indicated.
3. Surface Tolerances: Surface tolerances shall be as specified herein.
   a. Flat Tolerance: Slabs and flatwork with “troweled finish” and with “non-slip finish.”
   b. Straightedge Tolerance: Slabs and flatwork with “broom finish” or medium-coarse “broom finish.”
   c. Bull-Floated Tolerance: Slabs and flatwork with “scratched finish”, “floated finish” and with coarse “broom finish”.
4. Joints:
   a. Construction, expansion, isolation and contraction joints shall be located as indicated in the construction plans. Construction joints shall act as contraction joints. Where additional contraction joints are required to prevent shrinkage cracks, saw-cut such joints. All joints shall be straight and true to line.
   b. Mark-off lines or edges at formed construction and expansion joints shall be finished with 1/4 inch radius curved edging tool, neat and true to line, uniform throughout.

3.9 TOLERANCES

A. Formed Surfaces: Conform with applicable requirements of ACI 117.

B. Slabs and Flatwork: Conform with applicable classification requirements of ASTM E1155, as follows:
   1. Very Flat Tolerance: True plane with maximum variation of 1/8 inch in 10 feet when measured with a 10-foot straightedge placed anywhere on the slab in any direction.

2. Flat Tolerance: True plane with maximum variation of 3/16 inch in 10 feet when measured with a 10-foot straightedge placed anywhere on the slab in any direction.
3. Straightedge Tolerance: True plane with maximum variation of 5/16 inch in 10 feet when measured with a 10-foot straightedge placed anywhere on the slab in any direction.
4. Bull-Floated Tolerance: True plane with maximum variation of 1/2 inch in 10 feet when measured with a 10-foot straightedge placed anywhere on the slab in any direction.

3.10 REPAIR OF SURFACE DEFECTS

A. Repair Standards: Repair of surface defects shall conform with applicable requirements of ACI 301. When using epoxy mortar, conform with applicable requirements of ACI 503.4.

B. Surface Defects:
1. Repair of surface defects shall begin immediately after form removal. For repair with epoxy mortar, concrete shall be dry.
2. Surface defects are defined to include: form-tie holes, air voids or pockets, bug holes with a nominal diameter or depth greater than 1/4 inch, honeycombed areas, rock pockets, visible construction joints, fins and burs.
3. Repair of surface defects shall be tightly bonded and shall result in concrete surfaces of uniform color and texture, matching adjacent surfaces and free of shrinkage cracks.

C. Repair Work:
1. Remove honeycombed and other defective concrete down to sound concrete. Saw-cut the edges perpendicular to the surface or slightly undercut. Feather-edges will not be permitted. Dampen the area to be patched and an area of at least 6 inches wide surrounding the repair to prevent absorption of water from the patching mortar.
2. Where rock pockets or similar defects or voids expose steel reinforcement, cut out to solid surface behind reinforcing steel to provide suitable key-lock for patching mortar. Patching mortar shall envelope the exposed reinforcing bar.
3. Bond patching mortar to concrete with bonding grout or epoxy adhesive. Bonding grout shall consist of 1 part Portland cement to 1 part No. 30 mesh sand, mixed to the consistency of a thick cream, and then well brushed onto the concrete. Bond commercial patching mortar to concrete in accordance with the manufacturer’s instructions.
4. Make the patching mortar of the same materials and of approximately the same proportions as used for the concrete, except omit the coarse aggregate. Use not more than 1 part Portland cement to 2-1/2 parts sand by damp loose volume, and substitute white Portland cement for a portion of the regular gray Portland cement to produce patching mix matching the surrounding concrete in color when dry.
5. After surface water has evaporated from the area to be patched, brush the bond coat well into the surface. When the bond coat begins to lose the water sheen, apply the patching mortar. Compact the mortar into place and strike off so as to leave the patch slightly higher than the surrounding surface. To permit initial

shrinkage, leave the patch undisturbed for at least 1 hour before being finally finished.

6. Neatly finish patched surfaces to match adjacent surrounding surface texture of concrete. Grind or fill surfaces to produce level and plumb, true planes.
7. For walls exposed in the finished work, form tie holes shall be patched and finished flush with adjacent surface. For holes passing entirely through walls, a plunger type injection gun or other suitable device shall be used to completely fill the holes.
8. Patching of honeycombed areas or rock pockets that are to large and unsatisfactory for mortar patching shall be cut out to solid surface, keyed, and packed solid with matching concrete to produce firm bond and flush surface. Patching shall match texture of adjacent surfaces where exposed in the finished work.
9. Completed repairs shall be cured as specified in other paragraphs of this section.

3.11 FIELD QUALITY CONTROL

A. Before placing concrete, check lines and grades of erected formwork and positioning of embedded inserts, blockouts and joints for correctness. Verify that embedded piping and conduit are free from obstructions. Make corrections or adjustments to ensure proper size and location of concrete members and stability of forming systems.

B. While placing concrete, provide quality control to assure that formwork and related supports have not been displaced, that loss of cement paste through joints is prevented and that completed work will be within specified tolerances.

C. Before placing concrete perform a visual inspection of reinforcing steel in place, including bar supports, tied laps and intersections and welded wire fabric to insure proper placement.

D. Concrete Inspection and Testing Services:

1. Visual inspections and acceptance of concrete mix designs will be by the Engineer. The Engineer will observe concrete batching, mixing and placing operations as deemed necessary by the Engineer.
2. Testing services shall be provided by an independent testing laboratory or agency employed by the Owner, and shall be performed in accordance with the applicable requirements of ACI 301. If, as a result of these tests, it is determined that the specified concrete properties are not being obtained, the Engineer will order such changes as may be necessary to secure the specified properties.
3. Failure of the Engineer to detect defective work or material shall not prevent later rejection when such defect is discovered, nor shall it obligate the Engineer for final acceptance.
4. Additional inspection and testing services required by the Engineer because of changes in materials, sources or proportions or due to failure of inspections and tests shall be paid for by the Contractor.
5. The Contractor shall provide materials, labor and services for sampling and testing of concrete including the following:
    a. Preparation, handling, storage and delivery of concrete test specimens.
    b. Suitable containers for the storage, curing and delivery of concrete test specimens in accordance with ASTM C31 and ASTM C470.

c. Suitable storage for a supply of test cylinder molds, test specimens to be cured at the jobsite and other items required for sampling and testing.

E. Methods of Sampling and Testing of Concrete:
1. Sampling: Representative composite samples shall be taken by the Contractor or testing laboratory representative in accordance with ASTM C172. Each sample shall be obtained from a different batch of concrete on a random basis.
2. Slump Tests: The testing laboratory shall perform slump tests of concrete during placing of concrete, as required, in accordance with ASTM C143. At least one test shall be performed at the delivery trucks for each 50 cubic yards of concrete delivered.
3. Temperature Tests: The concrete temperature shall be recorded on all compression test cylinders made.
4. Strength Tests:
   a. The Contractor shall prepare, cast and deliver to the testing laboratory cylinders for laboratory-cured compression test samples. Cylinders shall be made and cured in accordance with ASTM C31. Cylinders shall be tested in accordance with ASTM C39.
   b. The minimum number of test cylinders to be made for each class of concrete and for each placement shall be four (4) cylinders for each 100 cubic yards or fraction thereof.
   c. All cylinders in a set shall be marked with a unique number on one end. The Contractor shall record this number on the record of concrete placed indicating the date and use. All cylinders shall be cured by the testing laboratory.
   d. From each set of cylinders cast, one cylinder shall be tested at seven days and two cylinders at 28 days in accordance with ASTM C39. If the 28-day tests are satisfactory, the fourth cylinder shall be discarded.
   e. In the event the 28-day tests are below the specified strength requirements, the laboratory shall then test the fourth cylinder at the age selected by the Engineer.

F. Evaluation and Acceptance of Tests:
1. Acceptance of Concrete: The strength of the concrete shall be considered satisfactory, provided the averages of strength test results equal or exceed the specified 28-day compressive strength, and no individual strength test result falls below the specified 28-day compressive strength by more than 500 psi.
2. Test Cores:
   a. When laboratory test results indicate concrete to be more than 300 psi below the specified strength, or if there is a likelihood of low strength concrete, a significant reduction in load-carrying capacity, or absence of desired durability in the concrete, the Engineer will require tests of cores to be drilled from the areas in question.
   b. Test cores shall be obtained from each member or area of suspect strength, from locations designated by the Engineer, and test specimens shall be prepared by the Contractor in accordance with ASTM C42.
   c. Three cores shall be taken for each determination of in-place strength. Concrete in the area represented by the core tests will be considered structurally adequate if the average of the three cores is equal to at least

90 percent of the specified design strength and no single core is less than 80 percent of the design strength.

d. The Contractor shall be responsible for adequate patching of all test core holes.

3. Rejection of Concrete: The Engineer shall have the authority to reject concrete work which does not meet specification requirements and to require repair or replacement as necessary to complete the Work.

G. Reinforcement Inspection:

1. Inspect for correct materials, fabrication, sizes, locations, spacing, concrete cover, and splicing.

END OF SECTION

SECTION 321123 - AGGREGATE SURFACE AND BASE COURSES

PART 1 GENERAL

1.1 SUMMARY

A. Scope of Work:
   1. Work under this section consists of furnishing all equipment, labor and materials as required to provide an aggregate base course for paving or an exposed aggregate surface course for drives, walks, parking areas and shoulders as indicated in the Drawings.

1.2 REFERENCES

A. American Association of State Highway and Transportation Officials:
   1. AASHTO M288 - Standard Specification for Geotextile Specification for Highway Applications.
   2. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

B. ASTM International:
   1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).
   2. ASTM D1556 - Standard Test Method for Density of Soil in Place by the Sand-Cone Method.
   3. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
   4. ASTM D2940 - Standard Specification for Graded Aggregate Material For Bases or Subbases for Highways or Airports.
   5. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

1.3 QUALITY ASSURANCE

A. Furnish each aggregate material from single source throughout the Work.

B. Perform Work in accordance with Louisiana Department of Transportation Standard Specifications for Roads and Bridges, 2000 Edition.

PART 2 PRODUCTS

2.1 AGGREGATE MATERIALS

A. Aggregate for Paving Base: Aggregate for pavement base courses shall meet the requirements of LDOTD Standard Specifications for Roads and Bridges, 2000 Edition, Section 302, Class II Base Course (Stone).

B. Exposed Aggregate Surfacing: Aggregate for exposed finished surfaces shall meet the requirements of LDOTD Standard Specifications for Roads and Bridges, 2000 Edition, Section 401, Aggregate Surface Course (Stone).

2.2 ACCESSORIES

A. Geotextile Fabric: When required, geotextile fabric underlayment for aggregate surfaces shall be in accordance with the requirements of LDOTD Standard Specifications for Roads and Bridges, 2000 Edition for Class D fabric.

PART 3 EXECUTION

3.1 EXAMINATION

A. Prior to placement of aggregate courses verify that the compacted subgrade is dry and ready to support paving and imposed loads.
   1. Proof roll subgrade with a loaded tandem-axle truck in minimum two perpendicular passes to identify soft spots. A representative of the Owner shall be on site during proof rolling operation.
   2. Remove any soft or substandard subgrade materials and replace with compacted fill as specified in Section 31 23 00 – Excavation & Fill.

B. Prior to placement of aggregate courses, verify that subgrade has been inspected and that gradients and elevations are correct.

3.2 PREPARATION

A. Correct irregularities in subgrade gradient and elevation by scarifying, reshaping, and re-compacting.

B. Do not place aggregate on soft, muddy, or frozen surfaces.

3.3 AGGREGATE PLACEMENT

A. Install geotextile fabric over subgrade as directed in the Drawings and in accordance with manufacturer's instructions.
   1. Lap ends and edges minimum 6 inches.
   2. Anchor fabric to subgrade when required to prevent displacement until aggregate is installed.

B. Place aggregate in equal thickness layers to total compacted thickness as indicated on the Drawings.
   1. Maximum Layer Compacted Thickness: 6 inches.
   2. Minimum Layer Compacted Thickness: 4 inches.

C. Roller compact aggregate to 95 percent maximum density.

D. Level and contour surfaces to elevations, profiles, and gradients indicated.

E. Maintain optimum moisture content of fill materials to attain specified compaction density.

F. Use mechanical tamping equipment in areas inaccessible to larger compaction equipment.

3.4 TOLERANCES

A. Maximum Variation From Flat Surface: 1/2 inch measured with 10 foot straight edge.

B. Maximum Variation From Thickness: 1/2 inch.

C. Maximum Variation From Elevation: 1/2 inch.

3.5 FIELD QUALITY CONTROL

A. Compaction testing will be performed in accordance with ASTM D698.

B. When tests indicate aggregate surface does not meet specified requirements, remove the substandard area, replace and retest.

C. Frequency of Tests: One test for every 1000 square yards of each layer of compacted aggregate surface.

END OF SECTION

SECTION 321613 - CONCRETE CURBS AND SIDEWALKS

PART 1 GENERAL

1.1 SUMMARY

A. Scope of Work:
1. This section includes all materials, equipment, labor and incidentals to provide cast-in-place concrete curb and sidewalks to the lines, grades, thicknesses and strengths indicated in the plans as required to complete the project. Formwork, reinforcement, jointing, accessories, finishing and curing are all included in this section.

B. Related Sections:
1. Section 32 05 23 – Cement & Concrete for Exterior Improvements

1.2 REFERENCES

A. American Concrete Institute (ACI):
1. ACI 116R – Cement and Concrete Terminology
2. ACI 117 – Standard Specifications for Tolerances for Concrete Construction and Materials.
3. ACI 221.1 – Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete.
4. ACI 211.2 – Standard Practice for Selecting Proportions for Structural Lightweight Concrete.
5. ACI 301 – Standard Specifications for Structural Concrete.
6. ACI 302.1R – Guide for Concrete Floor and Slab Construction.
7. ACI 303.1 – Standard Specification for Cast-In-Place Architectural Concrete.
8. ACI 304R – Guide for Measuring, Mixing, Transporting, and Placing Concrete.
9. ACI 304.2R – Placing Concrete by Pumping Methods.
10. ACI 305R – Hot Weather Concreting.
11. ACI 306.1 – Standard Specification for Cold Weather Concreting.
12. ACI 308 – Standard Practice for Curing Concrete.
13. ACI 309R – Guide for Consolidation of Concrete.
14. ACI 315 – Details and Detailing of Concrete Reinforcement.
15. ACI 318 – Building Code Requirements for Structural Concrete.
16. ACI 347 – Formwork for Concrete.
17. ACI 502.4 – Standard Specification for Repairing Concrete with Epoxy Mortars.

B. American Society for Testing and Materials (ASTM):
1. ASTM A185 – Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
2. ASTM A615 – Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
3. ASTM C31 – Standard Practice for Making and Curing Concrete Test Specimens in the Field.
4. ASTM C33 – Specification for Concrete Aggregates.

5. ASTM C39 – Test Method for Compressive Strength of Cylindrical Concrete Specimens.
6. ASTM C40 – Test Method for Organic Impurities in Fine Aggregates for Concrete.
7. ASTM C42 – Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
8. ASTM C94 – Specification for Ready-Mixed Concrete.
9. ASTM C114 – Test Methods for Chemical Analysis of Hydraulic Cement.
10. ASTM C117 – Test Method for materials finer than No. 200 Sieve in Mineral Aggregates by Washing.
11. ASTM C123 – Test Method for Lightweight Particles in Aggregate.
12. ASTM C127 – Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate.
13. ASTM C128 – Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate.
14. ASTM C136 – Test Method for Sieve Analysis of Fine and Coarse Aggregates.
15. ASTM C142 – Test Method for Clay Lumps and Friable Particles in Aggregates.
16. ASTM C143 – Test Method for Slump of Hydraulic Cement Concrete.
17. ASTM C150 – Specification for Portland Cement.
18. ASTM C171 – Specification for Sheet Materials for Curing Concrete.
19. ASTM C172 – Standard Practice for Sampling Freshly Mixed Concrete.
20. ASTM C309 – Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
21. ASTM C330 – Specification for Lightweight Aggregates for Structural Concrete.
22. ASTM C470 – Specification for Molds for Forming Concrete Test Cylinders Vertically.
23. ASTM C494 – Specification for Chemical Admixtures for Concrete.
24. ASTM C618 – Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.
25. ASTM C979 – Specification for Pigments for Integrally Colored Concrete.
26. ASTM C1017 – Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
27. ASTM D994 – Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
28. ASTM D1190 – Specification for Concrete Joint Sealer, Hot-Applied Elastic Type.
29. ASTM D1751 – Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
30. ASTM D3405 – Specification for Joint Sealant, Hot-Applied, for Concrete and Asphalt Pavements.
31. ASTM D3406 – Specification for Joint Sealant, Hot-Applied, Elastomeric-Type, for Portland Cement Concrete Pavements.
32. ASTM E329 – Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.

C. American Welding Society (AWS):
1. AWS D1.4 – Structural Welding Code – Reinforcing Steel.

D. Concrete Reinforcing Steel Institute (CRSI):
   1. CRSI Manual of Standard Practice
   2. CRSI Publication – Placing Reinforcing Bars

E. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

PART 2 PRODUCTS

2.1 PORTLAND CEMENT CONCRETE MATERIALS

A. All concrete materials including aggregates, reinforcement, admixtures, formwork, tools and equipment shall be in accordance with the requirements of Section 03 30 00.

2.2 CONCRETE MIX

A. Concrete mix for curbs and sidewalks shall be Class A (4,000 psi) in accordance with Section 03 30 00.

PART 3 EXECUTION

3.1 GENERAL

A. In addition to this section, requirements for formwork erection, reinforcement placement, concrete placement, form removal, joint sealing, finishing and curing are as specified in Section 03 30 00.

3.2 SUBGRADE PREPARATION

A. The subgrade shall be excavated or filled to the required lines and grades. All soft, yielding or otherwise unsuitable material shall be removed and replaced. Filled sections shall be compacted to ninety-five percent of the maximum standard Proctor density (ASTM D698) with compaction extending a minimum of six inches beyond form lines.

B. Remove loose material from compacted subgrade to provide a smooth surface immediately prior to placement of concrete.

3.3 INSTALLATION

A. The concrete shall be placed either by an approved slip form/extrusion machine, by the formed method or by a combination of these methods.

B. Formed Method:
   1. Forms shall be of metal or other suitable material that is straight and free from warp, having sufficient strength to resist the pressure of the concrete without displacement and sufficient tightness to prevent leakage of concrete mixture. Flexible or rigid forms of proper curvature may be used for curved sections.

2. Forms shall extend for the full depth of the required concrete section. All forms shall be set to the required lines and grades and rigidly braced and staked so that they remain in both horizontal and vertical alignment until their removal. Forms shall be cleaned and coated with an approved form-release agent before concrete is placed against them.
3. Install a sufficient quantity of forms to allow continuance of work and so that forms remain in place a minimum of 24 hours after placement of concrete.
4. Reusable forms shall be cleaned after each use.

C. Machine Placement:
1. The slip form/extrusion machine shall be so designed to place, spread, consolidate, screed and finish the concrete in one complete pass in such a manner that a minimum amount of hand finishing will be necessary to provide a dense and homogenous concrete section.
2. The machine shall shape, vibrate and/or extrude the concrete for the full width and depth of the section being placed. It shall be operated with as nearly a continuous forward movement as possible.
3. All operations of mixing, delivery and spreading concrete shall be so coordinated as to provide uniform progress with stopping and starting of the machine held to a minimum.

3.4 JOINTING

A. Contraction Joints:
1. Contraction and construction joints shall be placed at the standard spacing of ten feet in curb and gutter sections. For sidewalk sections, refer to the Drawings for joint spacing requirements.
2. Transverse weakened-plane contraction joints shall be constructed at right angles to the curb line. Joint depth shall average at least one-fourth of the cross-section of the concrete.
3. Contraction joints may be sawed, hand-formed for made by one-eighth inch thick division plates in the formwork. Sawing shall be done early after the concrete has set to prevent the formation of uncontrolled cracking. The joints may be hand-formed by using a thin metal blade to impress a plane of weakness into the plastic concrete.

B. Expansion Joints:
1. Expansion joints shall be constructed at right angles to the curb line at immovable structures, at points of curvature for short radius curves and at a standard spacing of sixty feet in curb and gutter or sidewalk sections unless otherwise specified in the Drawings.
2. Expansion joint filler shall conform to the requirements of ASTM D994 and shall consist of a 3/4 inch thick pre-formed material cut to the exact cross-section of the curb and gutter section.
3. Expansion joints in a slip-formed section shall be constructed with an appropriate hand tool by raking through the partially set concrete for the full depth and width of the section. After joint filler is placed, open areas adjacent to the joint shall be filled with concrete and then troweled and edged.

C. Curbs, combination curbs and gutters and sidewalks constructed adjacent to existing concrete shall have the same type of joints as in the existing concrete with similar spacing, however, contraction joints spacing shall not exceed ten feet.

D. Finish, protect and cure concrete in accordance with Section 03 30 00.

3.5 BACKFILLING

A. After the concrete has set sufficiently, the spaces in front and back of the completed section shall be filled to the required elevations with suitable material which shall be compacted and neatly graded.

3.6 CLEANING AND ADJUSTING

A. Sweep concrete surface and wash free of stains, discolorations, dirt and other foreign material just prior to final inspection.

B. Protect concrete from damage until acceptance of work. Exclude traffic from concrete for a minimum of 14 days after placement.

C. Remove and replace any sections of concrete damaged prior to final acceptance.

END OF SECTION

SECTION 321723 – PAVEMENT MARKING PAINT

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:
1. Traffic and pavement surface markings using low-VOC, fast-drying, latex acrylic traffic marking paint.

B. Related Requirements:
1. Section 321216 – Asphalt Paving.
2. Section 321313 – Concrete Paving.
3. Section 329200 – Turf and Grasses (coordination of paint near lawn areas).
4. Section 312000 – Earth Moving (for surface preparation coordination).

1.2 REFERENCES

ASTM D711, ASTM D2205, ASTM D968, ASTM D2369, ASTM D476, AASHTO M247, Federal Specification TT-P-1952F, and EPA 40 CFR Part 59.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
1. Coordinate pavement marking installation with completion of paving, seal coats, and curing period for new surfaces.
2. Schedule work to minimize interference with traffic and access.

B. Preinstallation Meeting:
1. Conduct meeting prior to marking operations to review surface conditions, application procedures, safety, and traffic control measures.

1.4 SUBMITTALS

A. Product Data: Manufacturer’s data sheets for each paint type, including VOC content, drying times, and application rates.
B. Safety Data Sheets (SDS).
C. Color Samples: Two samples, 6 inches long, for each color.
D. Manufacturer’s Certifications: Compliance with TT-P-1952F, Type II, and VOC limits.
E. Field Test Samples: Apply a 10-foot-long test strip on each substrate for review and approval.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum 5 years' experience in pavement marking coatings.
B. Installer Qualifications: Minimum 3 similar completed projects; proper equipment calibration required.
C. Field Sample Review: Approval required before continuation.
D. Regulatory Requirements: Paints must comply with all VOC and air quality regulations.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original unopened containers labeled with product name, color, batch number, and VOC content.
B. Store between 40°F and 100°F; protect from freezing and sunlight.
C. Do not use materials past shelf life.

1.7 FIELD CONDITIONS

Apply paint only when surface temperature is above 50°F, no precipitation is expected within 12 hours, and dust-free conditions exist.

1.8 WARRANTY

Provide manufacturer's standard one-year warranty against peeling, cracking, or excessive fading.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Sherwin-Williams SetFast Low VOC Acrylic Traffic Marking Paint.
B. Acceptable Manufacturers:
1. Sherwin-Williams Company.
2. PPG Industries – PPG Traffic Solutions Low VOC Latex Traffic Paint.
3. Ennis-Flint – EF Series Low VOC Waterborne Traffic Paint.
4. Or equal.

2.2 MATERIALS

A. Paint: 100% acrylic latex, low-VOC, waterborne, fast-drying; VOC ≤150 g/L; conforms to TT-P-1952F Type II.
B. Colors: As indicated (White, Yellow, etc.).

C. Drying Time: Track-free within 10 minutes per ASTM D711.
D. Weather Resistance: No cracking or discoloration after 12 months per ASTM D2205.
E. Glass Beads (if required): AASHTO M247, Type I or II.
F. Primer: As recommended for concrete or aged asphalt.
G. Thinner/Cleaner: Water-based, as recommended by manufacturer.

PART 3 – EXECUTION

3.1 EXAMINATION

Verify that surfaces are dry, clean, and properly cured. Proceed only when conditions are satisfactory.

3.2 PREPARATION

Clean pavement surfaces of all debris, dust, oil, and contaminants. Remove existing markings where required using approved methods.

3.3 APPLICATION

A. Mix paint thoroughly before and during application.
B. Apply per manufacturer's instructions using mechanical striping equipment.
C. Apply two coats at 320–400 SF per gallon per coat.
D. Apply glass beads after first coat if reflective markings are specified.
E. Maintain straight, uniform edges and true line alignment.

3.4 PROTECTION

Protect freshly applied markings from traffic until dry and cured. Provide barricades and signage. Clean overspray promptly.

3.5 FIELD QUALITY CONTROL

Inspect for coverage, thickness, and adhesion. Replace markings that fail to meet requirements.

3.6 CLEANING AND CLOSEOUT

Clean equipment with water after use. Remove debris and restore surrounding areas.

END OF SECTION 321723

SECTION 326113 - MISCELLANEOUS WORK AND CLEANUP

PART 1 GENERAL

1.1 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals required to do the miscellaneous work not specified in other sections but obviously necessary for the proper completion of the work as shown on the Drawings.

B. When applicable the Contractor shall perform the work in accordance with other sections of this Specification. When no applicable specification exists the Contractor shall perform the work in accordance with the best modern practice and/or as directed by the Engineer.

C. The work of this Section includes, but is not limited to, the following:
1. Protection and/or removal and reinstallation of signs, lampposts and mailboxes.
2. Crossing and relocating existing utilities.
3. Restoring of roadways and pavement.
4. Protection and bracing of utility poles.
5. Restoring easement and right-of-ways.
6. Temporary facilities.
7. Cleaning up.
8. Incidental work.

D. The Contractor’s bid price shall include costs associated with this Section. The work specified herein is not shown on the Contract Drawings. It shall be the Contractor’s responsibility to develop his/her costs for this work based on site/field investigations prior to the bid.

PART 2 PRODUCTS

2.1 MATERIALS

A. Materials required for this Section shall be the same quality of materials that are to be restored. Where possible, the Contractor may re-use existing materials that are removed and acceptable for reuse.

PART 3 EXECUTION

3.1 RESTORATION AND REPLACEMENT OF SIGNS, LAMPPOSTS AND MAILBOXES

A. Existing signs, lampposts and mailboxes which may be damaged by the Contractor or removed by the Contractor during the course of installing the new pipelines shall be reinstalled in a vertical position at the same location from which they were removed. Damaged items shall be replaced with an item equal to or better than the damaged items. A concrete anchor shall be provided as necessary, at no additional cost, to ensure a rigid

alignment. Care shall be exercised in the reinstallation of all items to prevent damage to the newly installed pipelines.

3.2 CROSSING AND RELOCATING EXISTING UTILITIES

A. The Contractor shall furnish all labor, materials, equipment, and incidentals required in crossing and/or relocating culverts; water courses, including brooks and drainage ditches; storm drains; sewers; water mains; and other utilities and obstructions including, but not limited to, electric, telephone and gas services. This work shall include, but is not limited to, the following: bracing, hand excavation and backfill, sheeting and shoring, dewatering, compaction, restoration, location and protection of existing utilities, erosion and sedimentation control, traffic control, clean-up, and all else incidental thereto for which separate payment is not provided under other items in the Bid Form.

B. In locations where existing utilities cannot be crossed without interfering with the construction of the work as shown on the Drawings, the Contractor shall remove and relocate the utility as directed by the Engineer or cooperate with the utility companies concerned if they relocate their own utility.

C. At pipe crossings and where designated by the Engineer, the Contractor shall furnish and place compacted granular bedding material so that the existing utility or pipe is firmly supported for its entire exposed length. The bedding shall extend to the mid- diameter of the pipe crossed.

3.3 RESTORATION OF ROADWAYS AND PAVEMENT

A. The Contractor shall repair and/or replace existing roadways disturbed by the construction. Paved drives shall be repaved to the limits and thicknesses existing prior to construction. Gravel drives shall be replaced and regraded to the limits and thicknesses existing prior to construction.

3.4 PROTECTION AND BRACING OF UTILITY POLES

A. The Contractor shall be responsible for making all arrangements with the proper utility companies for the bracing and protection of all utility poles that may be damaged or endangered by the Contractors operations. Work under this item shall include the related removal and reinstallation of guy wires, or support poles whether shown on the Drawings or not.

3.5 RESTORING EASEMENTS AND RIGHT-OF-WAYS

A. The Contractor shall be responsible for all damage to private property due to his operations. The Contractor shall protect from injury all walls, fences, cultivated shrubbery and vegetables, fruit trees, pavement, underground facilities, such as water pipe, or other utilities which may be encountered along the route. If removal and replacement are required, it shall be done in a workmanlike manner so that replacement is equivalent to that which existed prior to construction.

B. Existing lawn and sod surfaces damaged by construction shall be regraded and reseeded or sodded as directed. These areas shall be maintained until all work under this Contract

has been completed and accepted. Any additional work required to restore property to the original condition shall be performed by the Contractor.

C. Existing trees, shrubs, plants, and bushes outside of easements shall be fully protected during construction.

3.6 TEMPORARY FACILITIES

A. The Contractor shall furnish, install, maintain and remove all temporary facilities required for the proper completion of the Contract as shown on the Drawings and as specified herein.

3.7 CLEANING UP

A. The Contractor shall remove all construction material, excess excavation, buildings, equipment and other debris remaining on the job as a result of construction operations and shall restore the site of the work to a neat and orderly condition.

3.8 INCIDENTAL WORK

A. The Contractor shall perform all incidental work not otherwise specified, but obviously necessary, for the proper completion of the Contract as shown on the Drawings and as specified herein.

END OF SECTION

SECTION 329200 – TURF AND GRASSES

PART 1 GENERAL

1.1 SCOPE OF WORK

A. Seeding, sodding and lawn restoration.

B. Restoration work to provide the quality of landscape equal to or better than that which existed before initiation of the Project.

1.2 PROTECTION

A. Only vehicles and equipment necessary to perform the Work shall be permitted on lawn areas.

1.3 SUBMITTALS

A. Certificates of Conformance or Compliance
   1. Sod and seed blend.
   2. Fertilizer: Bag label with guaranteed analysis.
   3. Seeding method to be used with list of equipment.

1.4 FINAL ACCEPTANCE

A. Final inspection and acceptance will be at the end of the turf establishment period. Acceptance shall be based upon a satisfactory stand of turf defined as 95 percent ground cover of species established.

B. Reestablish turf in areas that do not have 95 percent ground cover of the established species. Repair rejected areas of turf within acceptable planting dates as directed by Owner's Representative.

PART 2 PRODUCTS

2.1 MATERIALS

A. Topsoil for landscaped, sodded or seeded areas shall be provided in accordance with LDOTD Standard Specifications for Roads and Bridges, 2006 Edition, Section 715, Topsoil.

B. Sod shall be furnished and installed in designated areas in accordance with LDOTD Standard Specifications for Roads and Bridges, 2006 Edition, Section 714, Sodding.

C. Seeding mixtures shall be in accordance with LDOTD Standard Specifications for Roads and Bridges, 2006 Edition, Section 717, Seeding.

D. Mulch shall be furnished and installed on seeded areas in accordance with LDOTD Standard Specifications for Roads and Bridges, 2006 Edition, Section 716, Vegetative and Fiber Mulch.

E. Fertilizer shall be in accordance with LDOTD Standard Specifications for Roads and Bridges, 2006 Edition, Section 718, Fertilizer and Agricultural Lime.

F. Water will be furnished by Owner. Contractor shall furnish all hoses, meters, back flow preventers, and any other connections necessary to perform watering needs.

PART 3 EXECUTION

3.1 PREPARATION

A. Topsoil depth shall be a minimum of 6 inches. Topsoil shall not be used while in a frozen or muddy condition. The Contractor shall dispose of surplus materials.

B. Scarify compacted areas to a depth of 6 inches. Scarify compacted subsoil before topsoil is added. Work the soil down to pea sized particles and form an appropriate grade that will allow sod to be just below flush with paved areas or as required for seeded areas.

C. Roll the area with an appropriately sized roller used in landscaping to firm the turf bed, then relevel to the appropriate grade.

D. Debris and stones over a maximum of 5/8 inch in any dimension shall be removed from surfaces designated as lawn areas.

E. Prepared surfaces shall be protected from compaction or damage by vehicular or pedestrian traffic and surface erosion.

3.2 SOD INSTALLATION

A. Sod shall be properly moist at the time of cutting and shall be laid within 24 hours of cutting to prevent excessive heat buildup.

B. Lay sod with the ends staggered by a minimum of 1 foot. Adjust the sod so the seams are firmly butted together and curled edges are laid flat.

C. Water thoroughly until subsoil is wet and whenever sod shows signs of drying or wilting. Sprinklers or nozzle hoses are acceptable. Continue watering until the Project is accepted.

D. Fertilize immediately prior to or immediately after the sodding operation.

E. Timing of the Work shall be done at typically accepted times in spring or fall when temperatures are mild and establishment can be completed.

F. Maintain lawn for 30 days after installation, including watering, weeding, re-sodding, mowing, trimming, and edging. Mow grass at regular intervals to maintain at a maximum height of 2.5 inches. Do not cut off more than 1/3 of the height at any one mowing.

G. Damage resulting from erosion, washouts, drought, diseases, or other causes shall be repaired by filling with topsoil, tamping, fertilizing, and sodding by the Contractor at no additional compensation. Sod operations shall be repeated until a satisfactory uniform stand of grass is obtained as determined by the Owner.

3.3 SEEDING OPERATION

A. Seed beds shall be prepared by disking, harrowing or other approved methods.

B. Rake seed for good soil contact.

C. Water with sprinklers whenever soil surface is dry and until small puddles just begin to form. Open ended hoses will not be accepted. Continue proper watering schedule until the Project is accepted.

D. Fertilize immediately prior to or immediately after seeding.

E. Install vegetative or fiber mulch on all seeded areas.

F. Maintain lawn for 30 days after installation, including watering, weeding, reseeding, mowing, trimming, and edging. Mow grass at regular intervals to maintain at a maximum height of 2.5 inches. Do not cut off more than 1/3 of the height at any one mowing.

G. Damage resulting from erosion, washouts, drought, diseases, or other causes shall be repaired by filling with topsoil, tamping, fertilizing, and seeding by the Contractor at no additional compensation. Seed operations shall be repeated until a satisfactory uniform stand of grass is obtained as determined by the Owner.

END OF SECTION

SECTION 331113 - PUBLIC WATER UTILITY DISTRIBUTION PIPING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Water piping.
2. Tapping sleeves and valves.
3. Valves.
4. Meters.
5. Air release valves.
6. Precast concrete vaults and meter boxes.
7. Bedding and backfill materials.

B. Related Sections:
1. Section 32 05 23 – Cement and Concrete for Exterior Improvements.
2. Section 33 12 16 – Water Utility Distribution Valves.
3. Section 33 12 43 – Water Utility Granular Activated Carbon Absorption Units.

1.2 REFERENCES

A. American Association of State Highway and Transportation Officials:
1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

B. American Society of Mechanical Engineers:
1. ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings.

C. ASTM International:
1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
3. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
4. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).
5. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft3 (2,700 kN-m/m3)).
6. ASTM D1784 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
7. ASTM D2241 - Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
8. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
9. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

10. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
11. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

D. American Water Works Association:
1. AWWA C104 - ANSI Standard for Cement Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
2. AWWA C105 - ANSI Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems.
3. AWWA C110 - ANSI Standard for Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In. (76 mm Through 1,219 mm), for Water.
4. AWWA C111 - ANSI Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
5. AWWA C115 - ANSI Standard for Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges.
6. AWWA C150 – ANSI Standard for Thickness Design of Ductile-Iron Pipe.
7. AWWA C151 - ANSI Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water or Other Liquids.
8. AWWA C153 - ANSI Standard for Ductile-Iron Compact Fittings for Water Service.
9. AWWA C200 - Steel Water Pipe 6 In. (150 mm) and Larger.
10. AWWA C203 - Coal-Tar Protective Coatings and Linings for Steel Water Pipelines - Enamel and Tape - Hot Applied.
11. AWWA C205 - Cement-Mortar Protective Lining and Coating for Steel Water Pipe - 4 In. and Larger - Shop Applied.
12. AWWA C206 - Field Welding of Steel Water Pipe.
13. AWWA C207 - Steel Pipe Flanges for Waterworks Service - Sizes 4 In. Through 144 In. (100 mm Through 3,600 mm).
14. AWWA C208 - Dimensions for Fabricated Steel Water Pipe Fittings.
15. AWWA C213 - Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines.
16. AWWA C300 - Reinforced Concrete Pressure Pipe, Steel-Cylinder Type.
17. AWWA C301 - Prestressed Concrete Pressure Pipe, Steel-Cylinder Type.
18. AWWA C500 - Gate Valves for Water and Sewage Systems.
19. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.
20. AWWA C605 - Water Treatment - Underground Installation of Polyvinyl Chloride PVC Pressure Pipe and Fittings for Water.
21. AWWA C606 - Grooved and Shouldered Joints.
22. AWWA C700 - Cold-Water Meters - Displacement Type, Bronze Main Case.
23. AWWA C701 - Cold-Water Meters - Turbine Type, for Customer Service.
24. AWWA C702 - Cold-Water Meters - Compound Type.
25. AWWA C706 - Direct-Reading, Remote-Registration Systems for Cold-Water Meters.
26. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe, and Fabricated Fittings, 4 In. through 12 In. (100 mm Through 300 mm), for Water Distribution.

27. AWWA C905 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 In. Through 36 In. (350 mm Through 1,200 mm), for Water Transmission and Distribution.
28. AWWA M6 - Water Meters - Selection, Installation, Testing, and Maintenance.

E. Manufacturer's Standardization Society of the Valve and Fittings Industry:
1. MSS SP-60 - Connecting Flange Joint between Tapping Sleeves and Tapping Valves.

F. National Fire Protection Agency:
1. NFPA 24 - Standard for the Installation of Private Fire Service Mains and Their Appurtenances.

1.3 SUBMITTALS

A. Contractor is required to submit six (6) copies of product data for review and approval. The Engineer shall promptly review this data, and return two (2) copies to the Contractor as accepted, or with requested modifications. Contractor to submit data on pipe materials, pipe fittings, valves, meter assemblies, and all accessories.

1.4 RECORD DRAWINGS

A. The Contractor shall furnish an As-Built drawing showing the actual locations of piping mains, valves, connections, fire hydrants, service assemblies, etc.

PART 2 PRODUCTS

2.1 GENERAL

A. All water main piping and fittings shall be of the types specified herein and shall be NSF approved.

B. All materials used to convey water for public consumption shall be "lead free" as defined in the Louisiana Department of Health and Hospitals' Fact Sheet included at the end of this section.

2.2 WATER PIPING

A. Ductile Iron Pipe
1. Ductile Iron Pipe shall comply with AWWA C150/A21.50, AWWA C151/A21.51 AWWA C111/A21.11, latest revisions. Pipe shall be minimum Class 50 for an internal working pressure of 250 psi with 100 psi surge allowance plus a safety factor of 2.0.
2. Thickness of ductile iron pipe shall be in accordance with laying condition "Type 2" with a minimum of 5 feet of cover, AWWA C150/A21.50. Thickness design will also be based on a minimum working pressure of 250 psi. Surface loading shall be AASHTO H-20 Truck.

3. Buried piping shall be Push-on or Mechanical Joint, with factory installed rubber gasket conforming to AWWA C111/A21.11, latest revisions.
4. Piping above ground shall be Flanged Joint. Flanged shall comply with AWWA C115/A21.15, latest revision. Pipe barrel shall be designed in accordance with AWWA C151/A21.51, latest revision and nominal thickness of pipe shall be at least Class 53. All flanges shall be ductile iron and rated for a working pressure of 250 psi. Flanged joints shall not be used for underground installations except within structures.
5. All ductile iron pipe shall be asphaltic coated outside and cement-mortar lined inside with seal coat of bituminous material all in accordance with AWWA C151/A21.51 and AWWA C104/A21.4 respectively.
6. Fittings shall be cast of gray iron or ductile iron conforming to AWWA C110/A21.10 or AWWA C153/A21.53. Cast iron fittings shall be asphaltic coated outside and cement-mortar lined inside with a seal coat of bituminous material conforming to AWWA C104/A21.4, latest revision. Joints for cast iron fittings shall be mechanical joint conforming to AWWA C153/A21.53 for 3" through 16" and AWWA C111/A21.11 for 18" through 24". Fittings shall have "O" ring seals.
7. Where indicated on the drawings or otherwise required by the Contract Documents, pipe joints may require additional thrust restraint by incorporating mechanical glands in accordance with pipe manufacturer's installation recommendations. Restrained joints shall meet requirements of AWWA C151, AWWA C110 and AWWA C111 standards. Joint design shall utilize a high strength ductile iron or structural steel gland assembled on the pipe along with retainer lugs, conforming to ASTM A536 strength requirements, latest revision. Stainless steel or corrosive resistant high-strength low-alloy nuts, bolts and rods shall complete the restrained joint assembly, delivering a full circumferential contact and support of the pipe wall. The mechanical joint restraining gland shall have a pressure rating equal to that of the pipe on which it is used. All bends and tie-ins shall require mechanical restraints, including thrust blocking.
8. Where indicated on the drawings or otherwise required by the Contract Documents, special external corrosion protection shall be provided for all ductile iron pipe and fittings. External corrosion protection shall be accomplished by complete encasement of the pipe with 8 mil thick polyethylene immediately before installing the pipe. Polyethylene encasement material shall be in accordance with requirements of AWWA C105/A21.5. The polyethylene encasement shall provide a "loose" wrap with no tears, rips or other perforations of the material.

B. Polyvinyl Chloride (PVC) Pipe – C900
1. C900 PVC pipe shall be the gasket joint bell type, meeting the requirements of AWWA C900 for sizes 4" to 12" diameter or AWWA C905 for sizes 14" to 48" diameter. Unless otherwise specified on the Drawings, Pipe shall be Pressure Class 165 (DR 25) with cast iron pipe equivalent OD.
2. Joints for PVC pipe shall be gasketed, push-on type conforming to the requirements of ASTM D3139 with joint gaskets complying with ASTM F477. Joints between pipe and metal fittings shall be compression type mechanical joints conforming with the requirements of ASTM D3139 and AWWA C111/A21.11 with joint gaskets complying with AWWA C111/A21.11. Pipe

and fittings shall be assembled with a non-toxic lubricant NSF tested, and certified suitable for potable water distribution products. Provisions shall be made for contraction and expansion at each joint. Integral bells or affixed couplings shall be tested with the pipe.

3. All fittings, tees, bends, crosses and specials used in connection with PVC pipe shall be of the same material and minimum thickness as specified for iron pipe. The fittings shall be made specifically for the pipe utilized, and only standard manufactured fittings will be acceptable. Special adaptors required to transition from PVC pipe to another type of pipe or to a valve or other appurtenance shall be of the type as recommended by the PVC pipe manufacturer. Only standard manufacturer adaptors will be acceptable.
4. Mechanical restraints for PVC pipe shall consist of the same physical properties as those described for ductile iron pipe with the exception of the circumferential contact support being designed for AWWA C900 pipe. Restraints shall be Uni-Flange 1300, Megalug 1100 PV or approved equal.
5. All PVC pipe shall have a 10 gauge insulated solid copper tracer wire installed in the trench with the pipe to facilitate locating the pipe with an electronic pipe locator. This wire is to be taped on top of the pipe at 10-foot intervals.

C. Polyvinyl Chloride (PVC) Pipe – Pressure-Rated

1. Pressure-Rated PVC pipe shall be the gasket joint bell type, meeting the requirements of ASTM D2241 and/or ASTM D3139. Unless otherwise specified on the Drawings, Pipe shall be Class 160 (SDR 26), except that PVC water mains located under roads or installed by jack & bore methods shall be Class 200 (SDR 21).
2. Joints for PVC pipe shall be factory installed rubber gasket seal joints conforming to ASTM F477 requirements. Solvent-cement type joints are not acceptable. Pipe and fittings shall be assembled with a non-toxic lubricant NSF tested, and certified suitable for potable water distribution products. Provisions shall be made for contraction and expansion at each joint. Integral bells or affixed couplings shall be tested with the pipe.
3. All fittings, tees, bends, crosses and specials used in connection with PVC pipe shall be of the same material and minimum thickness as specified for iron pipe. The fittings shall be made specifically for the pipe utilized, and only standard manufactured fittings will be acceptable. Special adaptors required to transition from PVC pipe to another type of pipe or to a valve or other appurtenance shall be of the type as recommended by the PVC pipe manufacturer. Only standard manufacturer adaptors will be acceptable.
4. Mechanical restraints for PVC pipe shall consist of the same physical properties as those described for ductile iron pipe with the exception of the circumferential contact support being designed for ASTM D2241 pipe. Restraints shall be Uni-Flange 1300, Megalug 1100 PV or approved equal.
5. All PVC pipe shall have a 10 gauge insulated solid copper tracer wire installed in the trench with the pipe to facilitate locating the pipe with an electronic pipe locator. This wire is to be taped on top of the pipe at 10-foot intervals.

D. High Density Polyethylene Pipe (HDPE)

1. HDPE pipe shall be extra-high molecular weight high density polyethylene 4710 and shall conform in all respects to AWWA C901/C906 and ASTM F714 and

shall meet the quality standard of the National Sanitation Foundation Standard 61 and bear its seal of approval as safe for potable water. HDPE pipe shall be Class 200 (SDR 11), Ductile Iron Pipe size. Piping shall be Design-Flow HDPE pipe, as manufactured by Independent Pipe Products, Inc., or approved equal. The minimum opening in the pipe shall be of equal or greater size as connecting pipe. No restriction of flow will be allowed.

2. All HDPE water pipe shall be connected together using the heat fusion butt-weld method. All joints shall be leak-tight and fully restrained.
3. All fittings for HDPE pipe shall be as specified for iron pipe and shall include stainless steel inserts. All fittings shall be compatible with the pipe on which they are installed and only standard manufactured fittings will be acceptable. Fittings shall be Tyler/Union or approved equal.
4. All HDPE pipe shall have a 10 gauge insulated solid copper tracer wire installed in the trench with the pipe to facilitate locating the pipe with an electronic pipe locator. This wire is to be taped on top of the pipe at 10-foot intervals.

2.3 TAPPING SLEEVES AND VALVES

A. Tapping Sleeves:
1. All tapping sleeves shall be cast iron or ductile iron sleeves meeting the requirements of AWWA C110/A21.10, in two sections, the halves to be bolted together along the centerline of the pipe.
2. Mechanical joint ends shall conform to AWWA C111/A21.11.
3. Flanged ends shall conform to AWWA C110/A21.10, Class 250 lb.
4. Bolts and nuts will be of a high strength low alloy corrosion resistant steel conforming to ASTM A325 (Type 3). All mechanical joint glands shall be cast iron.
5. Branch outlet or taping sleeve shall be flanged, with a machined projection or recess to mate with tapping valve inlet to assure correct alignment.

B. Tapping Valves:
1. Tapping valves shall conform to the requirements of AWWA C500 with the following exceptions:
   a. Tapping valves shall have oversize seat rings to permit entry of standard tapping machine cutters.
   b. In the open position, valve gates shall be clear of the ports, to that cutter will pass through without making contact with the gates.
   c. Valves shall have an inlet flange conforming to ASA B 16.1, Class 125, with a machined recess to mate the tapping sleeve outlet flange to assure correct alignment.
   d. Valves shall have a standard mechanical joint outlet end and shall fit any standard tapping machine.

2.4 VALVES

A. Valves: Conform to Section 33 12 16.

2.5 BEDDING AND BACKFILL MATERIALS

A. Bedding materials shall be installed as indicated on the Drawings using select material. Select material shall be defined as fine granular material, or native soil, consisting of sand, sandy loam or loam free of excessive clay (less than 5 percent). When wet, the material shall not form mud or muck.

B. Haunching backfill is defined as backfill material placed from the bottom of pipe to the pipe springline. Haunching backfill shall consist of approved native soil or fine granular backfill, and shall be tamped to provide the lower part of the pipe with support as indicated on the Drawings.

C. Initial backfill is defined as backfill material placed to a point 12” above the top of the pipe. Initial backfill may consist of finely divided native material stockpiled from the excavation, if approved by the engineer, or fine granular material. Initial backfill shall be compacted to 95% maximum density, as defined by the Standard Proctor test.

D. Final backfill is defined as backfill material placed from a point 12” above the top of the pipe to existing grade, sub-grade, or base as required. Final backfill may consist of native material, if approved by the engineer, or select material. The degree of backfilling compaction density required shall be governed by the location of the water main.
   1. Whenever trenches fall under known structural pavements (streets, drives, or walkways), the trench shall be compacted to 95% maximum density, as defined by the Standard Proctor test.
   2. Otherwise, the trench shall be compacted to 90% maximum density, or to the insitu density of the surrounding soil.

PART 3 EXECUTION

3.1 EXAMINATION

A. Contractor shall carefully examine the project site and verify existing conditions before starting work.

B. Contractor shall verify that existing utility water main size, location, and depth are as indicated on Drawings.

C. All pipe, fittings, and accessories delivered to the job site shall be carefully examined by both the Contractor and the Engineer or his representative. This inspection does not exempt the Contractor from supplying the materials specified by the Contract. All materials found to have flaws, cracks, or other defects, whether before or after installation, shall be rejected by the Engineer and will be repaired or replaced by the Contractor as directed by the Engineer, at no additional cost.

3.2 PREPARATION

A. Pre-Construction Site Photos:

1. Take photographs along centerline of proposed pipe trench; minimum one photograph for each 200 feet of pipe trench.
2. Show mail boxes, curbing, lawns, driveways, signs, culverts, and other existing site features.
3. Include project description, date taken and sequential number on back of each photograph.

B. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs. Use only equipment specifically designed for pipe cutting. The use of chisels or hand saws will not be permitted. Grind edges smooth with beveled end for push-on connections.

C. Remove scale and dirt on inside and outside before assembly.

D. Prepare pipe connections to equipment with flanges or unions.

3.3 SURFACE PREPARATION, PRIMING AND PAINTING

A. All exposed metal piping, valves, fittings, etc. which have not received a suitable system of paints from the factory shall be cleaned, primed and painted as specified in this section.

B. All metal surfaces to be painted shall be prepared by sandblasting or other methods to provide a surface suitable for paint adherence.

C. All above ground metal piping and fittings, after cleaning, shall be primed and painted with a four- coat Alkyd paint system to a total dry film thickness of 5 mils. Immediately after surface preparation, each surface shall be primed with one coat of red lead iron oxide alkyd linseed oil paint conforming to Federal Specifications TT-P-86a to a minimum dry film thickness of 1 mil. Any primer surface damaged after priming operations and prior to application of the paint system shall be re-cleaned and re-primed as specified above. The initial three coats of paint shall be modified in color to contrast with successive coats. All painting shall be done in accordance with SSPC Paint Applications Specifications No. 1 – Latest Revision and in accordance with the manufacturer's suggested application procedures.

D. All below ground metal piping and fittings shall be painted with two coats of a coal tar-epoxy paint. Each coat shall have a dry film thickness of 6 – 8 mils for a total dry film thickness of 12 – 16 mils. The limits of the coal tar epoxy application shall be all piping or fittings below, or in contact with, the ground surface to a point 12" above finish grade.

3.4 EXCAVATION AND BEDDING

A. Excavate pipe trench in accordance with the Drawings. Excavated trench shall be of sufficient width to allow proper handling of the pipe and thorough compaction of backfill around the pipe.

B. Dewater excavations to maintain dry conditions and preserve final grades at bottom of excavation.

C. Stones found in the excavated trench shall be removed for a depth of at least six inches below the bottom of the pipe.

D. Place bedding material as required.

E. The subgrade and/or bedding material shall be accurately shaped and trimmed to support the pipe barrel. Each pipe section, when in place, shall have a uniform bearing on the supporting soil for the full length of the pipe barrel.

3.5 INSTALLATION - PIPE

A. Install ductile iron pipe in accordance with AWWA C600.

B. Install PVC pipe in accordance with AWWA C605.

C. Unless otherwise indicated on the Drawings, water pipe shall be installed to clear all utility lines and shall have a minimum of 36 inches of cover.

D. Proper equipment shall be used for lowering sections of pipe into trenches. Under no circumstances shall pipe be laid in water and no pipe shall be laid when trench conditions or weather are unsuitable for work. Full responsibility for the diversion of drainage and for dewatering of trenches during construction shall be borne by the Contractor.

E. All dirt and foreign matter shall be removed from the inside of pipe and fittings before they are lowered into the trench. Pipe and fittings shall be kept clean during and after laying. Care shall be taken to keep dirt out of the jointing space.

F. At the end of each day's work, and when pipe laying is discontinued for any appreciable period, open ends of pipe shall be closed with a cast plug or cap securely in place in all openings and at the end of the line.

G. Pipe shall be supported to proper line and grade and secured against upheaval or floating during the placement of bedding.

H. All bends and tie-in assemblies shall require restraint by thrust blocking. Additional restraining devices shall be required as indicated in the Drawings.

I. All pipe and fittings shall be lowered carefully into the trench in such manner as to prevent damage to pipe, fittings, or linings. Neither pipe nor fittings shall be dropped or dumped into the trench.

J. Cutting of pipe, when needed, shall be done in a neat and workmanlike manner without damage to pipe or pipe lining.

K. Unless otherwise directed by the Engineer, pipe shall be laid with bell ends facing the direction of laying. For lines on a appreciable slope, bells shall, at the direction of the Engineer, face upgrade. Wherever necessary to deflect pipe from a straight line in either the horizontal or vertical plan, to avoid any obstructions, or for other acceptable reasons, the degree of deflection at any joint shall not be greater than that recommended by the

pipe manufacturer. Any necessary deflections greater than that recommended shall require fittings.

L. Separation of Water Mains and Sewer Lines

1. Water mains shall be generally laid at least ten (10) feet horizontally from any existing or proposed sewer line. The distance shall be measured from edge to edge. In cases where it is not practical to maintain a ten (10) foot separation, the Engineer, with approval of the Louisiana Department of Health and Human Resources, may allow water main to be installed closer to a sewer line provided that:
   a. Water and sewer mains are laid in separate trenches not less than six (6) feet apart (face to face), or
   b. The water main is laid on an undisturbed earth shelf located on one side of the sewer line at such an elevation that the bottom of the water main is at least 18 inches above the top of the sewer line.
2. Water mains crossing sewers shall be laid to provide a minimum vertical distance of 18 inches between the outside of the water main and the outside of the sewer. This shall be the case where the water main is either above or below the sewer. At crossings, one full length of water pipe shall be located so both joints will be as far from the sewer as possible. Special structural support for the water and sewer pipes, if required, shall be installed by the Contractor at no direct pay.

M. Install valves in accordance with Section 33 12 16.

3.6 THRUST RESTRAINT

A. Class R concrete, as defined in Section 32 05 23, shall be placed at all valves, tees, bends, caps, dead-end, plugs, etc. as detailed in the Drawings. Concrete thrust block shall be placed against undisturbed earth, and shall be located so pipe fittings and joints will be accessible for repair.

B. Additional thrust restraint devices shall be installed as indicated on the Drawings.

3.7 HYDROSTATIC TESTING

A. All hydrostatic testing shall be done in accordance with the manufacturer's specifications, or in accordance with AWWA C600 or AWWA C605, and in accordance with this specification, whichever is more stringent. The contractor shall furnish gages, meters, water and all other material, tools, labor equipment and other necessary assistance of conducting the tests. The Engineer shall be notified at least 48 hours in advance of the hydrostatic test.

B. The pipeline shall be tested with a pressure of 150 psi, maintained over a continuous four (4) hour period. After a successful four (4) hour pressure test has been achieved, a two (2) hour leak test shall be run at the same 150 pound pressure. If the test indicates a leakage in excess of ten (10) gallons per inch of internal pipe diameter per mile of pipeline per 24 hours, the Contractor will be required to find and fix the leak. All known leaks shall be stopped, regardless of this test requirement. The cost of finding and repairing any leak shall be at the Contractor's expense.

C. The Contractor may elect to pressure test against existing valves. However, the Owner does not guarantee the water tightness of existing valves. Should a new water main be tested against an existing valve and the test fails, the contractor must then install proper blocking and retest the system as provided herein, at his expense.

3.8 DISINFECTION OF POTABLE WATER PIPING SYSTEM

A. All new water lines including appurtenances shall be disinfected following the acceptance of the hydrostatic test in accordance with AWWA C651. Mains shall be thoroughly flushed before introduction of the disinfectant.

B. All new mains and repaired portions of, or extensions to, existing mains shall be thoroughly disinfected by the use of chlorine or chlorine compounds before being placed in use. The rate of application of chlorine shall be in such proportion to the rate of water entering the pipe or other appurtenances that the chlorine dose applied to the water shall be at least 50 mg/L. Chlorinated water shall be retained long enough to destroy non-spore-forming bacteria. The period shall be at least three hours and preferably longer, as may be directed. After the chlorine treated water has been retained for the required time, the chlorine residual at pipe extremities and at other representative points shall be at least 5 mg/L. If the residual is less than 5 mg/L, the disinfection procedure shall be repeated until a 5 mg/L residual is obtained, as required above.

C. While the disinfectant is being applied to any section of the system, the water will be allowed to escape at all extremities of this section until the presence of chlorine is evident by measuring with an orthotolidin test kit furnished by the contractor. If bacteriological tests indicate insufficient disinfection at the completion of the test and flushing of the system, the procedure shall be repeated on that part of the system at no additional compensation. The cost of disinfection shall be included in the bid price.

D. The Contractor shall take whatever steps necessary to prevent the backflow of the strong chlorine solution into any existing water distribution system.

E. Water from new systems, or from new parts of existing systems, shall not be furnished for consumer's use until tests performed by a laboratory which is certified by the state health officer have shown the new system or new part of the existing system to be free from contamination by Coliform bacteria (following EPA approved procedures prescribed in *Standard Methods for the Examination of Water and Wastewater*, Nineteenth Edition). Samples shall not be collected from the new facilities until such new facilities have been disinfected as prescribed in Paragraph B above, and the chlorinated water thoroughly flushed from the system.

END OF SECTION

DEPARTMENT OF HEALTH AND HOSPITALS

FACTS

Louisiana Lead Reduction

State of Louisiana Safe Drinking Water Program

Low lead requirements in plumbing and potable water distribution systems:

Concentrations of lead found in drinking water do not typically derive from natural sources. Instead, the most common cause of lead concentrations in potable water is contamination from the gradual corrosion of water supply pipes and plumbing fixtures as well as the solder, or flux, used for installation and repair. Most current regulatory efforts to control lead in drinking water focus primarily on reducing the lead content of these system components.

On June 29, 2011, Gov. Bobby Jindal signed Louisiana House Bill 471 and enacted Act Number 362. This Act takes effect January 1, 2013, and prohibits the use, installation, repair, introduction into commerce, or sale of pipes, fittings, fixtures, solder, or flux that are not "lead free" when used for conveying water for human consumption.

The Department of Health and Hospitals (DHH) has prepared this fact sheet to help clarify how Act 362 redefines "lead-free" and how these new, lowered lead limits will affect various components used in the construction of new and existing plumbing and water distribution projects. In addition, this fact sheet will describe the key components of implementation including code development, applicable performance and material standards, enforcement and exceptions.

Reduced Lead Requirements of Act 362 (effective January 1, 2013):

Under Act 362, the lead content of pipes, fittings and fixtures will be reduced from not more than 8.0 percent lead to not more than a weighted average of 0.25 percent lead when used with respect to the wetted surfaces of pipes, pipe fittings, plumbing fittings and fixtures.

All pipe, plumbing fittings and fixtures, solder or flux used in the installation or repair of any public water system or any plumbing in a facility providing water for human consumption must meet the new low lead requirements, except when necessary for the repair of leaded joints of cast iron pipes.

EXCEPTIONS: The following materials are not required to meet the reduced lead requirements of Act 362:

- Pipes, pipe fittings, plumbing fittings or fixtures, including backflow preventers, which are used exclusively for non-potable services such as manufacturing, fire sprinkler system, industrial processing, irrigation, outdoor watering or any other uses where the water is not anticipated to be used for human consumption; or
- Toilets, bidets, urinals, fill valves, flushometer valves, tub fillers, shower valves, showers, safety shower flushes, service saddles or water distribution main gate valves that are two inches in diameter or larger.
- Materials purchased or acquired by a public water system prior to January 1, 2013, can continue to be utilized until January 1, 2014.

In addition to the installation requirements, no person shall introduce into commerce any pipe, pipe or plumbing fitting or fixture intended to convey or dispense water for human consumption through drinking or cooking that is not lead-free, including kitchen faucets, bathroom faucets or any other end-use devices intended to convey or dispense water for human consumption through drinking or cooking.

Louisiana Administrative Code (LAC) Updates:

These new low-lead requirements will be published in Parts XII (Water Supplies) and XIV (Plumbing)

OVER



of LAC Title 51 (Sanitary Code). Under Parts XII and XIV, all applicable potable water piping, fixtures, pipe related products and materials that join or seal pipes shall be evaluated and listed as conforming with NSF/ANSI 372-Drinking Water System Components, Lead Content or shall be certified to be lead-free by an independent American National Standards Institute (ANSI)-accredited third party testing laboratory, inspection agency or other organization concerned with product evaluation.

Enforcement:

The enforcement of the lead reduction law will be handled during plan reviews, permit inspections, surveys, complaints, etc. For plumbing-related violations, the enforcement will typically be handled at the local level in accordance with their ordinances, laws or other regulations. When handled at the state level, the enforcement process will be in accordance with Part I of LAC Title 51.

Potential Health Effects of Lead Exposure:

- Lead is a neuro-toxic metal that accumulates in both soft tissue and bones. Even low-level exposure can lead to a range of adverse health effects, including brain, nervous system and blood disorders.
- Children and Infants— Exposure can result in delays in physical or mental development, reduced intelligence, learning disabilities, attention deficit disorder, behavioral problems, stunted growth, impaired hearing and kidney damage.
- Adults— Exposure can result in kidney problems, high blood pressure, nerve disorders, fertility problems, muscle and joint pain, irritability, memory and concentration problems. Pregnant women can pass lead contained in their bodies to their fetuses.

Highlighted Facts:

- Act 362 Becomes Effective January 1, 2013.
- Prohibits the use, installation or repair, introduction into commerce, or selling of pipes, fittings, fixtures, solder, or flux that is not “lead-free” when used for conveying water for human consumption.
- Pipes, fittings and fixtures that are used exclusively for non-potable services are not required to meet the reduced lead requirements of Act 362.
- Materials purchased or acquired by a public water system prior to January 1, 2013 can continue to be utilized until January 1, 2014.
- All applicable piping, fixtures, pipe-related products and materials that join or seal pipes shall be evaluated and listed as conforming with NSF/ANSI 372-Drinking Water System Components, Lead Content or shall be certified to be lead free by an independent ANSI-accredited third party testing laboratory.

State of Louisiana
Safe Drinking Water Program
Department of Health and Hospitals
Office of Public Health

628 N. 4th Street
Baton Rouge, LA 70802
Phone: 225-342-7499
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SECTION 331216 - WATER UTILITY DISTRIBUTION VALVES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Resilient wedge gate valves.
   2. Valve boxes.

B. Related Sections:
   1. Section 03 30 00 - Cast-In-Place Concrete.
   2. Section 31 23 17 - Trenching Excavation and Backfill.
   3. Section 33 11 13 - Public Water Utility Distribution Piping.

1.2 REFERENCES

A. American Water Works Association:
   1. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service.
   2. AWWA C515 – Reduced Wall, Resilient-Seated Gate Valves for Water Supply Service.
   3. AWWA C550 - Protecting Epoxy Interior Coating for Valves and Hydrants.
   4. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.

B. National Sanitation Foundation:
   1. NSF 61 - Drinking Water System Components - Health Effects

1.3 SUBMITTALS

A. Contractor is required to submit six (6) copies of product data for review and approval. The Engineer shall promptly review this data, and return two (2) copies to the Contractor as accepted, or with requested modifications. Contractor to submit data on pipe materials, pipe fittings, valves, meter assemblies, and all accessories.

1.4 DELIVERY, STORAGE AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing and protecting products.

B. Prepare valves and accessories for shipment according to AWWA Standards and seal valve and ends to prevent entry of foreign matter into product body.

C. Store products in areas protected from weather, moisture, or possible damage; do not store products directly on ground; handle products to prevent damage to interior or exterior surfaces.

PART 2 PRODUCTS

2.1 RESILIENT WEDGE GATE VALVES – STANDARD TYPE

A. Manufacturers:
1. M & H 7000 Series
2. Mueller A-2360 series.
3. American Darling 2500 series.
4. Clow F-6100 series.
5. Substitutions: Section 01 60 00 - Product Requirements.

B. All gate valves shall be resilient wedge type meeting the requirements of AWWA C-515 except as amended herein. All gate valves shall be provided with "O" ring seals. AWWA C-515 gate valves shall be provided with bronze stem nut and wedge lugs guided within the valve body with machined guides. Gate valves shall open counterclockwise and shall have a working pressure rating of 250 PSI. Gate valves shall have mechanical joint ends for below ground installations and flanged ends for above ground installations.

C. Gate valves 3" or smaller shall be iron body with bronze trim. Valves shall be of the mechanical joint or threaded end type.

2.2 RESILIENT WEDGE GATE VALVES – INSERTION TYPE

A. Manufacturer:
1. Hydra-Stop Insta-Valve 250 Patriot Series.

B. Insertion valve shall be an all stainless steel body resilient wedge gate valve designed for permanent use in potable water. Valve design shall allow the valve to be installed into an existing pressurized pipeline while maintaining constant pressure and service without system shutdown. No restraining devices, restraining fasteners or transition gaskets shall be required for installation or operation of the valve.

C. Traditional line tapping methods shall be used for the installation of all insertion valves to allow removal of a single coupon for system evaluation. Reaming the pipe, complete removal of a section of pipe or milling a slot in the pipe shall be prohibited.

D. All insertion valves shall be installed by companies trained and authorized by the approved valve manufacturer.

E. Valve Body and Bonnet Construction:
1. Insertion valves shall have a stainless steel body, carbon steel epoxy coated bonnet and a reinforced composite polymer valve cartridge to provide corrosion resistance, strength and a pressure rating that meets or exceeds the requirements of resilient seated gate valves.
2. Insertion valves must be capable of working on Cast Iron or Ductile Iron Class A, B, C and D, IPS PVC, C900 and C909 PVC, Steel and AC pipe diameters without changing either top or bottom portion of split valve body or using a transition gasket.

3. Insertion valves must provide a solid support of the host pipe through the entire laying length of the valve body. No gaps or space between the valve body and host pipe shall be accepted.
4. Insertion valves shall be rated for 250 psig maximum working pressure and the pressure rating must be permanently marked into the valve body.
5. Insertion valves must be hydrostatically pressure tested to 1.25 times the system operating pressure (minimum) or 1.5 times the insertion valve's 250 psig maximum pressure rating. The test shall be sustained for a minimum of 15 minutes prior to tapping the host pipe. If the insertion valve body is moved, the pressure test must be completed again before the host pipe is tapped.

F. Resilient Wedge Gate Assembly:
1. Insertion valves shall have an EPDM molded resilient wedge seal affixed into a reinforced composite polymer valve cartridge. The entire assembly shall be inert and impervious to corrosion.
2. The valve cartridge shall be engineered to come into contact with the interior of the host pipe and an engineered sealing surface in the valve body to create a seal. The resilient wedge shall be reinforced where the wedge contacts the host pipe.
3. Pressure equalization on the downstream or upstream side of the closed wedge shall not be necessary to open the valve.
4. The wedge shall be symmetrical and seal equally well with flow in either direction.
5. The resilient wedge must ride inside a minimum of four body channels to maintain wedge alignment throughout its travel and to achieve maximum fluid control.
6. Insertion valves shall have a full size, full port flow way that is unobstructed and free of depressions.

G. Insertion valves shall utilize four O-Rings to seal between valve body to valve bonnet and valve stem. O-Rings shall be located so as to ensure the 250 psig pressure worthiness and prevent ground water and/or foreign materials from entering the valve.

H. Valve Stem:
1. Insertion valves shall be NRS (non-rising stem) and shall operate with standard turns 3 turns per diameter inch to open or close.
2. Insertion valves shall be operated by a 2" square nut, opening left.
3. The valve stem shall be made of stainless steel.
4. The valve stem shall be able to withstand torque of 700 ft. lbs. without compromising operation.
5. The NRS stem shall have an integral stem collar manufactured of no lead bronze. The stem shall be affixed into the valve cartridge to maintain stem alignment, low torque and continuous operation of the valve.

2.3 ECCENTRIC PLUG VALVES

A. Eccentric plug valves shall be of the tightly closing, resilient faced, non-lubricating variety as manufactured by Clow, or approved equal. Valves shall be of eccentric design such that the valve's pressure member (plug) rises off the body seat contact area immediately upon shaft rotation during the opening movement. Valves shall be drop-

tight at the rated pressure (175 psi through 12", 150 psi 14" and above) and shall be satisfactory for applications involving throttling service as well as frequent or infrequent on-off service. The valve closing member should rotate approximately 90 degrees from the full-open to full-closed position and vice-versa.

B. The valve body shall be constructed of cast iron (semi-steel) conforming to ASTM A126, Class B. Body ends shall be:
   1. Flanged with dimensions, facing and drilling in full conformance with ANSI B16.1, Class 125. This includes flange thickness.
   2. Mechanical Joint to meet the requirements of AWWA C111/ANSI A21.11.
   3. Grooved Ends to meet the requirements of AWWA C606.

C. Eccentric plug valves shall have a rectangular shaped port. Port areas for 3" – 20" valves shall be a minimum 80% of full pipe area. Port area for 24" valve shall be a minimum 70% of full pipe area.

D. Valve seat surface shall be welded-in overlay, cylindrically shaped of not less than 90% pure nickel. Seat area shall be raised, with raised area completely covered with weld to ensure proper seat contact. The machined seat area shall be a minimum of .125" thick and .500" wide.

E. The valve plug shall be constructed of cast iron (semi-steel) conforming to ASTM A126, Class B. The plug shall have a cylindrical seating surface that is offset from the center of the plug shafts. The plug shafts shall be integral. The entire plug shall be 100% encapsulated with Buna-N rubber in all valve sizes. The rubber compound shall be approximately 70 (Shore A) durometer hardness. The rubber to metal bond must withstand 75 lbs. pull under test procedure ASTM D-429-73 Method B.

F. Shaft bearings, upper and lower, shall be sleeve type metal bearings, sintered, oil impregnated and permanently lubricated Type 316 stainless steel. Thrust bearings shall be Nylatron.

G. Plug valve shaft seals shall be of the multiple V-ring type (Chevron) and shall be adjustable. All packing shall be replaceable without removing the bonnet or actuator and while the valve is in service. Shaft seals shall be made of Buna-N.

H. Each valve shall be given a test against the seat at the full rated working pressure and a hydrostatic shell test at twice the rated working pressure. Certified copies of individual tests shall be submitted when requested. Certified copies of proof-of-design tests shall be submitted upon request.

I. Manual valves shall have lever or worm gear type actuators with handwheels. Lever actuators shall be furnished on valves 6" and smaller. Worm gear type actuators shall be furnished on valves 8" and larger.

2.4 BUTTERFLY VALVES

A. All butterfly valves shall be of the rubber-seated, tight-closing type. They shall meet or exceed AWWA Standard C-504. All valves shall be Clow Valve Style 4500 butterfly valves, or approved equal.

B. All valves must use full AWWA C-504 Class 150B valve shaft diameter, and full Class 150B underground-service-operator torque rating throughout entire travel, to provide capability for operation in emergency service. All valves shall be NSF approved.

C. Valve body shall be high-strength cast iron ASTM A126 Class B with 18-8 type 304 stainless steel body seat. Valve vane shall be high-strength cast iron ASTM A48 Class 40, having rubber seat mechanically secured with an integral 18-8 stainless steel clamp ring and 18-8 stainless steel self-locked screws.

D. For valves 4”-12” the valve shaft shall be one piece, extending full size through the entire valve. Valve shaft shall be 304 stainless steel. Packing shall be 0-ring cartridge designed for permanent duty in underground service. For 14” and larger valve shaft shall be 18-8 stainless steel stub shaft design keyed to the vane with stainless steel torque plugs.

E. Valve ends shall be one of the following type as indicated in the construction plans:
   1. Wafer Type Body: Suitable for installation between 125# or 150# ASA flanges.
   2. Flanged: Short body valves per Table 2 of AWWA C504. Flanges shall be 125# ANSI.
   3. Mechanical Joint: Both ends of valve shall be “MJ” per AWWA C111. “MJ” accessories (bolts, glands, gaskets) must be supplied by valve manufacturer.

F. Valve operator shall be of the traveling-nut type, sealed, gasketed, and lubricated for underground service. It shall be capable of withstanding an overload input torque of 450 ft. pounds at full-open or full-closed position without damage to the valve or valve operator. It shall be designed for submergence in water to 25 ft head pressure for up to 72 hours.

G. Valve shall be capable of easy closure by one man using standard valve key even under emergency line-break conditions. Operators shall come with easy external adjustment.

H. All manual operators for service other than underground shall have position indicator and shall be totally enclosed and permanently lubricated. All valves shall open left (clockwise to close). In any event, a maximum pull of 80 pounds on the lever shall produce full output torque through entire travel. Operator shall accept 300 pounds pull on lever at full-open and full-closed positions without damage to the valve or operator. Operators shall be of the traveling nut type.

I. Cylinder operator shall be of the base mounted configuration. Cylinder barrel shall be on molybdenum-disulfide lined glass fiber reinforced epoxy tubing, to provide a corrosion-free, self-lubricated high strength barrel. Rod seal shall be urethane, molybdenum-disulfide filled, to provide a self-lubricated, long life seal.

J. Piston rod shall be of hard chromium plated 18-8 stainless steel, and shall be top and bottom guided in a heavy cast iron mechanism housing for positive alignment. Guiding shall be accomplished by bronze bearings at ends of housing straddling all side loads improved in operation. Entire operator including piston rod shall be fully enclosed.

2.5 CHECK VALVES

A. All check valves shall be of the cushioned swing type as manufactured by Mueller, or approved equal. Valves shall be furnished with an external lever and weight unless otherwise specified. Swing check valves shall be constructed with heavy cast iron or cast steel body with a bronze or stainless steel seat ring, a non-corrosive shaft for attachment of the weight and lever, complete non-corrosive cushion chamber, and shall allow for removal of all internal parts without removing the valve body from the line.

B. The cushion chamber shall be attached to the side of the valve body externally and so constructed with a piston operating in a chamber that will effectively permit the valve to be operated without any hammering action. The cushioning shall be by air, and the cushioning chamber shall be so arranged that the closing speed will be adjustable to meet the service requirements.

C. The valve disc shall be of cast iron or cast steel and shall be suspended from a non-corrosive shaft which will pass through a stuffing box and be connected to the cushion chamber on the outside of the valve.

2.6 COMBINATION AIR AND VACUUM RELEASE VALVES

A. All combination air and vacuum release valves shall be guaranteed not to blow shut under normal operating conditions with air flowing into the pipeline or being exhausted from the pipeline via the valve.

B. Valves 2 inches and smaller shall be combination air and vacuum release valves and shall be Crispin Type R or approved equal.

C. Valves 3 inches and larger shall be dual air and vacuum release valves and shall include a small orifice valve for exhausting small quantities of entrained air and a large orifice for inducting as well as exhausting large quantities of air. The combination air/vacuum and pressure release valve shall be Crispin US Series Universal valve or approved equal.

2.7 VALVE BOXES

A. Valve boxes shall be made of cast iron and shall be of the heavy roadway type with an inside diameter of not less than 5 inches.

B. The top section of the valve box shall be adjustable for elevation and shall be of the three-piece screw type.

C. The base shall be sufficiently large so that it will not come in contact with the valve or pipe at any point.

D. The valve box cover shall be cast iron with the designation “water” embossed on the top side and shall be of the bolt-down type.

E. The top of the valve box shall be installed flush with the ground and shall be supported by a 2’ x 2’ x 6” poured in place concrete foundation reinforced with 6”x6”x10 ga. welded wire fabric as shown on the Drawings. Precast concrete pads will not be allowed unless prior approval is received from the owner.

2.8 ACCESSORIES

A. Concrete for Thrust Restraints: Type R Concrete as specified in Section 03 30 00.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.

B. Determine exact location and size of valves from Drawings; obtain clarification and directions from Architect/Engineer prior to execution of work.

C. Verify invert elevations prior to excavation and installation of valves.

3.2 PREPARATION

A. Identify required lines, levels, contours and datum locations.

B. Locate, identify, and protect utilities to remain from damage.

C. Do not interrupt existing utilities without permission and without making arrangements to provide temporary utility services.
1. Notify Engineer not less than three working days in advance of proposed utility interruption.
2. Do not proceed without written permission from the Engineer.

D. Perform trench excavation, backfilling and compaction in accordance with Section 31 23 17.

3.3 INSTALLATION

A. Install valves in conjunction with pipe laying; set valves plumb.

B. Provide buried valves with valve boxes installed flush with finished grade.

3.4 THRUST RESTRAINT

A. Class R concrete, as defined in Section 03 30 00, shall be placed at all valves, tees, bends, caps, dead-end, plugs, etc. as detailed in the Drawings. Concrete thrust block shall be placed against undisturbed earth, and shall be located so pipe fittings and joints will be accessible for repair.

B. Additional thrust restraint devices shall be installed as indicated on the Drawings.

3.5 DISINFECTION OF POTABLE WATER PIPING SYSTEM

A. Flush and disinfect system in accordance with Section 33 11 13.

3.6 HYDROSTATIC TESTING

A. Pressure test system to in accordance with Section 33 11 13.

END OF SECTION

SECTION 333100 - SANITARY UTILITY SEWERAGE PIPING

PART 1 GENERAL

1.1 SUMMARY

A. Scope of Work:
   1. Furnish all labor, materials, equipment and incidentals required to install and test sewer pipe and fittings, complete as shown on the Drawings and as specified herein.

B. Related Sections:
   1. Section 31 23 17 – Trenching Excavation & Backfill.
   2. Section 33 05 13 – Precast Concrete Manholes and Structures.

1.2 REFERENCES

A. ASTM International:
   1. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings.
   2. ASTM A746 - Standard Specification for Ductile Iron Gravity Sewer Pipe.
   3. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
   4. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).
   5. ASTM D 1784 - Standard Specification for Rigid Poly Vinyl Chloride (PVC) Compounds and Chlorinated Poly Vinyl Chloride (CPVC) Compounds.
   6. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
   7. ASTM D2729 - Standard Specification for Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
   8. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
   9. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
   10. ASTM D3034 - Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
   11. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
   12. ASTM F789 - Standard Specification for Type PS-46 and Type PS-115 Poly Vinyl Chloride (PVC) Plastic Gravity Flow Sewer Pipe and Fittings.
   13. ASTM F794 - Standard Specification for Poly Vinyl Chloride (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter.

B. National Sanitation Foundation (NSF)
   1. NSF 14 - Plastic Piping Components and Related Materials.

C. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.3 DEFINITIONS

A. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.

1.4 SUBMITTALS

A. Product Data: Submit data indicating pipe material used and pipe accessories.

B. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.

C. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.5 CLOSEOUT SUBMITTALS

A. Project Record Documents: Provide an as-built drawing indicating location of pipe runs, connections, manholes, cleanouts, and invert elevations.

1.6 QUALITY ASSURANCE

A. All pipe and fittings shall be furnished by manufacturers who are fully experienced, reputable and qualified in the manufacture of the pipe to be furnished. The pipe shall be designed, constructed and installed in accordance with the best practices and methods and shall comply with this Section.

B. All pipe and fittings shall be from a single manufacturer. The supplier shall be responsible for the provisions of all test requirements specified in the referenced Standards, as applicable. In addition, all pipe to be installed under this Contract may be inspected at the plant for compliance with the requirements specified herein by an independent testing laboratory provided by the Owner. The Contractor shall require the manufacturers cooperation in these inspections. The cost of plant inspection of all pipe approved for this Contract, plus the cost of inspection of a reasonable amount of disapproved pipe, will be borne by the Owner.

C. Inspections of the pipe may also be made by the Engineer or other representatives of the Owner after delivery. The pipe shall be subject to rejection at any time on account of failure to meet any of the requirements specified herein, even though sample pipes may have been accepted as satisfactory at the place of manufacture. Pipe rejected after delivery shall be marked for identification and shall be removed from the job at once.

1.7 DELIVERY, STORAGE AND HANDLING

A. Care shall be taken in shipping, handling and laying to avoid damaging the pipe and fittings. Extra care will be necessary, during cold weather construction. Any pipe damaged in shipment shall be replaced as directed by the Engineer.

B. Any pipe or fitting showing a crack or which has received a blow that may have caused an incipient fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the work.

C. While stored, pipe shall be adequately supported from below at not more than 3-ft intervals to prevent deformation. Pipe shall not be stacked higher than 6-ft. Pipe and fittings shall be stored in a manner which will keep them at ambient outdoor temperatures. Temporary shading as required to meet this requirement shall be provided. Simple covering of the pipe and fittings which allows temperature buildup when exposed to direct sunlight will not be permitted.

1.8 FIELD MEASUREMENTS

A. Verify field measurements and elevations are as indicated in the construction drawings.

B. Notify engineer of any discrepancies or variations from plan dimensions and elevations.

PART 2 PRODUCTS

2.1 SANITARY SEWAGE PIPE

A. Cast Iron Pipe: All cast iron pipe shall conform to the requirements of ASTM A74, Extra Heavy type, inside nominal diameter as indicated in the Drawings, bell and spigot ends.
1. Fittings: Cast iron.
2. Joints: ASTM C564, rubber gasket joint devices.

B. Ductile Iron Pipe: All ductile iron pipe shall conform to the requirements of ASTM A746, Extra Heavy type, inside nominal diameter as indicated in the Drawings, bell and spigot ends.
1. Fittings: Ductile iron.
2. Joints: AWWA C111, rubber gasket joint devices.

C. Polyvinyl Chloride (PVC) Pipe:
1. PVC gravity pipe and fittings shall be Type PSM, SDR 35 with full diameter dimensions and shall conform to ASTM D3034, or Type PS-46 conforming to ASTM F789. Straight pipe shall be furnished in lengths of not more than 13-ft and wyes shall be furnished in lengths of not more than 3-ft. Saddle wyes will not be allowed.
2. PVC pipe and fittings shall have bell and spigot push-on joints. The bell shall consist of an integral wall section with a solid cross-section elastomeric gasket securely locked in place to prevent displacement during assembly. Elastomeric gaskets shall conform to ASTM F477 and ASTM D3212.
3. All fittings and accessories for sewers shall be have bell and/or spigot configurations compatible with the pipe.
4. Each length of pipe and each fitting shall be marked with the name of the manufacturer, nominal size and SDR designation. All gaskets shall be marked with the name of the manufacturer, size and proper insertion direction.

2.2 MANHOLES

A. All manholes shall be in accordance with Section 33 05 13 – Precast Concrete Manholes and Structures.

2.3 BEDDING AND COVER MATERIALS

A. Bedding, Cover and Backfill shall be as specified in Section 31 23 17 – Trenching Excavation and Backfill.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify trench is ready to receive work and excavations, dimensions, and elevations are as indicated on drawings.

3.2 PREPARATION

A. Correct over excavation with fine aggregate.

B. Remove large stones or other hard matter which could damage pipe or impede consistent backfilling or compaction.

3.3 BEDDING

A. Excavate pipe trench in accordance with Section 31 23 17.

B. Place bedding material at trench bottom, level materials in continuous layer not exceeding 6 inches.

C. Maintain optimum moisture content of bedding material to attain required compaction density.

3.4 INSTALLATION - PIPE

A. No single piece of pipe shall be laid unless it is generally straight. The centerline of the pipe shall not deviate from a straight line drawn between the centers of the openings at the ends of the pipe by more than 1/16-in per foot of length. If a piece of pipe fails to meet this requirement check for straightness, it shall be rejected and removed from the site. Laying instructions of the manufacturer shall be explicitly followed.

B. If any defective pipe is discovered after it has been installed, it shall be removed and replaced with a sound pipe in a satisfactory manner at no additional cost to the Owner. All pipe and fittings shall be thoroughly cleaned before installation, shall be kept clean until they are used in the work and when laid, shall conform to the lines and grades required.

C. PVC pipe and fittings shall be installed in accordance with requirements of the manufacturer, ASTM D2321 or as otherwise specified herein. As soon as the excavation is complete to normal grade of the bottom of the trench, bedding material shall be placed, compacted and graded to provide firm, uniform and continuous support for the pipe. Bell holes shall be excavated so that only the barrel of the pipe bears upon the bedding. The pipe shall be laid accurately to the lines and grades indicated on the Drawings. Blocking under the pipe will not be permitted. Horizontal and vertical final position tolerance shall be plus or minus 0.02 feet.

D. All pipe shall be sound and clean before installation. When installation is not in progress, including lunchtime, the open ends of the pipe shall be closed by watertight plug or other approved means. Good alignment shall be preserved during installation. The deflection at joints shall not exceed that recommended by manufacturer. Fittings, in addition to those shown on the plans, shall be provided, if required, in crossing utilities which may be encountered upon opening the trench.

E. When cutting pipe is required, the cutting shall be done by machine, leaving a smooth cut at right angles to the axis of the pipe. Cut ends of pipe to be used with a bell shall be beveled to conform to the manufactured spigot end.

F. The Engineer may examine each bell and spigot end to determine whether any preformed joint has been damaged prior to installation. Any pipe having defective joint surfaces shall be rejected, marked as such, and immediately removed from the job site.

G. Each length of the pipe shall be shoved home against the pipe previously laid and held securely until enough backfill has been placed to hold the pipe in place. Joints shall not be “pulled” or “cramped”.

H. Before any joint is made, the pipe shall be checked to assure that a close joint with the next adjoining pipe has been maintained and that the inverts are matched and conform to the required grade. The pipe shall not be driven down to grade by striking it.

I. Precautions shall be taken to prevent flotation of the pipe in the trench.

J. When moveable trench bracing such as trench boxes, moveable sheeting, shoring or plates are used to support the sides of the trench, care shall be taken in placing and moving the boxes or supporting bracing to prevent movement of the pipe, or disturbance of the pipe bedding and the screened gravel backfill. Trench boxes, moveable sheeting, shoring or plates shall not be allowed to extend below mid-diameter of the pipe. As trench boxes, moveable sheeting, shoring or plates are moved, screened gravel shall be placed to fill any voids created and the screened gravel and backfill shall be recompacted to provide uniform side support for the pipe.

K. Lay pipe to slope gradients noted on drawings; with maximum variation from indicated slope of 1/8 inch in 10 feet.

L. Install bedding at sides and over top of pipe to minimum compacted thickness of 12 inches.

M. Refer to Section 31 23 17 for backfilling and compacting requirements. Do not displace or damage pipe when compacting.

3.5 INSTALLATION – JOINTING METHODS

A. Sewer pipe and fittings shall be jointed in accordance with the recommendations of the latest ASTM Standards and detailed instructions of the manufacturer.

B. All manhole connections shall be as shown on the Drawings except that concrete and mortared connections shall be equipped with an integral 0-ring or other sealant such that a positive watertight seal is established. The Contractor shall be responsible for repairing all damage to manholes where pipe connections are made.

3.6 INSTALLATION – WYE BRANCHES, CHIMNEYS AND STUBS

A. All fittings shall be furnished by the same manufacturer that furnishes the pipe.

B. Wye branches shall be furnished and installed and capped in locations directed by the Engineer. Each wye branch shall be provided with an end cap and shall be backed with a piece of wood (2-in by 4-in) that extends to a point 3-ft below the finished ground surface.

C. Chimneys shall be installed according to the detail on the Drawings at locations to be determined by the Engineer.

D. Ample time shall be given to the Engineer to obtain the exact location of each wye branch and chimney before it is covered up. Wye branches and chimneys, which are covered before the Engineer has had time to obtain their location, shall be exposed so that location measurements can be taken.

E. Manhole drops shall be installed as shown on the Drawings or directed by the Engineer.

F. Pipe stubs for manhole connections shall not exceed 3.25-ft in length unless directed otherwise by the Engineer. Install caps where required.

3.7 INSTALLATION – SERVICE CONNECTIONS

A. Service connections shall be installed at a minimum slope of 1 percent at the locations and to the limits as shown on the Drawings. The end shall be capped and backed with a 2-in by 4-in wood post extending to 3-ft below the finished ground surface.

B. Service connections shall be 6-in diameter unless otherwise shown on the Drawings.

C. Service connections shall include cleanout as detailed in the Drawings.

3.8 INSTALLATION - MANHOLES

A. Install manholes in accordance with Section 33 05 13 – Precast Concrete Manholes and Structures.

3.9 FIELD QUALITY CONTROL

A. Leakage Tests
   1. Prior to final inspection of the project, the Contractor shall, at his own expense, conduct a water leakage test for the entire collection and disposal system. The leakage outward or inward (exfiltration or infiltration) shall not exceed 100 gallons per inch of pipe diameter per mile per day for any section of the system.
   2. A low pressure air test may be conducted in lieu of the above water test with prior approval of the Engineer. The low pressure air test shall consist of pressurizing each segment of sewer main to 4 psi for 5 minutes. No loss of air pressure is allowed.
   3. All tests shall be conducted under the direct supervision of the Engineer or his representative. The Contractor shall provide 48 hours notice to the Engineer prior to conducting these tests.

B. Allowable Deflection Test
   1. Pipe deflection measured not less than 90 days after the backfill has been completed as specified shall not exceed *5* percent. Deflection shall be computed by multiplying the amount of deflection (nominal diameter less minimum diameter when measured) by 100 and dividing by the nominal diameter of the pipe.
   2. Deflection shall be measured with a rigid mandrel (Go/No-Go) device cylindrical in shape and constructed with a minimum of 9 or 10 evenly spaced arms or prongs. Drawings of the mandrel with complete dimensions shall be submitted to the Engineer for each diameter of pipe to be tested. The mandrel shall be hand pulled through all sewer lines.

C. Any section of sewer not passing the mandrel shall be uncovered at no additional cost to the Owner and the bedding and backfill replaced to prevent excessive deflection. Repaired pipe shall be retested.

D. When tests indicate Work does not meet specified requirements, remove work, replace and retest.

3.10 PROTECTION OF FINISHED WORK

A. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

END OF SECTION

SECTION 334000 - STORM DRAINAGE UTILITIES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Storm drainage piping.
2. Accessories.
3. Underground pipe markers.
4. Catch basins and plant area drains.
5. Cleanouts.
6. Bedding and cover materials.

B. Related Sections:
1. Section 32 05 23 – Cement & Concrete for Exterior Improvements
2. Section 31 23 17 – Trenching Excavation & Backfill

1.2 REFERENCES

A. American Association of State Highway and Transportation Officials:
1. AASHTO HB - Standard Specifications for Highway Bridges.
2. AASHTO M36 - Standard Specification for Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains.
3. AASHTO M190 - Standard Specification for Bituminous-Coated Corrugated Metal Culvert Pipe and Pipe Arches.
4. AASHTO M198 - Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.
5. AASHTO M218 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized), for Corrugated Steel Pipe.
6. AASHTO M245 - Standard Specification for Corrugated Steel Pipe, Polymer-Precoated, for Sewers and Drains.
7. AASHTO M246 - Standard Specification for Steel Sheet, Metallic-Coated and Polymer-Precoated, for Corrugated Steel Pipe.
8. AASHTO M315 - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
9. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

B. ASTM International:
1. ASTM A742 - Standard Specification for Steel Sheet, Metallic-Coated and Polymer-Precoated for Corrugated Steel Pipe.
2. ASTM A760 - Standard Specification for Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains.
3. ASTM A762 - Standard Specification for Corrugated Steel Pipe, Polymer-Precoated for Sewers and Drains.
4. ASTM A798 - Standard Practice for Installing Factory-Made Corrugated Steel Pipe for Sewers and Other Applications.

5. ASTM A849 - Standard Specification for Post-Applied Coatings, Pavings, and Linings for Corrugated Steel Sewer and Drainage Pipe.
6. ASTM A929 - Standard Specification for Steel Sheet, Metallic-Coated by the Hot-Dip Process for Corrugated Steel Pipe.
7. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
8. ASTM C443 - Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
9. ASTM C506 - Standard Specification for Reinforced Concrete Arch Culvert, Storm Drain, and Sewer Pipe.
10. ASTM C990 - Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.
11. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).
12. ASTM D1784 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
13. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
14. ASTM D2412 - Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.
15. ASTM D3034 - Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
16. ASTM D3212 - Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
17. ASTM D3350 - Standard Specification for Polyethylene Plastic Pipe and Fittings Materials.
18. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
19. ASTM F794 - Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter.
20. ASTM F949 - Standard Specification for Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings.
21. ASTM F2306 - Standard Specification for 12 to 60 inch Annular Corrugated Profile-Wall Polyethylene (PE) Pipe and Fittings for Gravity-Flow Storm Sewer and Subsurface Drainage Applications.
22. ASTM F2648 - Standard Specification for 12 to 60 inch Annular Corrugated Profile Wall Polyethylene (PE) Pipe and Fittings for Land Drainage Applications.

C. National Corrugated Steel Pipe Association (NCSPA)

1.3 SUBMITTALS

A. Product Data: Submit data indicating pipe and pipe accessories.

B. Manufacturer's Installation Instructions: Submit special procedures required to install Products specified.

C. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with Louisiana Standard Specifications for Roads and Bridges, Latest Edition.

PART 2 PRODUCTS

2.1 STORM DRAINAGE PIPING

A. Reinforced Concrete Pipe and Pipe Arch (RCP & RCPA): Circular pipe shall comply with the requirements of ASTM C76, Class III, wall thickness "B" unless otherwise noted on the Drawings. Arch pipe shall comply with the requirements of ASTM C506. The joint design for reinforced concrete pipe shall be bell and spigot or tongue and grove. Pipe joints shall incorporate preformed flexible joint sealant in accordance with the requirements of AASHTO M198/ASTM C990 or rubber gaskets in accordance with the requirements of AASHTO M315/ASTM C443. Joint sealants/gaskets shall be installed in strict accordance with the pipe manufacturer's recommendations. All concrete pipe joints shall be wrapped with filter fabric.

B. High-Density Polyethylene Pipe (HDPE): Pipe shall comply with the requirements of ASTM F2648 and shall have a smooth interior and annular exterior corrugations. Joints shall be watertight in accordance with ASTM D3212 with gaskets meeting the requirements of ASTM F477. Gaskets shall be installed by the manufacturer and covered with a removable, protective wrap to ensure gasket is free from debris. Pipe shall have a reinforced bell with a polymer composite band. HDPE fittings shall comply with the requirements of ASTM F2306. Material for pipe production shall be an engineered compound of virgin and recycled high-density polyethylene conforming with the minimum requirements of cell classification 435420C as defined by ASTM D3350.

C. Corrugated Metal Pipe and Pipe Arch (CMP & CMPA): Pipe shall be either bituminous coated steel pipe in accordance with AASHTO M36/ASTM A760 or polymer coated steel pipe in accordance with AASHTO M245/ASTM A762. Bituminous coating shall conform to the applicable requirements of AASHTO M190/ASTM A849. Polymer coated steel coils shall conform to the requirements of AASHTO M246/ASTM A742. Polymer coating shall be "Trenchcoat" by Dow Chemical, or approved equal. Pipe gauge shall be 14 minimum. Coupling bands for joining metal conduit shall comply with AASHTO M36/ASTM A760 and shall be fabricated from metal sheets of the same material and shall have the same thickness and coating as the conduit. All metal pipe joints shall be wrapped with filter fabric.

D. Ribbed Polyvinyl Chloride Pipe (RPVCP): PVC corrugated pipe and fittings with a smooth interior shall conform to the requirements of ASTM F949, Series 46 with UV inhibitors. Pipe and fittings shall be homogeneous throughout and free from visible cracks, holes, foreign inclusions or other injurious defects. Pipe shall be manufactured to 46 PSI stiffness when tested in accordance with ASTM D2412. The pipe shall be made of PVC compound having a minimum cell classification of 12454 as defined in ASTM D1784. To insure compatibility, the pipe manufacturer shall provide all fittings. All joints shall be made with integrally-formed bell and spigot gasketed connections. Gaskets shall meet the requirements of ASTM F477.

E. Polyvinyl Chloride Pipe (PVC): Pipe and fittings shall be Type PSM, SDR 35 with full diameter dimensions and shall conform to ASTM D3034. Pipe and fittings shall have bell and spigot push-on joints. The bell shall consist of an integral wall section with a solid cross-section elastomeric gasket securely locked in place to prevent displacement during assembly. Joints shall conform to the requirements of ASTM D3212 with gaskets conforming to ASTM F477.

F. Spiral-Ribbed Metal Pipe and Pipe Arch (SRMP & SRMPA): Pipe and pipe arch shall be manufactured to conform to the current AASHTO M246/ASTM A762 specification and shall be fabricated from polymer coated steel coil conforming to the current AASHTO M246/ASTM A742 material specification. The pipe shall have a helical corrugation pattern, and shall have the sectional properties per ASTM A796 (AASHTO Section 12.5.4.1 of the Highway Bridges Division 1) Design. All round pipe shall conform to the Type IR classification: Pipe with a full circular cross section, a singular thickness of corrugated sheet, fabricated with helical corrugations. All pipe arch shall conform to the Type IIR classification: Type IR that has been reformed into a pipe arch, having an approximately flat bottom. Coupling bands for joining metal conduit shall be fabricated from metal sheets of the same material and shall have the same thickness and coating as the conduit.

G. Corrugated Polypropylene Pipe (CPP):
1. Pipe shall be smooth interior and annular exterior corrugated polypropylene (PP) pipe meeting the requirements of ASTM F2764, ASTM F2881 or AAHSHTO M330 Type S (double-wall) or Type D (triple-wall).
2. Material for pipe and fitting production shall be an impact modified copolymer meeting requirements of ASTM F2764, ASTM F2881 and AASHTO M330.
3. The following shall be clearly marked on both the interior and exterior surface of the pipe:
    1) ASTM Specifications: ASTM F2764, ASTM F2881 or AASHTO M330, as appropriate.
    2) Class, size and wall.
    3) Date of manufacture.
    4) Name or trademark of manufacturer.
    5) Diameter of Pipe. The diameter indicating in the construction drawings shall mean the inside diameter of the pipe.
4. Water tight joints shall be bell and spigot meeting the watertight requirements of ASTM D3212. Gaskets shall comply with the requirements of ASTM F477. Gaskets shall be installed by the pipe manufacturer and covered with a removable wrap to ensure the gasket is free from debris. A joint lubricant supplied by the manufacturer shall be used on the gasket and bell during assembly.
5. Fittings shall conform to ASTM F2764, ASTM F2881 or AASHTO M330, with the exception of meeting the watertight joint performance requirements of ASTM D3212. Gasketed bell and spigot connections shall utilize a spun-on, welded or integral bell and spigot with gaskets meeting ASTM F477.

2.2 CATCH BASINS, AREA DRAINS AND JUNCTION BOXES

A. Catch basin lid and frame shall be cast iron or galvanized steel construction per details included in the Drawings.

B. Cast-in-place concrete, Class M as specified in Section 32 05 23.

2.3 BEDDING AND COVER MATERIALS

A. Bedding: If required, as specified in Section 31 23 17.

B. Soil Backfill from Above Pipe to Finish Grade: As specified in Section 31 23 17.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify trench cut and excavation base 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 fine aggregate.

B. Remove large stones or other hard matter which could damage piping or impede consistent backfilling or compaction.

3.3 BEDDING

A. Excavate pipe trench in accordance with Section 31 23 17 for work of this Section. Hand trim excavation for accurate placement of pipe to elevations indicated.

B. Place bedding material, if required, at trench bottom, level materials in continuous layer not exceeding 6 inches compacted depth.

C. Maintain optimum moisture content of bedding material to attain required compaction density.

D. Remove large stones or other hard matter which could damage piping or impede consistent backfilling and/or compaction.

3.4 INSTALLATION - PIPE

A. Install pipe, fittings, and accessories in accordance with ASTM D2321, ASTM A798 or manufacturer’s recommendations. Seal joints watertight.

B. Place pipe on bedding, if required, in accordance with Section 31 23 17.

C. Lay pipe to slope gradients noted on Drawings.

D. Pipe shall be laid with bell ends facing in the direction of laying and shall progress uphill.

E. Where ground water occurs, pumping shall continue until backfilling has progressed to a sufficient height to prevent flotation of pipe. Water shall be disposed of in such a manner as to cause no property damage or be a hazard to public health.

F. Refer to Section 31 23 17 for trenching, backfilling and compacting requirements. Do not displace or damage pipe when compacting.

G. Wrap pipe joints with a minimum 24 inch wide strip of filter fabric. Lap ends of fabric a minimum of 12” and securely band fabric to pipe at each end.

3.5 INSTALLATION - CATCH BASINS, AREA DRAINS AND JUNCTION BOXES

A. Form bottom of excavation clean and smooth to correct elevation.

B. Form and place cast-in-place concrete base pad, with provision for storm sewer pipe to be placed at proper elevations.

C. Establish elevations and pipe inverts for inlets and outlets as indicated on Drawings.

D. Form and construct cast-in-place concrete walls with sleeves at proper elevations to accept required storm sewer pipe.

E. Mount lid and frame and form/construct cast-in-place concrete top to proper elevation to ensure positive drainage as indicated on Drawings.

F. Grout all interior surfaces of structure as required to provide a watertight installation.

3.6 FIELD QUALITY CONTROL

A. Request inspection prior to placing backfill cover over pipe.

B. Compaction Testing: In accordance with ASTM D698.

C. When tests indicate work does not meet specified requirements, remove work, replace and retest.

3.7 PROTECTION OF FINISHED WORK

A. Protect pipe from damage or displacement until backfilling operation is complete.
   1. Take care not to damage or displace installed pipe and joints during construction of pipe supports, backfilling, testing, and other operations.
   2. Repair or replace pipe that is damaged or displaced from construction operations.

END OF SECTION